TESTS OF INTERNATIONAL CAPITAL MARKET INTEGRATION:

EVIDENCE FROM EMERGING STOCK MARKETS

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR

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Ao Jaime

Aos meus Pais

À minha Família

ABSTRACT

The central theme underlying my thesis is Emerging Stock Markets and my dissertation consists of three empirical essays regarding International Asset Pricing. I focus my research on emerging markets and stress how the new and extensive data provide additional insights on International Capital Market Integration and Portfolio Diversification issues.

My first essay tests whether an International Asset Pricing theory can account for the time-series as well as cross-sectional variation in discounts. I use an extensive new data set on US, UK and off-shore emerging markets' country funds. I find that changes in discounts are significantly and positively correlated with the fund's exposure to the world market factor but I find no significance for the underlying assets' exposure to the local market factor. The evidence is also inconclusive regarding the effects of barriers to free investment. Overall, my results suggest that segmentation of capital markets is insufficient to explain the time-series and cross-sectional variation in country funds' discounts.

My second essay examines how the dual-listing of emerging markets' stocks affects their valuation and studies the link between these effects and market segmentation. My empirical results are based on dual-listings of emerging markets' stocks on US and London exchanges. Firms experience significant positive abnormal returns before the listing date and a significant decline in returns over the first five weeks following listing. The valuation impact is similar across exchanges and more pronounced for emerging markets' firms. Overall, the results are consistent with the market segmentation hypothesis.

My third essay analyses the influence of industrial factors on the cross-sectional variance and correlation structure of country index returns for the particular case of emerging markets. In addition, I investigate, for each market, the role of a set of *a priori* specified factors in the cross-section of stock returns, and assess whether those factors are common to the universe of emerging markets. My sample consists of all the individual stocks composing the IFC emerging markets' indices. Country effects are the most important factors driving the behaviour of emerging markets' individual stock returns. A finer industry partition shows, however, that ignoring the industrial mix will lead to an important loss of diversification benefits. Furthermore, my results indicate that the most important pricing factors are common to emerging markets. Yet the payoffs to these factors are uncorrelated. Altogether, the empirical results are consistent with market segmentation.

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CHAPTER 1.

INTRODUCTION

In this chapter, I describe why I have chosen this thesis topic. After highlighting the importance of studying emerging stock markets, I uncover issues that seem to need further investigation. Next, I identify my general thesis topic and summarise each of the issues that I have investigated. For each of these research issues, I briefly explain the work that I have carried out and summarise my main findings. The chapter ends by presenting an overview of the dissertation.

1.1 MOTIVATION

Emerging markets have been at the centre of discussion and interest during the present decade.[1] The large increase in private flows to developing countries, and more specifically in portfolio equity flows, gives an idea of the magnitude and importance of these markets to the investment community of mature markets, and justifies by itself a close study of these markets and of how they differ from mature markets.

There is no comprehensive theory that describes how financial markets interact with economic activity and about the impact of financial markets on economic growth. Yet financial markets seem to play an important role in capitalist economies by facilitating intermediation between savers and investors. Financial markets' development drives economic growth by providing a more efficient allocation of resources: the healthy functioning of these markets leads to an increase in saving rates and investment rates, and promotes economic growth.

Many of the developing countries are still in their early stages of financial development. A clear understanding of how their stock markets work and mature, will undoubtedly be of interest to all agents in these economies. Specifically, one needs to know how assets are priced, what is the impact of trading systems and regulations, what are the effects of accessing international markets, and, in general, what are the outcomes of the different strategies in opening up financial markets. Knowledge about these

[1] A precise definition of emerging markets does not exist. Here, I consider as emerging markets all stock markets in developing countries as defined by the World Bank. The World Bank classifies low and middle-income economies as those with a GNP per capita level of less than US \$ 725 and less than US \$ 8 956, respectively. Chapter 2 addresses this issue in more detail.

processes of development may also prove useful to other countries where the process of financial liberalisation is far behind; for example, Eastern European countries.

The literature on emerging markets is quite recent and followed the interest by the investment community and the availability of reliable data. Except for a few papers in the late 1980s, most of the literature dates from the 1990s. Most of the studies have concentrated in replicating some international asset pricing tests that had been done for mature countries, using usually market index data.

The core issue analysed by these papers is whether emerging stock markets are financially integrated with the more mature markets, that is, whether prices in emerging markets follow the same pricing rule as mature markets' prices do. The fall in formal barriers, the improvement of regulations, the ease of procedures and cheaper access attracted foreigners into these markets. This foreign direct presence together with the launch of country funds and the increasing importance of international listings and international equity offerings from emerging markets' firms definitely changed the structure of market segmentation.

The literature has made use of two different approaches to appraise the new pricing rule:

- tests of asset pricing equilibrium models (that incorporate barriers to international investment or not). The fit of the data is understood to give information about the degree of segmentation of a particular market.

- tests of the law of one-price. The rationale behind these tests is that, when markets are integrated, two assets that generate the same stream of cash flows should have the same return. These tests use individual assets' data; for example, returns on country funds, dual-listed stocks or different classes of stocks of the same company. Static tests compare and model the returns across countries or clienteles: different return-generating processes give support to the hypothesis of market segmentation. Dynamic tests are usually event studies that measure the impact of a particular liberalisation measure on expected returns: significant abnormal returns indicate that the investment frontier has shifted and that financial markets have moved into in a different degree of integration.

Most of the empirical evidence has found support for the hypothesis that emerging markets are partially segmented with the world market. It is possible to reject the null hypothesis of complete segmentation as well as that of complete integration. Results suggest that emerging markets, on average, have become more integrated. The dismantlement of barriers to investment flows seems to affect prices but there is only weak evidence of a direct relation between the degree of segmentation and the severity of barriers. There is scope for research on this issue, in particular, to establish links between the results obtained for the different emerging markets and the existing barriers and other institutional features that characterise each particular market.

A large number of studies have focused on quantifying the benefits of international diversification in emerging markets. All these studies show low correlation between mature and emerging markets' returns and provide robust evidence of the large benefits of emerging markets' diversification thanks to improved risk-adjusted performance.

Contrary to what happens with mature markets, very little is known about the main factors that drive the returns in emerging markets. After a decade of academic research on emerging markets, and if we exclude the research on country funds or dual-listed stocks and single-country studies, there are fewer than five studies that use individual security level data. Given the present debate in the major markets concerning the definition of the risk factors that play an important role in explaining the cross-section of stock returns, studies using extensive and new data sets may throw new light on these issues and identify what, if anything, makes emerging markets different from mature markets.

Finally, a set of papers describes the institutional features of emerging markets and documents the direct and indirect barriers to international investment in these markets.

Given the importance of a sound financial market to the overall economic growth of a country, I found it would be useful to study how these countries' stock markets work and progress. Furthermore, I found there were still several interesting unexplored or unanswered research issues respecting international asset integration.

1.2 CENTRAL ISSUES AND CONTRIBUTION

Emerging markets provide a good testing ground for the theories of international asset pricing. During the 1980s and also in this decade, several authors have derived asset pricing models to accommodate the effect of barriers. In these models, emerging markets' and mature markets' investors have different pricing rules and risk premia. Expected returns incorporate a super risk premium that reflects different investment sets and imperfect risk sharing for those local assets that are traded with restrictions. The pricing rule in each emerging market is associated to the degree of segmentation of that market, which in turn is a result of the barriers to free investment and the availability of free assets to mimic restricted assets.

The three essays that comprise my dissertation are tests of hypotheses that directly derive from these theoretical models. Using data from emerging stock markets, I provide further evidence on the validity of these pricing models and I try to explain the cross-country variation in the results based on proxies for the degree of segmentation. In addition, I compare the results I find for emerging markets with results previously reported for mature markets.

1.3 OVERVIEW

The central theme of my thesis is Emerging Stock Markets. My research uses new and extensive data from emerging markets to provide additional insights on International Asset Pricing (IAP) issues. My dissertation consists of three empirical essays. In the first two essays I test the law of one-price using two different tools: an extended data set of emerging markets' closed-end country funds and dual-listed stocks from emerging markets. My third essay sheds light on the cross-country correlations of returns between mature markets and emerging markets and identifies the important factors in the cross-section of returns for the particular case of emerging markets' stocks. These results help to understand what drives the cross-country correlation in returns and shed light on the debate about the determinants of stock returns. The three essays provide extended evidence on international capital market segmentation.

In my first essay I look at the behaviour of country funds' discounts in emerging markets. Closed-end country funds, unlike domestic closed-end funds, often sell at a premium from their underlying asset values in the long run. Closed-end country funds offer an attractive research design within which to examine international asset pricing theories: as a consequence of segmentation, investors have different pricing rules and risk premia across countries; therefore one would expect prices and net asset values (NAVs) to differ and that difference would change over time and across funds targeting different markets.

The theoretical models in International Asset Pricing have developed closed-form solutions where discounts/premia arise as a consequence of different pricing for the fund and for the underlying assets if three conditions are met:

- first, the assets of the fund are not spanned in the free world;
- second, cross border arbitrage is costly or impossible;
- and third, the price of risk is higher in emerging markets.

The main variables driving country funds' premia are the different degrees of risk aversion in the local and world markets and the different portfolios against which systematic risks are measured in the world and local markets.

The central issue of my first essay is to investigate whether an International Asset Pricing theory can account for the time-series as well as cross-sectional variation in discounts. I also investigate the role of noise traders' sentiment in explaining discounts for emerging markets' country funds.

I propose a return-generating process for fund discounts that depends on the unconditional covariances between the returns of the fund and the world and local emerging market returns and on the severity of barriers. The empirical literature on country funds has focused on testing the noise traders' sentiment explanation, analysing the time-series variation in discounts. I replicate the time-series analysis and then try to go one step further and explain the cross-section of expected returns for emerging markets' country funds. I restrain the analysis to emerging markets but I use extensive new data on US, UK and off-shore emerging markets' country funds - 105 funds over the period of August 1990 to August 1995.

My results show that fund returns are related to both local and world risk factors. Using panel data estimation, I find that changes in discounts are significantly and positively correlated with the fund's exposure to the world market factor, as expected, but I find no significance for the underlying assets' exposure to the local market factor. The evidence is also inconclusive regarding the impact of barriers to free investment on discounts. Overall, my results suggest that an IAP-based explanation is insufficient to explain the time-series and cross-sectional variation in discounts. Results regarding the investor sentiment hypothesis are mixed: I find that some country funds' returns co-move with small firms' excess returns and that country funds' returns are predictable from their recent past history.

In my second essay I study the valuation impact of emerging markets' dual-listings in international markets. Dual-listed stocks are useful instruments to test international capital market segmentation. An increase in value or a decline in the expected return of a stock after the listing date may be explained in the following way: if markets were segmented before the dual-listing occurs and if the dual-listed stock is unique, then dual-listing would mitigate segmentation by improving risk sharing. In the particular case of emerging markets, where barriers to investment are more severe, these effects should be more pronounced.

The change in the return characteristics of a firm that cross-lists on an international stock exchange can be related to issues other than international capital market segmentation. A public listing on a major exchange increases investor awareness and improves liquidity and both induce a lower required rate of return. Alternatively, post-listing returns may be low because managers of small firms, for which listing requirements may be binding, time their application for listing to when firms have recently performed well.

Previous literature has looked at the effects of foreign listings for the above mentioned arguments. The evidence provides support for investor recognition and liquidity as sources of value but is inconclusive regarding the market segmentation-based explanation. The goal of this essay is to provide more evidence regarding the valuation impacts of emerging markets' dual-listings in international markets, and to study the link between these effects and market segmentation. In addition, I compare the impact of US and London Stock Exchange Automated Quotation International (SEAQ-I) listings.

My empirical results are based on 70 international dual-listings from 10 emerging stock markets over the period of January 1991 to November 1995. Results show that firms experience significant positive abnormal returns before the listing date and a significant decline in returns over the first five weeks following listing. The valuation impact is similar across exchanges and more pronounced for emerging markets' firms. For mature markets' firms, only NYSE listings register an impact on value. The results are robust to different specifications for modelling returns and the inference conclusions are robust to a battery of parametric and non-parametric tests. In addition, I observe a significant increase in the world systematic risk parameters. The cross-sectional analysis identifies some economically and statistically significant coefficients for proxies of the International Asset Pricing determinants. Overall, the results are consistent with the market segmentation hypothesis.

My third essay examines the influence of the industrial factors on the cross-sectional variance and correlation structure of country index returns for the particular case of emerging markets. I look at different industry classifications and whether these results are the same when I use regions instead of countries. I subsequently investigate, for each market, the role of a set of *a priori* specified factors in the cross-section of stock returns, and assess whether those factors are common to the universe of emerging markets. I use new data on emerging markets' individual stocks obtained from the Emerging Markets Data Base.

With a sample of 364 weekly series for between 629 stocks in January 1990 and 1702 stocks in December 1996 from 26 markets, I show that country effects are the most important factors driving the behaviour of emerging markets' stock returns. Emerging markets' indices are mainly driven by country factors, as documented previously for mature markets, and cross-market correlation does not seem to be affected by the industrial composition of the indices. These results have important implications in regard to portfolio diversification: cross-market diversification seems to be a better bet than cross-industry diversification. The best strategy is to invest across markets and across industries. The very close second best is to invest across markets regardless of the elected industry. A finer industry partition shows, however, that ignoring the industrial mix will lead to an important loss of diversification benefits.

Furthermore, my results indicate that the most important pricing factors are common to emerging markets and these important factors are similar to those identified by the literature for mature markets. Among the top 6 factors are technical factors and price-level attributes. The payoffs to these factors are not correlated however, suggesting that, even if investors across markets elect similar factors to price assets, those factors' risk premia are local. Overall, the results seem to suggest that markets are segmented, and this is valid even if pricing factors are the same.

1.4 STRUCTURE OF THE STUDY

The dissertation consists of three parts. Part I provides a general overview of emerging markets and sets the scene for what lies ahead. Part II surveys the international asset pricing literature that backs up the three essays on international capital market segmentation that make up part III.

Chapter 2 presents some stylised facts regarding emerging markets. The chapter begins with a brief look at global capital markets trends over the last decade; next, I document the situation regarding the barriers to capital flows and I briefly describe emerging markets. I then compare the existing indices for these markets and I give an idea of the data I use in the dissertation. The chapter ends with a set of summary statistics for the returns of the emerging markets' indices as well as for the returns of the stocks that compose these indices.

Chapter 3 reviews the international asset pricing literature focusing on the topic of integration of international capital markets. A separate section is dedicated to research on emerging markets.

The issue of emerging markets' country funds pricing is discussed in chapter 4. After introducing the issue of country funds' premia, I present some stylised facts regarding country funds in emerging markets. Based on an international asset pricing model, I state the hypotheses to test and present the empirical methodology to do it. Next, I describe the sample used in this study and present some preliminary findings. Finally I report and discuss the results, and conclude.

Chapter 5 reports the valuation effects for dual listings of emerging markets' firms on international exchanges. After presenting some stylised facts on depository receipts, and reviewing the different strands of the literature that propose explanations to account for these effects, I define the test hypotheses motivated by the international asset pricing theory. I concentrate on the results for emerging markets and compare them with the effects for a control sample of listings from European stocks. In appendix, I provide detailed information on depository receipts.

Chapter 6 revisits the cross-country correlation structure of returns briefly addressed in chapter 2. After discussing the different proposed explanations for the low correlation of returns, I look specifically at the role of industry factors in this debate. Next, I evaluate, for each of these mature markets, the explanatory power of set of *a priori* factors, which are important in explaining the cross-section of stock returns in the major markets.

Chapter 7 summarises the conclusions from the three essays and draws the implications of the different results for international capital market segmentation. I close the chapter and the dissertation by referring to some research topics that I find need to be better studied or extended.

This introduction has presented the motivation for my dissertation studies, described briefly each of the specific issues here investigated, and provided a map for reading the thesis.

PART I : EMERGING MARKETS

CHAPTER 2.

EMERGING MARKETS

This chapter sets the scene for what lies ahead. First, I give information regarding global capital market trends over the last decade concentrating on emerging markets. Second, I describe each of these stock markets and the prevailing barriers to free investment. Third, I compare the information that is available for studying these markets. Finally, I present simple statistics on aggregate stock returns.

2.1 STOCK MARKETS AND ECONOMIC DEVELOPMENT

Financial markets play an important role in capitalist economies by facilitating intermediation between savers and investors. The better these markets work, the more likely it is that savers will be attracted to supply capital, thereby reducing its costs to investors. The main function of financial markets is thus allocation of resources. The healthy functioning of these markets leads to an increase in saving rates and investment rates and promotes economic growth.

There is no comprehensive theory that describes how financial markets interact with economic activity and the impact of financial markets on economic growth. Thus, it is not possible to assess exactly the merits of developing strong and diversified financial markets and their benefits for economic activity. Particularly relevant is the question of how financial markets are efficient at allocating resources.[2]

Both the endogenous growth literature and the financial structures literature see the creation of financial markets as a way to cope with liquidity and productivity risks. Productivity risk arises because firms are subject to productivity shocks. This productivity risk discourages risk-averse investors from investing in firms. Stock markets allow investors to invest in a large number of firms and thus diversify away productivity risk. Since more productive investments tend to be riskier, the risk-sharing provided by financial markets induces investors to shift their portfolios to higher return investments.[3] Liquidity risks have to do with privately observed liquidity shocks that oblige investors to consume their wealth before the firms in which they have invested, generate and

[2] Pagano (1993) refers to additional ways financial intermediation can affect growth: by raising the proportion of savings funnelled to investment and by affecting the saving rate.

distribute cash flows. Thus, the risk of receiving a liquidity shock and a premature liquidation may discourage firm investment. Stock markets may help agents to cope with this risk by allowing those who receive the liquidity shocks to sell their shares to other investors that have not receive those shocks.

Stock markets can, on one hand, raise the fractions of savings to productive investment and thereby accelerate growth. On the other hand, they ensure that capital is not prematurely removed from firms and increase willingness to invest in less liquid, more productive projects. Given that risk is reduced and technological innovation is not retarded, stock markets encourage investment and growth.[4]

Another role of stock markets has to do with information. Given that stock markets create more information about projects, they can guide investors' funds to better uses.

There is robust evidence that growth and indicators of financial development are highly correlated. However, the direction of causality and exactly how financial development enhances growth, is not clear. Furthermore, there are countries with similar levels of economic development and with varying relative sizes of stock markets' capitalisation.

Understanding what determines the emergence of stock markets, how they work and mature is certainly an important issue.

2.2 CAPITAL FLOWS

Over the last twenty years, the composition of capital flows to developing countries has changed dramatically. In the seventies, external financing was mainly from commercial banks to public borrowers. Following the debt crisis in 1982, most of the financing flows to developing countries in the 1990s targeted private borrowers and the source of lending has shifted from banks to non-banks.

At the end of 1996, Private Flows were US $ 244 billion out of the US $ 285 billion for aggregate net long term resource flows.[5] Back in 1989, Private Flows amounted to

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[3] Pagano (1993) shows that, in certain conditions, risk sharing can reduce the saving rate and at least partially offset the growth-enhancing effect of more productive investments. The final effect on growth is ambiguous.

[4] I do not compare here the various financial structures that can reduce risk and improve welfare above the non-financial market case. Please refer to Levine (1990) for a detailed comparison between equilibria under stock markets, banks and mutual funds.

[5] The main sources of public data on portfolio flows to emerging markets are the IMF and the World Bank. The main private sources of information are Euromoney/Euroweek, the International Financial Review, the Lipper Analytical Services (early data was from Emerging Markets' Fund

US$ 42 billion out of the US$ 85 billion for the aggregate flows. Official Grants and Loans is the category that has been loosing importance. Within the Private Flows, the largest source of funds is Foreign Direct Investment. Portfolio Flows have been increasing their share as well. The sum of bond and equity investment represented 38% of total private flows in 1996 against 12% in 1990. Within this category, Portfolio Equity Flows increased more than 14 times from 1990 to 1996, from US $ 3.2 billion to US $ 45.7 billion.

The main target region of Private Flows has been Asia. Portfolio Flows have changed direction over the years. At the beginning of the decade, Latin America markets were elected first. After the Mexican crisis at the end of 1994, the flows changed direction to Asia. The 1997/1998 crisis in Asia changed the direction of flows back to Latin America again.

Table 2.1 - Net Long Term Resource Flows to Developing Countries

Billion US $	1990	1991	1992	1993	1994	1995	1996
Total	**100.6**	**122.5**	**146.0**	**212.0**	**207.0**	**237.2**	**284.6**
Growth Rate	*19%*	*22%*	*19%*	*45%*	*-2%*	*15%*	*20%*
Private Flows	**44.4**	**56.9**	**90.6**	**157.1**	**161.3**	**184.2**	**243.8**
Growth Rate	*6%*	*28%*	*59%*	*73%*	*3%*	*14%*	*32%*
% Total Flows	*44%*	*46%*	*62%*	*74%*	*78%*	*78%*	*86%*
East Asia and Pacific	43%	37%	41%	40%	44%	46%	45%
South Asia	5%	3%	3%	4%	5%	3%	4%
Europe and Central Asia	21%	14%	24%	16%	11%	16%	13%
Latin America	28%	40%	32%	38%	33%	29%	30%
Africa	1%	1%	0%	0%	3%	5%	5%
Foreign Direct Investment	24.5	33.5	43.6	67.2	83.7	95.5	109.5
Portfolio Flows	**5.5**	**17.3**	**20.9**	**80.9**	**62.0**	**60.6**	**91.8**
Growth Rate		*215%*	*21%*	*287%*	*-23%*	*-2%*	*51%*
% Private Flows	*12%*	*30%*	*23%*	*51%*	*38%*	*33%*	*38%*
Portfolio Equity Flows	**3.2**	**7.2**	**11.0**	**45.0**	**32.7**	**32.1**	**45.7**
Growth Rate	-8%	125%	53%	309%	-27%	-2%	42%
% Portfolio Flows	*58%*	*42%*	*53%*	*56%*	*53%*	*53%*	*50%*

Note: Private Flows include net resource flows on debt (Bonds and Private Debt) plus non-debt-creating flows. This latter group includes net Foreign Direct Investment and Portfolio Equity Flows.

Source: World Debt Tables/Global Development Finance 1994-1997

Research) and Micropal (London). One of the major problems when analysing portfolio investment flows is to make compatible the estimates for flows with different definitions.

Two types of factors may explain this recent surge of private capital flows to developing markets: external factors and domestic factors.

Among external factors, I would like to emphasise three:

- the cyclical downturn in activity and the decline in interest rate in mature markets, namely in the US in the early 1990s;

- the very rapid growth of institutional investors, in particular mutual funds; and

- the financial deregulation that resulted in relaxation of limits in foreign exposure combined with the practitioners' recognition of the benefits of international portfolio diversification.

A mixture of domestic factors influenced the attractiveness of emerging markets. In general, all developing countries had been showing higher rates of economic growth and their governments seemed committed to stability and liberalisation. In addition:

- in the late 1980s, several Latin American countries were recovering from the debt crisis that drove away commercial banks. They seemed to have managed to restructure their commercial bank debt and reduced fiscal debits following sound macro-economic and tax reforms;

- most of these countries decreased the barriers on capital account transactions and currency convertibility, eased the rules regarding repatriation of profits, and opened markets and sectors to foreign investors;[6]

- most of these countries invested strongly in information and development of their stock markets, improving accounting rules and regulating systems and modernising financial infrastructures (settlement, clearance of stock trades, reduced taxes and fees on transactions);

- in many of these countries, governments have set important privatisation programs inviting foreigners to participate;

- finally, the liberalisation of stock markets and the modernisation of exchange practices and regulatory changes eased direct equity portfolio inflows. Many instruments came out, enabling investors indirect access where direct access was still too costly or forbidden. Initially, using country funds was the only way that foreign portfolio investors could acquire the shares of firms in developing countries. The IFC (International Finance Corporation) promoted the establishment of these funds by advising developing countries on legal and regulatory frameworks and by underwriting and investing in these funds. In

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[6] During 1991-1993, 11 developing countries undertook full or extensive liberalisation of their exchange controls on portfolio outflows, 23 liberalised controls on foreign direct investment and 15 eased restrictions on portfolio inflows (source: IMF). See below in this section for detailed information regarding the removal of formal barriers in these markets.

the early 1990s other channels became available with special reference to depository receipts (ADRs and more recently GDRs).[7] Large companies were able to issue equity that was underwritten and distributed in multiple foreign equity markets. Most of the largest recent issues have been in conjunction with privatisation processes.

This strong expansion of private financing to developing countries reflects a significant broadening of the investor base, namely a more active participation by institutional foreign investors. In the past, Asian countries attracted little investment and Latin America received inflows only from flight capital investors and wealthy individuals. Starting in late 1992, some US pension funds began to invest in Latin America (mainly in Brady bonds). In 1992, US investors owned 73% of Latin American securities, owned by foreigners, against 16% for UK investors. Asian securities held by foreigners were divided with 50% for US investors, 21% for Japanese investors and 15% for UK investors.

Table 2.2 - Percentage of Foreign Equity Flows of Industrialised Countries Invested in Emerging Markets

	1990	1991	1992	1993
All Emerging Markets	12%	10%	15%	16%
Asia	1%	2%	2%	3%
Europe and Central Asia	1%	1%	1%	2%
Latin America	11%	8%	1%	11%
Africa	0%	0%	1%	0%

Source: IFC; IMF.

The trend towards international diversification was aimed, at first, at mature markets and only during the 1990s at emerging markets. Emerging markets' share is, however, still very small.[8] Chuhan (1994) reports that, for example, US mutual funds' and pension funds' holdings of foreign securities represented, respectively, 10% and 6% of their total assets in 1993. Only 16% of foreign equity investment flows were invested in emerging markets (up from 1.2% in 1989). In 1993, US open-end mutual funds held about 2% of their assets in emerging markets (around US$ 30 billion) mainly as equities (source: Morningstar). US pension funds and insurance companies allocated an even smaller share to emerging markets. These small holdings could result partially from the prudential

[7] American Depository Receipts and Global Depository Receipts.

[8] In absolute terms, the US institutional investors held about US$ 400 billion foreign securities in 1993.

limits on the ability to invest in foreign assets these institutions have to face.[9,10] Yet these constraints do not appear to be binding so far for most of the institutional investors (Chuhan, 1994).

Table 2.3 - Institutional Investors' Holdings of Foreign Securities

	1990	1991	1992	1993
Pension Funds				
UK	18%	21%	22%	20%
US	4%	4%	5%	6%
Memo: Total Assets, Billion of US $				
UK	583.6	642.9	670.5	695.7
US	2257.3	3070.9	3334.3	3571.4
Life Insurance Companies				
UK	11%	12%	13%	12%
US	4%	4%	4%	4%
Memo: Total Assets, Billion of US $				
UK	447.9	516.7	574.7	619.3
US	1367.4	1505.3	1624.5	1784.9
Mutual Funds				
UK	37%	39%	38%	36%
US		7%		10%
Memo: Total Assets, Billion of US $				
UK	91.5	104.4	91.2	141.3
US	1066.9	1348.2	1595.4	2011.3

Source: Chuhan (1994); UK CSO; US Federal Reserve System; IMF.

Pension funds and insurance companies tend to rely on specialised fund managers to select investments in emerging markets. Consequently, the most common way to invest in emerging markets has been to purchase shares in a country fund. By the end of 1995, the number of country funds targeting emerging equity markets has increased from 91 in 1988 to 1254 in 1995. These funds managed around US $ 110 billion.

[9] Insurance companies have even tighter rules: they generally have ceilings on the amount of foreign assets in their portfolios and are subject to restrictions on the share of equities in total assets. More detailed information is available upon request.

[10] 25% of the main US institutionals - profession's pension funds - are not allowed to invest in stocks that do not have a full listing on the NYSE (level two or three ADRs or ordinary listing for Canadian firms). A further 50% may accommodate foreign shares only in the form of ADRs.

Table 2.4 - Emerging Markets' Equity Country Funds

	1990	1991	1992	1993	1994	1995
Number	225	290	449	557	954	1254
Net Assets, Billion US $	13.3	19.2	29.5	72.8	109.3	108.8
Growth Rate	*34%*	*44%*	*54%*	*147%*	*50%*	*0%*
Global	17%	20%	26%	34%	32%	33%
Asia	69%	60%	56%	53%	51%	52%
Latin America	11%	18%	15%	13%	15%	12%
Europe	2%	2%	1%	1%	1%	2%
Africa	0%	0%	0%	0%	0%	1%

Source: Lipper Analytical Services; Emerging Markets Fund Research; Micropal; IMF.

The demand for country funds has been reduced recently for those developing countries where it is now possible for foreign investors to invest directly in their emerging stock markets or when depository receipts are listed in their home market. Nevertheless, investors have continued to invest through country funds in countries where domestic laws make it difficult or costly to invest directly.

Equity placements in the international capital market have also registered a huge growth. Most international equity placements have been from Latin American and Asian firms (with special emphasis for Mexico, Argentina, China and recently India). Many of these emerging markets' firms have used American Depository Receipts (ADRs) to raise capital. In addition, even a larger number of firms have targeted international exchanges to list their existing shares.

Table 2.5 - International Equity Issues from Emerging Markets

Billion US $	1991	1992	1993	1994	1995
Developing Countries	5.4	9.3	11.9	18.2	11.2
ADRs Share	44%	31%	62%	77%	49%
% Total International Issues	35%	41%	35%	37%	25%

Source: Euroweek; Financial Times; International Financing Review; IMF.

This brief set of stylised facts shows how much has changed in these markets. Undoubtedly the increasing importance of foreigners in these markets must have had some impact on the structure of their capital markets. These figures call thus for an investigation into what changes occurred in equity pricing. The presence of international investors does not mean by itself that markets are integrated: it is likely that local investors are still responsible for marginal pricing. Thus, even if increases in foreign portfolio flows and access to international markets may have partially dismantled segmentation, one should observe now an intermediate pricing structure between complete segmentation and integration.

The surge in foreign capital flows was facilitated by the removal of barriers to free investment. The next section describes emerging stock markets and documents the main barriers faced by international investors.

2.3 EMERGING STOCK MARKETS: DESCRIPTION AND BARRIERS TO FREE INVESTMENT

The previous section gave an outlook of the capital flows, in particular equity flows to developing countries in recent years. The large increase in capital flows is, itself, a very good indicator of how these markets have liberalised and developed. Investors have invested in these stock markets because they were able and willing to do so, thanks to the dismantlement of barriers, both formal and informal. But, as is often emphasised in the integration/segmentation literature, the existence of formal barriers does not mean that a market is segmented and vice-versa. Binding and effective barriers are the true cause of segmentation.

This section characterises the environment of emerging markets during this decade. I first provide detailed information on the aggregate market activity (on features like size, turnover and importance of stock markets in the local economies) for the emerging markets studied in this dissertation. I then highlight some features of these markets. I give special emphasis to the information regarding barriers to free investment.

2.3.1 AGGREGATE MARKET ACTIVITY

There are different views on what the category "emerging stock markets" include. The most popular definition is the one by IFC that considers all stock markets in developing countries to be emerging stock markets. The investment community looks at emerging markets as an asset class. The information below will shed light on whether it makes sense to consider emerging markets as such.

Table 2.6 shows some aggregate market activity facts. By the end of 1996, six emerging markets (Malaysia, Taiwan, South Africa, Brazil, Korea and India) were among the first 20 in the world ranking of market capitalisation. Emerging markets accounted for 11% of the total world market capitalisation up from 7% in 1990. The emerging markets' share in terms of value traded was similar. These percentages are, as yet still below the 18% these countries represent in terms of GNP. In terms of the number of firms, emerging markets have a much larger quota, around 50%, reflecting the fact that the average size of firms in mature markets is much larger than that in emerging markets. Still, in 1996, there are three emerging markets (Taiwan, Mexico and Brazil) in the top 20 markets, when ranked by average company size.

As was noted before, emerging markets have been playing an increasingly important role in global markets and this results both from the growth of the existing markets and from new-born markets. The International Monetary Fund policy of supporting liberalisation, the predominant liberal doctrine in the developed world, and the lack of success of alternative market structures, have surely been incentives for the development of the stock markets in these countries, with explicit support from local governments.

Table 2.6 - Selected Features of Emerging Stock Markets

Billion US $	1990	1991	1992	1993	1994	1995	1996
Number of Firms							
World	29189	29551	31404	32385	36038	38740	42404
Emerging Markets	12866	13352	14467	15412	17613	20133	22263
Share	*44%*	*45%*	*46%*	*48%*	*49%*	*52%*	*53%*
Market Capitalisation							
World	9399	11295	10835	13963	15124	17787	20178
Emerging Markets	615	862	913	1637	1915	1931	2226
Share	*7%*	*8%*	*8%*	*12%*	*13%*	*11%*	*11%*
Turnover							
World	5514	5020	4787	7190	8822	10218	13598
Emerging Markets	900	616	637	1099	1665	1043	1587
Share	*16%*	*12%*	*13%*	*15%*	*19%*	*10%*	*12%*
GDP							
Emerging Markets					4264	4648	
Share					20%	18%	

Source: IFC.

What characterises emerging markets? What do their underlying economies have in common and what makes them different from mature markets? The economies of the emerging markets covered by IFC have very different features. These markets include high-income countries, like Taiwan, with GNP per capita of over US $ 12000, as well as poor countries, like Nigeria, with per capita income levels at below US $ 300. If we look at real growth of GNP, over the period 1985-1995, the range varies between -2.8% for Jordan to 8.4% for Thailand. Only eight out of the twenty-six markets show an average growth above 2% and only five above 3%. If we take the average inflation, emerging markets include countries with very high price inflation, countries with low inflation and countries with moderate rates of inflation. When looking at the importance of trade (exports plus imports) in GNP, we continue to observe a wide range of values: there are countries like Malaysia, where trade represents over 194% of its GNP, while there are others, like Brazil, where external trade accounts for only 15% of the yearly national income. This heterogeneity is sometimes found even at a regional level. Yet, over the most recent period, all countries show real growth of GNP and the cross-markets average doubles the one observed for the ten year period.

Some of these stock markets play an important role in the economies, and have significant turnover, like Malaysia, South Africa and Taiwan, while others seem to be still emerging. Market capitalisation in 1996 ranged from US $ 3.6 billion, in Nigeria, to US $ 307 billion, in Malaysia. Traded value figures across markets are also very different: the turnover ratio is, for example, 3% in Jordan, and above 100% in four markets. The number of firms in each market varies widely, from 45 in Hungary to 8800 in India. Many of these markets are very concentrated: at the end of 1996, in nine out of twenty-six markets, the ten largest stocks represented a share of over 50% of total market capitalisation and in eleven out of the twenty-six markets, the ten most active stocks accounted for more than 50% of the total value traded. All Latin American markets show this level of concentration but, for Asian markets, the concentration is only high for the smaller markets.

Table 2.7 - Market Ratios: Emerging Stock Markets vs. World

	1995	1996
Turnover		
World	62%	72%
Emerging Markets	54%	76%
Price-Earnings Ratio		
World	21.3	22.4
Emerging Markets	20.0	18.1
Price-Book Value		
World	2.4	2.7
Emerging Markets	1.7	1.8
Dividend Yield		
World	2.2%	2.1%
Emerging Markets	2.2%	1.9%
Average Stock Size		(US $million)
World	459	476
Emerging Markets	96	100

Source: IFC.

Note: The figures for emerging markets and the world refer, respectively, to the IFC Global Composite index and to the MSCI World index.

A common trend for almost all markets is the increasing importance of their stock markets. With the exception of South Korea, the market capitalisation over the national product has increased. The cross-markets average of this ratio has doubled from 26%, in 1990, to 53% in 1996.

The valuation ratios in these markets are not very similar. The average market value of firms listed on the stock exchange also differs significantly showing that there are different company-dimension structures in the underlying economies.

Table 2.7 compares some other aggregate market statistics for the world and emerging markets. Except for the average stock size, there are very few differences.

2.3.2 Individual Markets Description and Barriers to Free Investment

Descriptions for each of twenty-six emerging stock markets are available upon request. These include an overview of the structure and dimension of each stock market, what are its main players, investors and regulators, how trading occurs and how the back office systems work. I pay special attention to barriers to free investment and to the different vehicles investors have used to invest in these markets.

There is greater variation in the manner in which these markets are organised and regulated, in the trading mechanisms they use and, especially, in the policies instituted to provide access to foreign investors. Figure A.1 in appendix illustrates the situation of these markets in terms of some selected features.[11] Table A.2 in appendix summarises the formal barriers in these markets as of the end of 1996. Barriers can be classified into direct barriers, like general inflow or outflow restrictions, general or sector specific ownership restrictions, exchange rate restrictions and differential taxation; and indirect barriers arising from differences in information, transaction costs, or accounting standards.

It is unfeasible to summarise the information provided because there seem to be very few regularities. Here are some general considerations on these diverse realities:

- Most of the markets now have in place an automated trading system and have improved the supporting services. This last development is very recent and is only finely tuned for a few markets.

[11] IFC has created an investability index that captures, for each stock, the barriers of free access by foreigners (general, sector or company ownership restrictions and exchange and repatriation restrictions). The comparison of figure A.1 with a plot of the average value of the investability index across markets shows that, in general, the index seems to be a good proxy for the severity of barriers in these markets.

- The main problem seems to reside on market regulation - information disclosure, investors protection and, in general, control of illegal behaviour like manipulations and insider's trading. Most of the times, the authority and law are in place, but the players in the market keep on breaching the regulations and enforcement of the law is difficult because of lobbying.

- Overall, liberalisation measures focused on inward investment. Outward investment is still strictly regulated in many of these countries or has only been liberalised in very recent years.

- The liberalisation has been intense but many of these markets still have formal barriers. It is not possible to define a precise date of liberalisation: this is a slow continuous process.

- The presence of foreigners and the severity of formal barriers do not share a one-to-one relation and there is not necessarily entry of investors following the removal of barriers. Informal barriers could be the reason for this.

- There are several criteria that can be used to categorise these markets. If we take size, there are three main categories of markets. The first category includes large markets with an important role in the economy. Most of these larger markets, have at least a small participation of foreigners irrespective of the severity of barriers. At the same time, in most of these markets, the participation of local investors is also important. With one or two exceptions, these are usually the most sophisticated markets and informal barriers are usually low. The second group includes markets that emerged in spite of little local participation and their growth seems to have resulted from the participation of foreigners and the important efforts of modernisation and regulation. Finally, there is a set of very small markets that are yet to emerge. There seems to be no relation between the size of markets and the severity of barriers: whatever the size, it is possible to find a range from completely free to almost closed markets.

- The importance of vehicles like international listings and country funds seems to result from the regulations in those markets. Yet if country funds are or were important when direct investment into those markets was not possible, international listings are always important irrespective of the severity of barriers, as long as companies are allowed to issue securities, and obey the listing requirements, of international exchanges. Thus, even if most of these markets have the presence of foreigners and even in the cases where locals are very active, firms seem to prefer listing on international markets, where they can optimise risk sharing, and offer securities in venues with greater liquidity and complete information.

As I focus on stock markets, I do not capture other sources of risk that may lead to segmentation. I may have touched important aspects, like market risk, related with the barriers on information or market regulation. I have covered some aspects regarding foreign exchange and capital controls but I have not documented political and other expropriation risks, inflation, exchange rate volatility, industrial portfolio and its economic viability or sensitivity to global shocks. Country credit risk works as a barrier and could drive international investors away from these markets. These ratings result from a semi-annual survey of leading international banks and have been published by "Institutional Investor" since 1979. For most of the emerging markets, country credit risk has decreased in recent years, even if very slightly. Again, there is a wide variation in this measure across markets. In 1996, the rating ranged from 15 for Nigeria to 70 for Taiwan.

2.4 EMERGING MARKETS' INDICES AND DATA

The previous sections have described the reality of emerging markets in recent years. This section describes the indices available to study the behaviour of returns in emerging stock markets. Special attention was given to IFC indices, the ones used in the empirical analyses that follow. I briefly describe these indices' methodology, coverage and composition, and I present an overview of the data used in the dissertation.

2.4.1 INTERNATIONAL AND LOCAL INDICES

There are four important attributes a well constructed index should have:

- it should accurately reflect the performance of local markers, i.e., it should have a high level of tracking;
- it should allow the replication of that index, i.e., their constituents should be investable;
- it should reflect the industrial structure of the underlying market allowing for the decomposition of the broad index into separate industry indices;
- finally it should have enough history to provide investors information on the past performance of the market.

Narrow or broader indices are, of course, more or less valuable depending on the purposes they are used for. A global index, since it represents the entire market, is the best indicator to use if one wants to measure the overall performance of a market. An investable index, on the other hand, that includes only companies that are to a certain degree investable for foreign investors, may be more suitable as a performance benchmark for foreign investors.

An index is a simple or weighted arithmetic average of its constituents securities' prices or returns. Capital changes (rights, dividends, share issuance and repurchasement) have to be adjusted for. The weights can be as diverse as market capitalisation, value traded, free floating or GDP.

Currency hedging is also an important issue when choosing an index. Unhedged indices, by converting foreign equity prices into the reference currency at the spot exchange rate, measure the performance of a portfolio that is completely exposed to foreign currency movements. In contrast, local indices give a measure of the stock price effects in that particular country. Hedged indices are a third alternative and they incorporate the results of real currency hedging strategies (for example, Morgan Stanley Capital International uses thirty-day forward rates to compute hedged indices for developed markets).

Index series may reflect price movements only or may include dividends in order to measure total returns. Taxes may complicate the use of total returns. A gross dividend series is usually the best choice if one needs to compare the level and trend of total returns across various countries.

International equity indices provide information on the level and trend of international stock markets. International indices are specially valuable when local indices cannot be used because of lack of reliability, or when the wide differences in methodologies used in constructing local indices make the comparison very difficult across countries. In the particular case of emerging markets, two other factors play against the use of local indices: the choice of a "correct" foreign exchange rate and the choice of the "correct" free interest rate.[12] When severe controls exist on either exchange rates or money markets, translating local indices returns in a common currency may be misleading.

Most emerging markets have local stock market indices which are usually calculated by the local stock exchange or by a leading local bank. Table 2.8 gives a broad idea of how local indices differ in terms of coverage across markets. There is no uniformity among these indices with regard to scope or methodology. When we look at the behaviour of these indices' returns and compare it with the international indices, we find, as expected, that the series of returns for the local indices, show low or high correlation with the series for the international indices depending on each particular index.

There are three main sources for international emerging markets' equity indices:

- the Morgan Stanley Capital International (MSCI);
- the ING Barings' Securities; and
- the International Finance Corporation (IFC), World Bank.

[12] In countries with huge inflation rates, there are times when only overnight rates reflect the true market conditions.

Table 2.8 - Local Indices vs. IFC Indices: Coverage

% Total	IFCG	Local Indices
Number of Firms		
Average	20%	55%
Range	1-45%	3-100%
Market Capitalisation		
Average	60%	89%
Range	40-79%	60-100%

Source: IFC; Stock Exchange Reports.

Note: The figures above are time-series averages for two cross-sectional statistics, median and range interval, over the period 1992-1995. The figures for local indices are based upon the availability of information. For example, the market capitalisation figures refer to only 11 markets.

Each of these institutions produces global and investable indices (composite, regional and "pure" country or national indices). All these indices are value-weighted portfolios that represent a substantial amount of the market capitalisation within each market. Overall the computation methodologies are quite close.

IFC has the most comprehensive indices and that is still true if one looks at the coverage country by country. The main differences between the three families of indices are mainly related to different assumptions about the extent to which markets are accessible to foreign investors and to which individual stocks are available to foreigners.

While there are differences in the indices regarding their scope and coverage, there is little difference in the behaviour of the indices' returns, at least over long periods. For example, when comparing the behaviour of two different composite indices, over the last eight years, the IFC Global (IFCG) total return index and the MSCI Global (EMG) total return index, I found very similar numbers for the indices' average and volatility. The correlation between the two different types of indices is very high. The correlation coefficient obtained using monthly returns is 96%. Other studies found similar correlation using different time periods and return horizons, looking not only at composite indices but at the complete set of national indices.

The IFC indices present the longest series and the most comprehensive coverage among the three international indices available. Some local indices are more representative of the underlying market but, besides other limitations, these indices are not directly comparable with each other. Given that in all the three essays I conduct cross-sectional analyses, I have elected the IFC indices in my empirical studies. The next section describes these indices in detail.

2.4.2 IFC INDICES

International Finance Corporation (IFC) is a member of the World Bank group and is the world's main source for statistics on stock markets in emerging markets.[13] IFC started collecting information in 1975 and presently covers over forty markets and around 2000 stocks.

IFC has no predetermined criteria for selecting an emerging market for IFC index coverage. In practice, most markets added had at least thirty to fifty listed companies with market capitalisation of around US $ 1 billion and annual value traded of around US $ 100 million at the start of IFC index coverage.

The IFC Global and the IFC Investable indices are the most important categories of the IFC family of indices[14]. They have many features in common. Both types of indices are market capitalisation weighted, use period data linked by chained Paasche method and are adjusted for stock splits, stock dividends, rights issues, new issues of stock and the addition or deletion of the constituents. They are available on a price only (transaction closing price) and a total return basis (gross cash dividends);[15,16] in local currency and in US $ terms.[17] The indices use end-of-week and end-of-the month data. There are individual country, composite, regional, sector and industry indices.

The IFC Global Indices (IFCG)

These indices are the core of the IFC family of indices. All the constituents of the IFC Industry and IFC Investable indices are selected from the constituents of the IFC Global indices. Please see below for more information about these constituents. IFCG indices are intended to represent the performance of the most active stocks in their respective stock

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13 Please refer to footnote 1.

14 For more details, see the "IFC Indices - Methodology, Definitions and Practices", 1996.

15 The last transaction price is carried forward if a stock did not trade on the index date; IFC will not substitute bid-offer prices and only main board prices are used. IFC does not use foreign prices or grey market prices. When a country has more than one exchange, IFC has chosen the most liquid market. Please refer to the "IFC Indices - Methodology, Definition and Practices", 1996, for more information.

16 IFC assumes dividends are reinvested across the entire index portfolio in proportion to the capitalisation of all stocks in the index.

17 IFC uses spot exchange mid-rates given in WM/Reuters exchange rate service since October 1994. In the absence of a legal market determined rate (commercial inter-bank bid and offer quotes), IFC uses the official rate.

markets and to be the broadest possible indicator of market movements. The IFCG index stock selection guidelines are based mainly on liquidity and tracking criteria:

- trading activity: "the stock must have traded frequently during the review period and it must have reasonable prospects for a continued trading presence in the stock exchange";

- market capitalisation: the target coverage is between 60% and 75% of the market capitalisation;

- (secondarily) industry diversification.

Starting in January 1996, IFC began adjusting the capitalisation of the index constituents to eliminate cross-holdings. IFC does not consider the limited float index constituents may have.

Monthly indices are available from the end of 1975 and weekly indices from the end of 1998.

The IFC Investable Indices

The IFCI indices were included, starting in 1988. The constituents of these indices are a subset of the IFCG index which IFC has determined to be "investable". The pre-requisites to include this index are the following:

- the market has to be opened to foreign investors: there can be no constraints on income or capital repatriation and the extent to which foreigners can sell and buy is taken into account;

- when foreign institutional investors are allowed to invest in listed shares, IFC investigates each individual security limitations (corporate or industry-related) on foreign ownership and creates a variable called "the degree open factor", with a value from zero to one, that indicates the amount of the security foreigners may legally hold.[18] Each stock's market capitalisation is then adjusted by its degree open factor;

- once IFC identifies the IFCG securities that are technically open to foreign institutional investors, it applies two additional criteria to select the stocks: a year average minimum investable market capitalisation of US $ 25 million or more; and a value traded of at least US $ 10 million over the prior year.[19]

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[18] Many markets also set limits on the amount of company capital a single foreign portfolio investor may hold, and separate limits on the amount that all such investors may hold collectively.

[19] There are some exceptions to these rules. A security can also be included in the following cases:

The IFC Industry Indices

There are IFC sector and industry indices. These indices are prepared only on a composite index basis. IFC computes nine sector indices and over 60 industry indices for both the IFCG and the IFCI index series. These indices are available in US $ and IFC has adopted the SIC (Standard Industrial Code) list from the Standard and Poor's Register to identify the business sectors in which companies operate.

The IFC Tradable Indices

The last indices launched by IFC were the IFC tradable indices - the IFC 100, the IFC Asia 50 and the IFC Latin 50 indices. These indices consist of the largest and most liquid stocks in IFC index markets. They are constructed from the constituents of IFCI indices and cover 114 stocks and 13 emerging markets.[20] The narrower Asia 50 and Latin 50 track their respective regional indices. The indices are calculated daily in US $ terms. The base date for the IFC Tradable Indices is January 1993.

IFC Coverage

In 1996, the IFC Global Composite index aggregated 1705 constituents from 26 markets with a total capitalisation of US $ 1043 billion. Back in 1992, IFCG Composite included 839 firms from 20 markets with a market capitalisation of over US $ 400 billion.

In terms of market capitalisation, and as of the end of 1996, the IFC indices' coverage was, in general, above 40% except for China and South Africa. The coverage over time has been stable and for most countries, it fluctuates between 40% and 70%. When one looks at the number of firms, the scenario is very different. Except for two or three small markets (Jordan, Nigeria and Poland), the average coverage is well below 30%.

- if the investable market capitalisation does not meet the minimum, but the security traded is more than US $ 100 million over the last year;
- for small emerging markets, IFC calculates an index with the five more liquid stocks open to foreign portfolio investment, called the " 5 stock minimum rule";
- very large new listings.

[20] Argentina, Brazil, Chile, Mexico, Venezuela, Korea, Taiwan, India, Indonesia, Malaysia, the Philippines, Thailand and Turkey.

IFCG Country and Industry Composition

Some markets are represented by many firms (a range that goes from 18 for Venezuela to 180 for China) but most of these firms are very small. Notice, for example, that China has the largest number of firms but accounts only for 4% in terms of the emerging markets' aggregate market capitalisation. In contrast, Taiwan has only 90 constituent firms but accounts for around 15% of the emerging markets' aggregate market capitalisation. Results are similar for industries. For example the Transportation, Communication and Utilities sector seems to be dominated by large firms: the number of firms, 136, represents only 8% of all emerging markets' firms, but, in terms of market value, those same firms account for around 18% of the aggregate market capitalisation.

In 1996, for 20 out of the 26 markets, the indices are concentrated in two or three sectors (out of the 9 SIC broad sectors) that account for more than 80% of the total market capitalisation. Moreover, three sectors dominate in all markets: Manufacturing (present in all the 26 markets); Transportation, Communication and Utilities (in 21 markets) and Finance, Insurance and Real Estate (in 20 countries). For the IFCG Composite index these sectors represent respectively 33%, 18% and 27% of the total market capitalisation (49%, 8% and 19% in terms of the number of firms). Similarly, the geographical composition of the Industry IFCG indices reveals that some sectors are completely dominated by one market and several sectors do not have constituents from all markets. This is the case, for example, with Agriculture, Forestry and Fishing where Malaysia dominates with 68% of the total market capitalisation and 39% of the total number of firms.[21] South Africa, for example, dominates Mining with, respectively, 38% and 29% of that industry aggregate market capitalisation and of the total number of firms.

2.4.3 Data in this Dissertation

While there are now substantial data sources in terms of market indices, there are still very few vendors providing consistent information on individual stocks. IFC has the most comprehensive data set on individual stocks: the Emerging Markets Data Base (EMDB). This data set has comprehensive information and statistics on stock markets in developing countries. The database provides three levels of data:

- comprehensive data on individual stocks in all markets;
- comprehensive data series for each index;
- extensive information for each market covered.

Besides some proprietary data, that is only available at substantial costs, there are two or three commercial vendors that provide individual stocks' price information. For example, Datastream and Bloomberg provide information on a subset of stocks from emerging markets. These are usually the largest and most liquid stocks, whose firms often have their shares listed as depository receipts on international markets. The main problem with this data is that, besides the small number of firms followed, only short, recent series are available.

In my first essay, I use data from Micropal both for country funds and the corresponding net asset value (NAV) series. This is monthly data and I describe the Micropal data set and the sample data in chapter 4. The local return series, for the firms that listed their shares on international exchanges, were downloaded from Datastream.[22] These are weekly returns and again, the sample data is described in detail in chapter 5. Finally, the individual stock returns' series I use in my last essay are from EMDB. Below, I present some descriptive statistics for these stocks' returns weekly series. Chapter 6 covers other aspects of the data.

The use of monthly or weekly data was dictated by data availability together with the requirements of the methodological analyses.

I use IFCG indices returns in US \$ or in local currency unless otherwise stated. I use MSCI and FT/S&P-A indices in US \$ for the mature markets' and the world's returns, respectively for monthly and weekly data.[23] The Morgan Stanley Capital International World Index (AC) covers around 60% of a broad range of markets: 47 and 2600 stocks, but total return data is only available on a monthly basis. The FT/S&P covers around 80% of 28 different markets and 2400 stocks. Missing from their indices are, for instance, markets like Argentina, Israel, Pakistan and Greece.

2.5 SUMMARY STATISTICS

The previous two sections have provided detailed information on aggregate market activity and on the data available for each of the 26 markets that I study here. This section discusses the summary statistics for the returns of the IFC Global indices as well as for

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[21] Malaysia represents 16% of the IFCG Composite market capitalisation.

[22] The EMDB includes these series. I have used the Datastream data because when I got the IFC database, the dual listings' essay was almost finished.

[23] FT/S&P-Actuaries' indices are owned by FTSE International Limited., Goldman Sachs & Co. and Standard & Poor's. These indices are compiled by FTSE and Standard & Poor's in conjunction with the Faculty of Actuaries and the Institute of Actuaries.

the returns of the stocks that compose these indices. Information is available upon request.

For aggregate data, I report weekly and monthly statistics but I focus here on the weekly results. The weekly series go from January 1990 to December 1996. The monthly series cover a longer period starting in February 1982 and ending in August 1995. For South Africa, I only look at weekly data.

As some markets have short series I have left them out for some of the statistics here discussed. This is the case for China, Hungary, Pakistan, Nigeria, Peru, Poland, Sri Lanka and Zimbabwe.

2.5.1 SIMPLE STATISTICS

2.5.1.1 Mean and Variance of Aggregate Market Returns

Over the period 1990-1996, the emerging markets' composite index annualised (arithmetic) average US $ return was 3%. The average return for the World index was 7% (14% for the US market). If we look at each emerging market individually, we observe that 9 out of the 17 markets with complete series over this period show substantially higher returns than the World. Yet only five markets, all originating from Latin America, have outperformed the UK and the US markets. Thus, on average, emerging markets achieved lower returns than the mature markets considered here. The Latin American market returns were above the World returns but Asian markets, with one or two exceptions, were laggards.

Previous studies analysing longer time-series, that include the 1980s and the 1990s, show that emerging markets' returns were above World returns. Over the last 14 years (ending in 1995), emerging markets outperformed the World and most mature markets. The average return for the IFC Global Composite Index was 18% against 16% for the World index (and 15% for the US market). The cross-market single average for the 20 emerging markets with series starting in the 1980s was 25%.

I have also looked at the series of returns measured in local currency. These reflect the gross returns that could be obtained by a US investor who was hedged against nominal currency fluctuations. All countries that registered large inflation rates in the recent past, in particular the Latin American markets, show very high nominal returns. Overall, for all emerging markets, returns measured in US $ are smaller than local currency denominated returns reflecting that depreciation against the dollar was a common feature for this sample period.

The annualised volatility of weekly returns for the emerging markets' IFC Global Composite index was 16% over the 1990s. With the exceptions of Chile, Portugal and Jordan, the annualised volatility is well above 20% against 12% for the FT/S&P World index (and 11% for the US market).[24] Over the last 14 years the annualised volatility for the emerging markets' IFC Global Composite index monthly returns was 23%. Over this period, the World index displayed 15%. While the high volatility is a common attribute for emerging markets, not all markets observe the same level of volatility: in the 1990s the average annualised volatility of weekly returns for Latin American markets was 23%, above the 19% observed for Asian markets, and this difference was even more pronounced in the fourteen-year period (42% against 25%). The volatility of local returns is on average higher than the one observed for US returns. This result is influenced by Latin American countries and shows that part of the volatility observed for returns measured in local currency is offset by exchange rate movements.

These simple statistics analysed so far reveal three things. The first is that over a reasonably large period of time emerging markets seem to outperform mature markets in terms of mean returns: over the last 14 years, the average returns for the 20 emerging stock markets here analysed exceeded mature markets returns by around 10%. However, over shorter periods of time that superiority is no longer guaranteed and that was what happened in the 1990s. If I had included the Asian crisis of 1997 and all that followed, the relative performance of emerging markets would be worse. Second, emerging markets as an average, and almost every single market, show higher volatility in returns than mature markets. A simple risk-adjusted measure like the Sharpe ratio shows that the average return advantage does not seem to compensate for the larger variation in returns. Third, the emerging markets' composite index is a poor indicator of the underlying emerging markets. The IFC Global Composite returns and volatility figures are close to the ones observed in mature markets. The reason for this is that cross-markets correlation of returns is very low. This heterogeneity will be further explored below in this section and later on in chapter 6.

2.5.1.2 Skewness, Kurtosis and Normality of Aggregate Market Returns

A few papers (for example, Bekaert, Erb, Harvey and Viskanta, 1998 and Susmel, 1997) have suggested that skewness and kurtosis are very important when studying emerging markets.

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[24] These figures assume zero serial correlation in returns.

Even if, in small samples, the sample skewness and kurtosis are unreliable estimators of the true statistics, they can still indicate departures from normality. There is negative skewness for some of the emerging markets (11 out of 17 with complete series). The statistic ranges from -3.0 for Venezuela to 1.2 for Colombia. Yet when measured over a longer period, the skewness is no longer negative but positive: only 3 markets out of the 20 with series starting in the 80s, have negative skewness. Mature markets show negative skewness for the two periods. Anyway, and with a few exceptions, the absolute value of this statistic is small both for emerging and mature markets.

That is not the case for excess kurtosis: the distribution of returns for both emerging and mature markets' indices present fat tails and the absolute value of this statistic is usually high irrespective of the period analysed. For some markets like the US, the October 1987 observation seems to affect the results but even after deleting that particular observation the pattern of positive excess kurtosis prevails. Overall, emerging markets show more extreme values of excess kurtosis.

Fat tails are supposed to be caused by extreme observations. The minima give a broad idea of the potential downfall risk in these emerging markets. I have checked the data for influential observations and analysed the influence statistics, both for the raw returns and for the residuals - that result from regressing the returns of the emerging market indices on the World index. The influence statistics indicate two observations: October 1987 and August 1990. Even if most of the emerging markets react to those two events, Latin American markets did not identify the Gulf war. Other markets, like India, did not pick up the 1987 crash. Finally, the Mexico crisis in December 1994 was only identified in Mexico. If one excludes these point observations, the excess kurtosis does not disappear.

The different values I find for the weekly and monthly longer series seem to suggest that skewness and kurtosis change through time. Bekaert *et al.* (1998) also investigate the difference between the 1980s and the 1990s (they study the period from April 1987 to March 1997). They report lower returns over the most recent period and a slight decrease in volatility. Over the two periods, they find that the emerging markets' indices show positive skewness and excess kurtosis. Mature markets' indices, on the other hand, also show excess kurtosis, stronger than in emerging markets, but negative instead of positive skewness. Over the last ten years, they find that the absolute level of skewness decreases while no pattern emerges for kurtosis.

I have also looked at two normality statistics:[25] the Bera and Jarque and the Wilk-Shapiro tests.[26]

The Bera-Jarque test provides a Wald statistic to test departures for normality. Under the hypothesis of normality the test statistic is:

$$W = n\left[\frac{sc^2}{6} + \frac{ek^2}{24}\right] \tag{2-1}$$

This univariate test statistic is asymptotically distributed as chi-squared with two degrees of freedom (see Greene, 1996, page 309).

Over the 1990s, for the 17 emerging markets with complete weekly series, the null hypothesis of normality is strongly rejected. This has been a common finding of previous research for other sample periods.[27] The normality assumption is also rejected for the World index but not for the US index. For the longer series, I fail to reject normality only for 2 emerging markets.

In sum, this evidence suggests that the distribution of returns for emerging markets is not normal. The most prominent feature is the excess kurtosis. This evidence is similar to that of mature markets but the non-normality for emerging markets seems to be much more severe.

The first order autocorrelation of the series is significant for 9 out of the 20 emerging markets at the 10 percent level. For correlation coefficients of higher order, the coefficients are less significant. The importance of lag returns results first, because we are analysing indices and, second, because infrequent trading is a common feature in most of these markets.

2.5.1.3 Individual Stock Returns

I computed time-series averages of cross-sectional statistics for the constituents of the IFC Global indices (measured in US $). The results are compared with the evidence for

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[25] Harvey (1995) and Bekaert and Harvey (1997) provide a very detailed analysis of the distributional characteristics in emerging markets.

[26] The Wilk-Shapiro statistic compares a variance figure based on order statistics with the traditional variance measure.

[27] This is the case, for example, of Bekaert, Erb, Harvey and Viskanta (1997[2]) that analyse the period from April 1987 to March 1997. See also Bekaert and Harvey (1998) that look at a sample period that goes from 1976 or later through March 1992.

the universe of US stocks over the period 1962-1994, as reported by Campbell, Lo and Mackinlay (1996). The analysis by market shows several results of interest:[28]

- the average standard deviations are high: in annualised terms, the average is 48%, ranging from 29% for Portugal to 77% for Brazil.

- the average sample estimates of skewness for weekly emerging markets' stock returns tend to be positive but close to zero for individual stocks, ranging from -0.5, for Mexican stocks, to 0.6 in Chile. This feature is similar to what has been documented for US stocks which register skewness in the range -0.2 to 2.3.

- weekly individual stock returns have positive sample excess kurtosis, ranging from 1.7 for Korean stocks to 12.8 in Venezuela. In the US, that range goes from 3.4 to 59.4.

In sum, individual stock returns show weak evidence of skewness and strong evidence of excess kurtosis. The average *p*-value for normality is above the 10% level of significance in around half the 17 markets.

2.5.2 CORRELATION

2.5.2.1 Correlation Structure

I looked at the correlation of weekly returns for the emerging and mature markets indices over the 1990s.[29] The weekly correlation coefficients are based on a maximum of 364 weeks - from January 12, 1990 to December 26, 1996 - and a minimum of 178 weeks for Nigeria and Zimbabwe. Because the US $ and local-currency correlations are very similar, I concentrate here on the US $ returns matrix.

The pair-wise correlation of returns between emerging markets can be found in the range [-0.15, 0.52] but only three correlation coefficients are above 0.40 and ten above 0.30. The average weekly dollar return correlation is 0.07.[30]

As documented by previous research the correlation between mature markets is also not very high. For the five mature markets in analysis, all correlation coefficients fall in the range [0.27, 0.59] and the average weekly correlation is 0.40.[31]

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[28] The comments here are relative to 17 markets for which there is coverage over the entire sample period. For individual stock returns, I only have data on a weekly basis.

[29] I use Pearson product-moment correlation coefficients.

[30] This figure means very little given that many of the coefficients are not significant.

[31] Akhogan (1995) reports the cross-correlation coefficients for a longer period (January 1982 to January 1990): the average pair-wise correlation for 20 mature markets can be found in the range [0.2, 0.5].

In the 1990s, the average correlation of weekly returns between emerging markets and the World index was 0.14 and the coefficients were in the range [-0.13, 0.45].[32] For mature markets, the average correlation with the World was 0.62 and correlations varied between 0.60 and 0.94.[33] As we can see, the correlation coefficients between emerging markets and mature markets are always below the cross-correlation coefficients for mature markets and there are a few negative coefficients (for example, India and Venezuela). One exception to this general behaviour is Portugal.[34]

Several studies have highlighted that there may be a downward bias in correlation coefficients obtained using daily or even weekly data as a result of non-overlapping trading hours across markets and infrequent trading.[35] To investigate the importance of this bias, I have re-computed the correlation coefficients using monthly data instead of weekly data over the same period (January 1990 to December 1996). The monthly correlation coefficients are based on a maximum of 83 months - from January 1990 to December 1996 - and a minimum of 48 months. The cross-correlation of returns between any two of the emerging markets can be found in the range [-0.28, 0.63] but now there are fourteen coefficients above 0.50 and forty-four above 0.30. The average pair-wise correlation is 0.16 against the 0.07 obtained using weekly returns.

I have also re-computed the weekly correlations using not only contemporaneous returns but also five lagged and five leaded returns.[36] Within emerging markets, the average correlation is now 0.27 against the average contemporaneous correlation of 0.07. The correlation coefficients range now from 0.10 to 0.57 against -0.15 to 0.52 before. The correlation with the World return, on average, is now 0.29 against 0.14 before. When we look at the range of correlations, we no longer observe negative correlations and the range goes now from 0.10 to 0.57 (against the contemporaneous correlations of -0.13 to 0.45). Difference *t*-tests show that the downward bias is very significant both for pair-wise correlations of returns in emerging markets and for the correlations with the World index.

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[32] The average correlations with Japan, UK and the US are, respectively, 0.07, 0.14 and 0.12.

[33] Given that the World index is a value-weighted index, the large weights of mature markets necessarily drive these results.

[34] Recently MSCI has "upgraded" Portugal and included Portuguese stocks in the group of Developed Markets.

[35] See, for example, Bailey and Stulz (1990). They examine in detail two problems that may lead to overestimate the gains from diversification into emerging markets: non-synchronous trading and autocorrelation. They suggest the use of monthly data or in case the distribution of returns changes over time, low-frequency lagged data.

The results are valid within regions even if the downward bias seems to be more severe for Asian markets. This is not surprising given that these are markets that trade at different times and with a huge time-lag relative to the US market. The results above confirm a downward bias between 10% and 15% from using weekly data. Yet the average correlation among emerging markets and with mature markets is still very low.

To get a first picture of how these correlations have evolved recently, I have computed the correlations over a longer period (thirteen and an half year-period with a maximum of 163 monthly returns). Within emerging markets, the average pair-wise correlation coefficient is 0.09 and the coefficients vary widely from -0.17 to 0.56. The average correlation coefficient against the World index is 0.13 and the correlation coefficients varied between -0.09 for India and 0.40 for Malaysia.

I have also re-computed the correlations without the weeks surrounding the Mexican crisis. I obtain similar coefficients. The average correlation with the World return if we exclude the Mexican crisis is 0.13, very close to the average of 0.14 we had using all the observations.

Summarising, the average correlation among emerging markets and with mature markets is very low. Apparently, there seems to be a slight increase in correlations in recent years. The next section investigates that issue.

2.5.2.2 Correlation Dynamics

During the last decade, world trade has been liberalised and economic integration, especially at a regional level, has steadily progressed (GATT/WTO; EU; NAFTA; MERCOSUR; ASEAN and APEC). Financial markets are more deregulated and we have witnessed large increases in the allocation of international investors' portfolios to emerging markets. Correlation of returns does not provide a measure of financial or economic integration between markets but, *ceteris paribus*, an increase in financial or economic integration should result in greater correlation.

Many authors have studied the stability of covariance matrices. For example, Kaplanis (1986) tested for a constant unconditional correlation and covariance matrices of monthly returns of ten markets over a fifteen year period and could not reject the null hypothesis of stability. More recently, Longin and Solnik (1995) have replicated the same tests for a longer period for seven major stock markets. They additionally model the conditional

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36 The correlations are the square root of the R^2 in a multiple regression of market index returns on the other emerging markets, or on the World index contemporaneous, leaded and lagged returns.

variance of national equity markets using a univariate GARCH approach and allow for time-varying correlation. Their main finding is that both correlation and covariance structures have been unstable over time and that there is only weak evidence that correlations increased over the last 30 years.

In the case of emerging markets, more important than looking at how these markets relate to each other is to find out if the correlation between these and mature markets has been increasing in the recent past as a result of increasing economic and financial integration.

The plots of the correlation seem to indicate that correlation coefficients are time-varying. Most of the series plotted show a striking jump in the correlation coefficient after the 1987 crash. This confirms previous evidence, that reports increasing correlations in periods of high turbulence.[37] After deleting the crash observation, the trend to increasing correlation becomes more evident. Yet the trend in correlations shown by the plot covering a more recent period is ambiguous and the increase in correlation seems to start only late in 1992.

To assess if the correlation between emerging markets and the world has increased in the recent past, I have looked at several different tests.[38]

Fisher *z* Test

I first looked at a simple test: I compared the correlation coefficients for each market for two sub-periods. The first sub-period was February 1982 to June 1987 and the second sub-period was January 1988 to August 1995. I tested the null hypothesis of a zero cross-market average difference between the two sub-period coefficients. The *t* test was significant at the 1% level of significance. Thus, across emerging markets, I have rejected the hypothesis that the correlation coefficients with mature markets were constant.

I have then proceeded to study the difference in correlations for each individual market. The correlation coefficients were computed for each market for two sub-periods as before. For each emerging market, I tested individually the hypothesis that the two coefficients were different. The null hypothesis was that that difference was zero. I have used a one-sided test since my prior was that correlation should have registered an increase over the recent past.

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[37] See, for example, King, Sentana and Wadhani (1994) or Patell and Sarkar (1998) and the references therein.

[38] I only report here the results regarding the correlation with the World index. I performed the same tests for the correlations with Japan, the UK, the USA and with the IFC Composite index.

The correlation coefficient is bounded between -1 and +1 and, as a consequence, the distribution of the sample estimates is only symmetrical when the null hypothesis is that the correlation coefficient is zero and the t test cannot be used to make inferences about other different hypotheses. There is, however, the transformation of the correlation coefficient (ρ),

$$z = \log\sqrt{(1+\rho)/(1-\rho)} \qquad (2\text{-}2)$$

that provides a near-normal sampling distribution and allows the use of procedures using the normal distribution. The variance of the transformed value z can be considered a known parameter:

$$\sigma^2 = 1/(n-3) \qquad (2\text{-}3)$$

This is known as the Fisher z test of equality of correlations.

The z statistic exceeds the critical value of the 5% level of significance for only 3 out of the 17 markets studied: Brazil, Malaysia and Thailand. With a 10% threshold, I reject the null hypothesis also for Jordan, Korea and the Philippines.[39]

I have repeated the tests for a more recent period (1990 to 1996) using weekly data. The first sub-period goes from January 1990 to November 1993 (203 weeks), just before the Mexican crisis. The second sub-period goes from March 1994 to December 1996 (148 weeks). The cross-market average difference in the correlation coefficients is not significant. When I test each market individually, I reject the null of no increase in the correlation with World index, at a 5% level of significance, in 9 out of the 17 markets analysed.

Multivariate Wolak Test

To addresses specifically whether the correlation coefficients are increasing I use a multivariate test proposed by Wolak (1989).[40-41] The null hypothesis is that the world betas, that are obtained in a multivariate regression of emerging markets' indices against the World index, are monotonically increasing over time. The alternative hypothesis is that betas are unconstrained.

39 I have performed the same tests using a control sample of mature markets, namely, Germany, Japan, Spain, UK and US. I have rejected the null hypothesis of constant correlation with the World index in the cases of Japan, Spain and UK.

40 This test uses beta parameters instead of correlation coefficients. The core results should be similar.

41 I was motivated by the work of Richardson, Richardson and Smidt (1992) on the monotonicity of the term premium.

I have defined three sub-periods of 53 monthly observations each and constructed the Wald statistic for all the emerging markets that had observations for the entire period (in a total of 10 markets). The first sub-period was February 1982 to July 1986. The second sub-period starts in August 1986 and ends in January 1991. Finally the last sub-period starts in February 1991 and ends in July 1995.[42]

The null hypothesis is thus:

$$\beta_{III} \geq \beta_{II} \geq \beta_{I} \tag{2-4}$$

where β results from estimating the regression:

$$Y = \beta X + \varepsilon \tag{2-5}$$

Y is a stacked vector (3x53 X 1) of 53 monthly observations of total returns for a specific IFC Global market index for each of the three sub-periods (I, II and III).

X* is a stacked vector (3x53 X 1) of 53 observations for the three sub-periods of total returns for the MSCI World market index. X* results from the partition of each of the element-matrix of X in a first column of units and the column of observations of the explanatory variable. I will drop the * from here forward.

β is a vector (3x2 X 1) of parameters. ε is a random vector (3x53 X 1) that is distributed $N(0,\Sigma \otimes I_{53})$, where Σ is a (3 X 3) variance-covariance matrix across the sub-periods and I_{53} is the identity matrix (53 X 53).

The restriction matrix R (2 X 3) is as:

$$R = \begin{bmatrix} -1 & +1 & 0 \\ 0 & -1 & +1 \end{bmatrix} \tag{2-6}$$

Then the testing framework (the inequality constraints) can be written as:

H0: $R\beta \geq 0$

H1: The parameters are unrestricted. (2-7)

Following closely Wolak (1989) for the case of multivariate inequality constraints, the Wald statistic is:[43]

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[42] I have repeated the same tests leaving a gap between each sub-period and I have also removed two outliers: October 1987 and August 1990. The main results are robust to these deletions.

[43] I used penalty functions to impose the inequality constraints (please refer to SAS ETS User's Guide, page 589). Given $h_j(\beta_i) >= 0$, the *j*th constraint on the *i*th parameter and a penalty function, PEN_i: $\alpha_j / h_j(\beta_i)$ where α_j is a small positive constant. The penalty function gets very small when β_i is well within the feasible region. The penalty function modifies the objective function so that it remains nearly the same in the feasible region, and increases rapidly as it approaches the constraints. That is:

$PEN_1=1/(\beta_{II}-\beta_{II})$

$PEN_2=1/(\beta_{III}-\beta_{II})$

$$W = \left[R\tilde{b} - R\hat{b}\right]' \left[R\left(X'\hat{\Sigma}X\right)^{-1} R'\right]^{-1} \left[R\tilde{b} - R\hat{b}\right] \tag{2-8}$$

where $\tilde{b}$ is the vector of restricted estimates and $\hat{b}$ is the vector of unrestricted estimates. $\hat{\Sigma}$ is a consistent estimate of Σ. The Wald statistic tests the amount the unrestricted estimate differs from the hypothesised restrictions based on the unrestricted estimate of Σ. The two test statistics, based on the unrestricted and on the restricted estimates of Σ, when evaluated at the true covariance matrix, have asymptotically the same distribution.

Kodde and Palm (1986, table 1, page 1246) provide upper (c_U) and lower (c_L) bound critical values that do not require the calculation of the weights necessary to find the asymptotic distribution of W (a weighted sum of Chi-squares). If the statistic lies within the two critical values the test is inconclusive.[44] In that case it would be necessary to compute the weights. If the value of the statistic does not fall between the upper and lower critical value given by the table, it is possible to infer. If the Wald statistic exceeds the upper bound, we reject the null that the world betas are monotonically increasing; if the Wald statistic lies below the lower bound, we cannot reject the null hypothesis that betas are equal or greater than zero. The significance is given by:

$$\begin{aligned} \inf \Pr\left[W \geq c_L\right] &= \tfrac{1}{2}\Pr\left[\chi_1^2 \geq c_L\right] \\ \inf \Pr\left[W \geq c_U\right] &= \tfrac{1}{2}\Pr\left[\chi_1^2 \geq c_U\right] + \tfrac{1}{2}\Pr\left[\chi_2^2 \geq c_U\right] \end{aligned} \tag{2-9}$$

If we do not reject the null hypothesis that betas are monotonically increasing, we should then test whether this happens because betas are constant or because they are increasing. Thus, we have to test for the equality constraints:

$$\begin{aligned} &\text{H0: } R\beta = 0 \\ &\text{H1: } R\beta > 0 \end{aligned} \tag{2-10}$$

The Wald statistic is now:

$$W = \left[R\tilde{b} - 0\right]' \left[R\left(X'\hat{\Sigma}X\right)^{-1} R'\right]^{-1} \left[R\tilde{b} - 0\right] \tag{2-11}$$

$PEN_3 = 1/(\beta_{III} - \beta_I)$.

The procedure is implemented by adding the penalty functions to the error term.

[44] These critical bounds assume that errors are serially uncorrelated. If it is the case that AR(1) errors occur, Wolak shows the bounds given by Kodde and Palm are slack. So it is possible that when we are not rejecting the null hypothesis, we should rather be concluding that the test is inconclusive.

Finally if this hypothesis is not rejected, we should test individually the pair-wise restrictions, namely:

$$\beta_{II} = \beta_I$$

$$\beta_{III} = \beta_{II}$$

$$\beta_{III} = \beta_I \qquad (2\text{-}12)$$

To test these latter hypotheses, I have used a Fisher z test as described above.

Please refer to table in the appendix for the results. I reject the null hypothesis of monotonically increasing betas only for Thailand. Of the remaining nine markets, however, only Greece rejects the hypothesis that betas were constant over the three sub-periods.

I have repeated the test for a more recent period (1990 to 1996) using weekly data[45]. I have defined three 96-week sub-periods: January 1990 to November 1991; January 1992 to November 1993 and March 1994 to December 1996. For the 17 markets, I could reject the null of monotonically increasing correlation coefficients five times at the 10 % level. For the markets for which I could not reject the null of monotonically increasing correlations, the results are disappointing: only Argentina shows strictly increasing correlation.

Summarising, I find that monthly correlations of returns with the World market have been monotonically increasing over the last 14 years. However, my tests are not powerful enough to reject the null of constant correlation. Similarly, for a more recent period, I find little evidence supporting the hypothesis of strictly increasing correlation.

2.5.2.3 Correlation and Fundamentals

The highest correlation coefficients occur within a region. For example, for weekly data, the highest correlation coefficients occur between Thailand, Malaysia, Philippines and Indonesia, and between Argentina and Peru. There seems to be some regional effect but not as strong as one would expect given the increasing economic links in some geographical areas.

Plot of the correlations over the last twelve years between the IFC Global indices and the World index against the average growth observed in these countries over the last decade, the importance of trade in GNP in 1995, and the importance of the stock market in their economies as of 1996 suggest a positive relation between the first two indicators and the level of correlation of those markets with the World market: countries that are growing faster and that have open economies display higher correlations.

The results in this section confirm some of the empirical regularities documented by previous research on emerging markets: higher returns than mature markets over the long run, higher volatility and low correlation of returns within emerging markets and with mature markets. I also find weak evidence regarding the rise in correlations of returns between these markets and the world.

I would like to emphasise one idea that emerges from this section: emerging markets' returns have different characteristics among themselves and from mature markets and that difference is reflected in the low cross-markets correlations we observe. This evidence, together with the qualitative heterogeneity, substantiates the idea that it may be inappropriate to treat these markets as an homogeneous asset class.

Two other aspects are worth to keeping in mind: the higher volatility and the non-normality of emerging markets' returns. The higher volatility in returns conditions all the results I find. Some of the questions I ask will remain unanswered because noise prevents inference. The non-normality of returns may be another reason why I fail to get more powerful and sometimes meaningful results.

2.6 SUMMARY

This chapter intended to help the reader to locate himself in terms of the reality of emerging markets. I have started by giving an idea of the magnitude of foreign capital flows to these markets. Next, I have described some market features and the existing barriers to free investment. This information on formal and informal barriers will be a companion reference and it will be helpful for interpreting and understanding some of the empirical results discussed in chapters 4, 5 and 6. I have also presented the available data for emerging markets and reported some simple statistics on aggregate returns.

Most of these markets have these things in common: they have outperformed mature markets in terms of economic growth, registered positive net capital flows, and their stock markets have been through processes of liberalisation and sophistication. In terms of growth, economic policies, political risks, degree of openness, and importance of financial markets there are, however, very wide differences. The individual market descriptions highlight other differences in terms of organisation, regulation, trading mechanisms, policies elected to open their stock markets and treatment of foreign investors. The summary statistics of the returns for these markets reinforce the idea that an emerging market asset class is a very broad category. The essays that follow treat

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[45] Results are available upon request.

emerging markets sometimes as a group in order to uncover other potential hidden common features. The heterogeneity of these markets suggested by the stylised facts, may explain the weakness of some my results, indicating that it might be inappropriate to treat these markets as an asset class.

In recent years these markets have changed completely. They have been liberalised and modernised and foreign investors play now an important role in many of these markets. What has happened to pricing? I report low correlation of returns between emerging and mature markets and find little evidence of an upward trend but low correlations do not imply necessarily that markets are segmented. That may simply reflect differential cash flow structures. I also document removal of formal and informal barriers but, again, the removal of barriers is not enough to prove increased market integration. The theoretical literature on international asset pricing has come up with models that deal explicitly with such market structures. Chapter 3 reviews those studies and the empirical tests of international capital market integration.

APPENDIX A - EMERGING MARKETS: INDIVIDUAL DESCRIPTIVE FEATURES

Table A.1 - Emerging and Mature Markets' Indices: Descriptive Statistics

This table shows descriptive statistics for the 26 emerging markets, 5 mature markets and the world market. Data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. The data refers to the period 1990 to 1996. Panel I gives the year-end number of firms listed on the stock exchanges of each market . Panel II shows the year-end aggregate market capitalisation for each market.

I. Number of Firms

	1990	1991	1992	1993	1994	1995	1996
Emerging Markets							
Argentina	179	174	175	180	156	149	147
Brazil	581	570	565	550	544	543	551
Chile	215	221	245	263	279	284	291
China		14	52	183	291	323	540
Colombia	80	83	80	89	113	190	189
Greece	145	126	129	143	216	212	224
Hungary		21	23	28	40	42	45
India	6200	6229	6540	6800	7000	7985	8800
Indonesia	125	141	155	174	216	238	253
Jordan	105	101	103	101	95	97	98
South Korea	669	686	688	693	699	721	760
Malaysia	282	321	369	410	478	529	621
Mexico	199	209	195	190	206	185	193
Nigeria	131	142	153	174	177	181	183
Pakistan	487	542	628	653	724	764	782
Peru	294	298	287	233	218	246	231
Philippines	153	161	170	180	189	205	216
Poland		9	16	22	44	65	83
Portugal	181	180	191	183	195	169	158
South Africa	732	688	683	647	640	640	626
Sri Lanka	175	178	190	200	215	226	235
Taiwan	199	221	256	285	313	347	389
Thailand	214	276	305	347	389	416	454
Turkey	110	134	145	152	176	205	229
Venezuela	76	87	91	93	90	90	88
Zimbabwe	57	60	62	62	64	64	64
Mature Markets							
Germany	413	428	665	426	417	678	681
Japan	2071	2107	2118	2155	2205	2263	2334
Spain	427	433	399	376	379	362	357
UK	1701	1623	1874	1646	2070	2078	2433
USA	6599	6742	6699	7246	7692	7671	8479
Emerging markets	12866	13352	14467	15412	17613	20133	22263
Developed markets	16323	16199	16937	16973	18425	18607	20141
World	29189	29551	31404	32385	36038	38740	42404

Table A.1 - Emerging and Mature Markets' Indices: Descriptive Statistics (cont.)

II. Market Capitalisation

US$ millions

	1990	1991	1992	1993	1994	1995	1996
Emerging Markets							
Argentina	3268	18509	18633	43967	36864	37783	44679
Brazil	16354	42759	45261	99430	189281	147636	216990
Chile	13645	27984	29644	44622	68195	73860	65940
China		2028	18255	40567	43521	42055	113755
Colombia	1416	4036	5681	9237	14028	17893	17137
Greece	15228	13118	9489	12319	14921	17060	24178
Hungary		505	562	812	1604	2399	5273
India	38567	47730	65119	97976	127515	127919	122615
Indonesia	8081	6823	12038	32953	47241	66585	91016
Jordan	2001	2512	3365	4891	4594	4670	4551
South Korea	110594	96373	107448	139420	191778	181955	138817
Malaysia	48611	58627	94004	220328	199276	222729	307179
Mexico	32725	98178	139061	200671	130246	90694	106540
Nigeria	1372	1882	1221	1029	2711	2033	3560
Pakistan	2850	7326	8028	11602	12263	9286	10639
Peru	812	1118	2630	5113	8178	11795	12291
Philippines	5927	10197	13794	40327	55519	58859	80649
Poland		144	222	2706	3057	4564	8390
Portugal	9201	9613	9213	12417	16249	18362	24660
South Africa	137540	168497	103537	171942	225718	280526	241571
Sri Lanka	917	1936	1439	2498	2884	1998	1848
Taiwan	100710	124864	101124	195198	247235	187206	273608
Thailand	23896	35815	58259	130510	131479	141507	99829
Turkey	19065	15703	9931	37496	21605	20772	30020
Venezuela	8361	11214	7600	8010	4111	3655	10055
Zimbabwe	2395	1394	628	1433	1828	2038	3635
Mature Markets							
Germany	355073	393454	348138	463476	470519	577365	670997
Japan	2917679	3130863	2399004	2999756	3719914	3667292	3088850
Spain	111404	147928	98969	119264	154858	197788	242779
UK	160044	173881	195285	271713	284092	433621	402104
USA	3059434	4087660	4485040	5136199	5067016	6857622	8484433
Emerging markets	614585	861635	913308	1637079	1914876	1931471	2225957
Developed markets	8784770	10432928	9921841	12326261	13209111	15855775	17951705
World	9399355	11294563	10835149	13963340	15123987	17787246	20177662

Note: The market capitalisation is the end of the year total market value of listed domestic stocks.

Table A.2 - Barriers in Emerging Markets

This table summarises the main formal barriers to free portfolio investment in emerging markets with capitalisation over US $ 10 billion. This is the outlook at the end of December 1996. Data was obtained from IFC, IMF, UBS, Economist Intelligence Unit, Euromoney, Euroclear and Financial Times.

	Inward (Portfolio Investment)					Outward
	Access	Exchange Rate Controls	Repatriation	Ownership Limits	Taxes on Foreigners	General Restrictions
Argentina	Free from 1989	No controls	Free	None	No taxes	Free
Brazil	From 1992 through institutional investors	Some controls	Free	<5%voting capital <20% total capital	Dividends: 15% Capital Gains: 15% Eligible Investors: Tax-exempt	Strictly regulated
Chile	On approval	No controls but short term capital required reserves of 30%	Free after one year from 1993 (previously 3 to 6 years)	Free	Dividends: 20% Capital gains: 35%	Limited
China	Through B,H and N shares	Free from 1996	Free from 1996		Dividends: 20%	Strictly regulated
Colombia	Through foreign investment funds, from 1991; Free from 1995	Free from 1993	<10% total capital	Free from 1993	Dividends: 12% Capital gains: 31%	Free with upper limits
Greece	Free	Free	Free	Free except utilities	No taxes	Free with upper limits

Table A.2 - Barriers in Emerging Markets (cont.)

	Inward					Outward
	Access	Exchange Rate Controls	Repatriation	Ownership Limits	Taxes on Foreigners	General Restrictions
India	FII or through off-shore Indian companies	Free	Free but needs approval	<5% individual <24% aggregate	Dividends: 20/25% (FII/others) Capital gains:30/10% (short/long term)	Strictly regulated --
Indonesia	Free from 1994	Free	Free	<49%	Dividends: 10-20% (tax-treaties)	Free
Korea	Free from 1992	Registration	Free but needs approval	<6% individual <20% aggregate	Dividends: 15% Capital gains: 10-25%(tax-treaties)	Strictly regulated
Malaysia	Free	Controlled by central bank	Free	<15% voting capital <30% total capital Approval above these limits	Dividends: franked 32%	Free
Mexico	Free from 1993 Through B,L and N shares	Registration	Free	In general, no limits	No taxes	Free
Peru	Free for approved institutional investors	Free	Free	No limits	Dividends: 10%	Free

Table A.2 - Barriers in Emerging Markets (cont.)

	Inward					Outward
	Access	Exchange Rate Controls	Repatriation	Ownership Limits	Taxes on Foreigners	General Restrictions
Philippines	Free from 1991 through B shares	Registration	Free	Free except for a few industries (<40%)	Dividends: 30-35% (or less through tax-treaties)	Free with a few exceptions
Portugal	Free	Free	Free	Free	Dividends: 17.5% Capital gains: 0% after one year (10% short term)	Free
South Africa	Free	Registration	Free	In general, free	No taxes	Strictly regulated
Taiwan	Through QII, from 1991. Individual investors from March 1996	Few controls after 1995	Free (Dividends: before 1996, only once a year)	<7.5% individual <20% aggregate Absolute ceilings	Dividends: 25%-35% (or reduced to 20%)	Need authorisation
Thailand	Registration. Free in Alien Board, from 1990	Few controls	Free	<49% in general <25% banks	Dividends: 10% Capital gains: 15% (or exempt with tax-treaties)	Need authorisation
Turkey	Free from 1989 Approval to exercise voting rights	Free	Free	Free	No taxes	Free for individuals. Companies are regulated

US $ Billion		Open <====	========	=======	========	========	======	===> Closed
MC>=100	High Turnover	Mexico***/••		Thailand**/••• Korea**/•• Malaysia*/•••	Brazil*/••	India*/••	Taiwan*/•••	
	Low Turnover				South Africa*/•••			China•
50<=MC<100	High Turnover		Indonesia***/••	Phillipines*/•••		Chile*/•••		
	Low Turnover							
10<=MC<50	High Turnover	Turkey***/• Portugal**/••	Greece*/•	Pakistan*/•				
	Low Turnover	Argentina**/•	Peru**/•	Venezuela*/•		Colombia•		
MC<10	High Turnover	Poland**/• Hungary***/•						
	Low Turnover		Jordan*/••		Zimbabwe**/••	Sri Lanka•		Nigeria•

Figure A.1 - Emerging Stock Markets: Size vs. Severity of Barriers
This figure gives a very rough map of these markets' location in terms of severity of barriers, size, turnover ratio, presence of foreigners and importance of the stock market in the local economy. *MC* refers to total market capitalisation as of end-1996. The other features illustrate the status of the market in recent years. *, ** and *** indicate a small, important or very important presence of foreigners (in terms of turnover/investment). •, •• and ••• indicates the importance of the stock market in the local economy.

APPENDIX B - SUMMARY STATISTICS:

ADDITIONAL TABLES

Table B.1 - Summary Statistics for Emerging and Mature Markets' Indices Returns - Weekly Data, January 1990-December 1996

This table shows the simple statistics of weekly total returns for the IFC Global 26 Country +1 Composite +2 Regional Emerging Markets' Indices and for the FT&SP indices over the period January 1990-December 1996 (maximum 364 weeks). Markets listed above China have complete series. The data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. FT&SP data was obtained from Datastream. The *p*-values refer to the Bera-Jarque normality test.

I. IFC Global Indices

	Mean		St Deviation		Minimum		Maximum		Skewness		Excess Kurtosis		Normality *p*-value	
	Local	US$	Local	US$	Local	US$	Local	US$	Local	US$	Local	US$	Local	US$
Argentina	0.0094	0.0047	0.0802	0.0678	-0.4032	-0.4032	0.5646	0.3905	1.5338	0.1039	11.5808	7.3464	(0.0000)	(0.0000)
Brazil	0.0370	0.0030	0.0805	0.0758	-0.4575	-0.4652	0.2718	0.2091	-0.2670	-0.6764	3.6576	3.9179	(0.0000)	(0.0000)
Chile	0.0056	0.0045	0.0280	0.0296	-0.0740	-0.0805	0.1071	0.1090	0.2929	0.3256	0.7160	0.7591	(0.0015)	(0.0005)
Colombia	0.0081	0.0058	0.0374	0.0387	-0.1377	-0.1412	0.2435	0.2389	1.4755	1.2281	7.1509	5.9022	(0.0000)	(0.0000)
Greece	0.0026	0.0013	0.0396	0.0412	-0.1456	-0.1385	0.2055	0.2128	0.9827	0.8128	4.6666	3.9743	(0.0000)	(0.0000)
India	0.0030	0.0010	0.0424	0.0433	-0.1578	-0.1578	0.1650	0.1706	0.1905	0.0291	2.0995	2.4384	(0.0000)	(0.0000)
Indonesia	0.0015	0.0007	0.0317	0.0325	-0.1710	-0.1718	0.1068	0.1062	-0.2196	-0.3646	3.3113	3.5662	(0.0000)	(0.0000)
Jordan	0.0018	0.0015	0.0210	0.0217	-0.1789	-0.1789	0.0859	0.0845	-1.1496	-1.0141	15.8770	13.9296	(0.0000)	(0.0000)
Korea	-0.0011	-0.0017	0.0334	0.0339	-0.0723	-0.0729	0.1339	0.1343	0.6433	0.6427	1.2713	1.2520	(0.0000)	(0.0000)
Malaysia	0.0023	0.0025	0.0289	0.0292	-0.1419	-0.1427	0.1150	0.1172	-0.3720	-0.4420	2.5772	2.6080	(0.0000)	(0.0000)
Mexico	0.0054	0.0024	0.0317	0.0410	-0.1387	-0.3021	0.1042	0.1349	-0.3215	-1.3654	0.9389	8.9341	(0.0001)	(0.0000)
Philippines	0.0026	0.0020	0.0352	0.0366	-0.1252	-0.1358	0.1256	0.1422	-0.1270	-0.2348	1.2668	1.6116	(0.0000)	(0.0000)
Portugal	0.0006	0.0005	0.0195	0.0248	-0.1024	-0.0951	0.0895	0.1008	-0.1524	-0.1066	4.1134	1.4347	(0.0000)	(0.0000)
Taiwan	-0.0006	-0.0008	0.0518	0.0531	-0.2383	-0.2456	0.2331	0.2423	-0.1704	-0.1854	4.2902	4.3214	(0.0000)	(0.0000)
Thailand	0.0010	0.0010	0.0422	0.0422	-0.2675	-0.2663	0.2078	0.2097	-0.4668	-0.4527	6.3631	6.3212	(0.0000)	(0.0000)
Turkey	0.0093	-0.0013	0.0755	0.0776	-0.2933	-0.4277	0.2964	0.2875	-0.0470	-0.4335	1.7451	3.0208	(0.0000)	(0.0000)
Venezuela	0.0119	0.0053	0.0518	0.0668	-0.1793	-0.7071	0.2628	0.2331	0.7393	-3.0070	2.9793	35.5228	(0.0000)	(0.0000)
China	0.0004	0.0002	0.0741	0.0746	-0.2184	-0.2181	0.6015	0.6030	2.9991	2.9244	21.9672	21.5548	(0.0000)	(0.0000)
Hungary	0.0052	0.0020	0.0365	0.0369	-0.1222	-0.1174	0.1627	0.1640	0.6526	0.7607	3.7777	3.6605	(0.0000)	(0.0000)
Pakistan	0.0039	0.0020	0.0343	0.0344	-0.1143	-0.1143	0.1186	0.1186	0.2264	0.2500	0.9907	1.0026	(0.0006)	(0.0004)
Peru	0.0063	0.0041	0.0407	0.0422	-0.0917	-0.0966	0.1654	0.1683	0.7987	0.6425	1.9147	1.6736	(0.0000)	(0.0000)
Poland	0.0127	0.0099	0.0801	0.0800	-0.2748	-0.2781	0.2495	0.2508	-0.1585	-0.2340	2.0538	2.0815	(0.0000)	(0.0000)
South Africa	0.0039	0.0040	0.0218	0.0316	-0.0538	-0.0945	0.0693	0.1329	0.1368	0.3235	0.2685	2.0021	(0.5291)	(0.0000)
Sri Lanka	0.0005	-0.0005	0.0342	0.0341	-0.1405	-0.1391	0.1118	0.1186	0.0588	0.0606	2.1865	2.2324	(0.0000)	(0.0000)
Nigeria	0.0127	0.0064	0.0131	0.1088	-0.0087	-1.2828	0.0599	0.6242	1.5051	-8.3476	2.2562	116.2780	(0.0000)	(0.0000)
Zimbabwe	0.0125	0.0097	0.0329	0.0338	-0.1244	-0.1427	0.1395	0.1196	0.5510	0.1646	3.3042	3.4907	(0.0000)	(0.0000)
Composite	.	0.0006	.	0.0224	.	-0.1116	.	0.0944	.	-0.5657	.	4.9354	.	(0.0000)
Latin America	.	0.0033	.	0.0324	.	-0.1713	.	0.0887	.	-0.8775	.	3.4889	.	(0.0000)
Asia	.	0.0000	.	0.0262	.	-0.1194	.	0.1231	.	-0.3853	.	5.1616	.	(0.0000)

Table B.1 - Summary Statistics for Emerging and Mature Markets' Indices Returns - Weekly Data, January 1990-December 1996 (cont.)

II. FT&SP Indices

US $

	Mean	Median	Standard Deviation	Minimum	Maximum	Skewness	Excess Kurtosis	Normality *p*-value
World	0.0014	0.0024	0.0163	-0.0601	0.0636	-0.0440	2.0635	(0.0000)
Japan	-0.0009	-0.0012	0.0325	-0.1281	0.1202	0.2221	2.2845	(0.0000)
UK	0.0023	0.0019	0.0213	-0.0633	0.1160	0.5009	2.3625	(0.0000)
US	0.0027	0.0038	0.0154	-0.0495	0.0526	-0.0206	0.5085	(0.1390)
Germany	0.0015	0.0024	0.0258	-0.0944	0.0839	-0.4471	1.6029	(0.0000)
Spain	0.0016	0.0004	0.0268	-0.0950	0.0869	-0.0967	0.9718	(0.0006)

Table B.2 - Summary Statistics for Emerging and Mature Markets' Indices Returns - Monthly Data, 1982-1995

This table shows the descriptive statistics of monthly total returns for the IFC Global 26 Individual +1 Composite +2 Regional Emerging Markets indices and for a set of MSCI mature markets' indices over the period February 1982 or inception (if later)-August 1995. The data was obtained from Datastream. *, ** and *** mean statistical significance at a 10 percent, 5 percent and 1 percent level. The p-values refer to the Bera-Jarque normality test.

I. IFC Global Indices

	Start	Mean		Std Deviation		Minimum		Maximum		Skewness		Excess Kurtosis		Normality p-value		Autocorr				
		Local	US \$	Local	US \$	Local	US \$	Local	US \$	Local	US \$	Local	US \$	Local	US \$	Order1	Order2	Order3	Order4	Order12
Argentina	Feb-82	0.1711	0.0236	0.4341	0.2174	-0.3908	-0.6495	2.6924	0.9596	3.5434	2.6380	16.0053	13.0627	(0.0000)	(0.0000)	-0.0070	-0.0040	0.1150	-0.1340*	-0.0930
Brazil	Feb-82	0.1971	0.0314	0.2952	0.1910	-1.0000	-0.5689	1.0045	0.5753	0.1699	0.3940	2.0321	0.4930	(0.0000)	(0.0532)	0.0370	-0.0090	-0.0710	-0.1188	0.0090
Chile	Feb-82	0.0353	0.0216	0.0826	0.0881	-0.2623	-0.2803	0.2219	0.2185	-0.1926	-0.1609	0.4013	0.0965	(0.3497)	(0.6815)	0.2860***	0.0540	-0.0120	0.0370	0.0480
Colombia	Jan-85	0.0490	0.0321	0.0912	0.0901	-0.1648	-0.1746	0.4005	0.3734	1.5107	1.5028	4.0062	3.7373	(0.0000)	(0.0000)	0.4830***	0.1580*	0.0160	-0.0770	-0.1020
Greece	Feb-82	0.0213	0.0133	0.1105	0.1139	-0.2696	-0.3081	0.5984	0.5858	1.7698	1.6440	6.3703	5.9363	(0.0000)	(0.0000)	0.1290	0.1700	0.0050	-0.1120	-0.0500
India	Feb-82	0.0206	0.0126	0.0931	0.0885	-0.2460	-0.2438	0.4705	0.3527	0.9884	0.6517	3.3721	1.5639	(0.0000)	(0.0000)	0.1530*	-0.0540	-0.0160	-0.0730	-0.1260
Indonesia	Jan-89	0.0100	0.0051	0.0921	0.0921	-0.2058	-0.2088	0.2033	0.1960	0.1045	0.1476	-0.2050	-0.2357	(0.8872)	(0.8218)	0.1630	0.0730	-0.0110	0.0030	0.1220
Jordan	Feb-82	0.0090	0.0046	0.0458	0.0471	-0.1284	-0.1285	0.1819	0.1615	0.8452	0.3994	1.5603	1.0302	(0.0000)	(0.0031)	-0.0091	-0.1066	0.1947***	-0.0517	0.1375
Korea	Feb-82	0.0169	0.0166	0.0776	0.0789	-0.1843	-0.1925	0.2642	0.2658	0.5920	0.5616	0.3360	0.2228	(0.0058)	(0.0116)	-0.0008	0.0975	-0.0772	0.1218	-0.0063
Malaysia	Jan-84	0.0144	0.0143	0.0791	0.0786	-0.3112	-0.3059	0.2736	0.2098	-0.3663	-0.4831	2.1710	1.5889	(0.0000)	(0.0001)	-0.0390	0.1472	-0.1279	0.0064	-0.0322
Mexico	Feb-82	0.0576	0.0258	0.1314	0.1406	-0.4135	-0.5932	0.4306	0.3960	-0.1161	0.0258	1.3833	4.2073	(0.0013)	(0.0000)	0.2492***	-0.0505	-0.0959	-0.0563	-0.0635
Nigeria	Jan-85	0.0387	0.0144	0.0452	0.1584	-0.0389	-0.7022	0.2540	0.9951	2.5428	1.0510	9.5960	16.5181	(0.0000)	(0.0000)	0.0001	-0.0615	-0.1189	-0.1202	0.0248
Pakistan	Jan-85	0.0217	0.0116	0.0703	0.0629	-0.1582	-0.1880	0.3510	0.2607	1.5909	0.6166	6.4655	3.8810	(0.0000)	(0.0000)	0.2378	-0.1194	-0.1363	0.0889	-0.0453
Phillipines	Jan-85	0.0385	0.0361	0.1111	0.1069	-0.2740	-0.2930	0.5120	0.4241	1.0467	0.6399	3.7718	2.5577	(0.0000)	(0.0000)	0.2515***	0.0616	0.0450	0.0703	0.0393
Portugal	Mar-86	0.0255	0.0263	0.1256	0.1269	-0.3258	-0.2930	0.7305	0.7084	1.8761	1.7947	9.0512	7.5015	(0.0000)	(0.0000)	0.2688***	0.0282	-0.0167	0.2418**	0.0353
Taiwan	Jan-84	0.0238	0.0272	0.1444	0.1465	-0.3576	-0.3552	0.5324	0.5334	0.4781	0.5525	1.7802	1.6913	(0.0000)	(0.0000)	0.0771	0.0104	-0.0540	0.0453	0.0801
Thailand	Feb-82	0.0244	0.0240	0.0810	0.0811	-0.3382	-0.3382	0.3354	0.3301	-0.1149	-0.1218	3.5326	3.3365	(0.0000)	(0.0000)	0.0719	0.0674	-0.0811	-0.1944**	0.0309
Turkey	Feb-87	0.0770	0.0376	0.2012	0.2070	-0.3056	-0.3145	0.7480	0.6931	0.9596	0.8773	1.0236	0.8215	(0.0000)	(0.0003)	0.1895*	0.1330	0.0962	0.1423	-0.2029*
Venezuela	Jan-85	0.0402	0.0175	0.1159	0.1310	-0.2541	-0.4979	0.4588	0.4855	0.6103	0.1408	1.9123	3.0209	(0.0000)	(0.0000)	0.2130**	0.1542*	0.0539	0.0470	-0.0711
Zimbabwe	Feb-82	0.0316	0.0165	0.0966	0.1002	-0.2305	-0.2515	0.4889	0.4496	0.5384	0.3642	3.0712	1.9443	(0.0000)	(0.0000)	0.1549**	0.2588***	0.2337***	0.1441*	-0.0536
China	Jan-94	-0.0044	-0.0017	0.2539	0.2570	-0.2076	-0.2046	0.9832	0.9973	3.3663	3.3632	13.0780	13.0436	(0.0000)	(0.0000)	-0.1040	-0.1880	0.0490	-0.1120	
Hungary	Feb-94	0.0024	-0.0087	0.1390	0.1342	-0.2344	-0.2331	0.4584	0.4408	1.8488	2.0052	6.2340	6.9761	(0.0000)	(0.0000)	-0.0890	0.0900	-0.2180	-0.0740	
Peru	Nov-93	0.0417	0.0400	0.1282	0.1287	-0.1825	-0.1856	0.3190	0.3264	0.4106	0.4208	0.0153	0.1746	(0.7341)	(0.7128)	0.0497	-0.2327	-0.2819	-0.1551	
Poland	Feb-94	-0.0015	-0.0073	0.2097	0.2053	-0.3094	-0.3170	0.4009	0.3924	0.5148	0.5131	-0.4130	-0.3395	(0.6144)	(0.6298)	-0.1274	-0.1147	-0.1857	-0.1945	
Sri Lanka	Nov-93	0.0061	0.0049	0.1050	0.1051	-0.1650	-0.1631	0.2074	0.2156	0.2043	0.2768	-0.6783	-0.6010	(0.7502)	(0.7364)	0.3068	0.0668	0.1662	-0.0823	
Composite	Jan-85		0.0152		0.0666		-0.2510		0.1948		-0.4822		1.7053		(0.0000)	0.2080**	0.0920	-0.1410	-0.0390	0.0660
Asia	Jan-85		0.0156		0.0713		-0.2534		0.2439		-0.4141		1.9968		(0.0000)	0.0280	0.1740	-0.0840	0.0940	0.0770
Latin America	Jan-85		0.0232		0.1057		-0.2961		0.3733		1.4773		1.4089		(0.0000)	0.2745***	0.0086	-0.1881	-0.1847**	-0.1118

Table B.2 - Summary Statistics for Emerging and Mature Markets' Indices Returns - Monthly Data, 1982-1995 (cont.)

II. MSCI Indices

US $

	Start	Mean	Std Deviation	Minimum	Maximum	Skewness	Excess Kurtosis	Normality *p*-value	Autocorr Order1	Order2	Order3	Order4	Order12
World	Feb-82	0.0129	0.0422	-0.1696	0.1177	-0.438	1.884	(0.0000)	0.034	-0.030	-0.028	-0.012	0.015
Japan	Feb-82	0.0146	0.0754	-0.1938	0.2426	0.255	0.458	(0.2032)	0.056	-0.077	0.047	0.042	0.027
UK	Feb-82	0.0146	0.0582	-0.2153	0.1596	-0.105	0.886	(0.0599)	-0.083	-0.099	-0.074	0.054	-0.098
USA	Feb-82	0.0134	0.0427	-0.2122	0.1328	-0.680	4.612	(0.0000)	-0.003	-0.003	-0.076	-0.098	-0.054
Germany	Feb-82	0.0154	0.0647	-0.1763	0.2023	-0.156	0.927	(0.0387)	-0.027	-0.001	0.102	0.140	-0.078
Spain	Feb-82	0.0148	0.0716	-0.2057	0.2672	0.344	1.144	(0.0023)	0.105	-0.064	-0.071	0.098	-0.049

Table B.3 - Summary Statistics for Individual Stocks - Weekly Data, January 1990-December 1996

This table shows the within-market averages of simple statistics over the period January 1990 to December 1996 for the constituent stocks of the IFC Global Markets Indices. These are US $ total returns from the Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. Markets listed above China have complete series. *N* is the number of constituents stocks of the IFCG indices at the end of 1996.

				US $		
	N	Mean	Median	Standard Deviation	Skewness	Kurtosis
Argentina	38	0.0017	-0.0003	0.0884	0.2990	3.300
Brazil	99	-0.0011	-0.0068	0.1068	0.1132	6.4695
Chile	51	0.0019	-0.0014	0.0515	0.5248	3.269
Colombia	27	0.0019	-0.0008	0.0587	0.4485	6.0002
Greece	69	-0.0032	-0.0062	0.0511	0.4624	3.6855
India	151	-0.0020	-0.0043	0.0651	0.5004	3.8505
Indonesia	110	-0.0039	-0.0014	0.0657	-0.3265	6.8669
Jordan	58	-0.0015	-0.0026	0.0400	0.4238	5.5423
Korea	185	-0.0046	-0.0080	0.0569	0.4636	1.6120
Malaysia	179	-0.0016	-0.0048	0.0544	0.4180	3.4647
Mexico	114	-0.0010	-0.0018	0.0672	-0.4863	13.7600
Philippines	71	-0.0012	-0.0022	0.0599	0.1713	3.9304
Portugal	46	0.0010	-0.0003	0.0405	0.1279	5.6851
Taiwan	113	-0.0003	-0.0017	0.0602	0.0325	3.4374
Thailand	115	-0.0074	-0.0090	0.0638	0.0553	3.4411
Turkey	64	-0.0003	-0.0070	0.1020	0.2514	2.8902
Venezuela	23	0.0030	-0.0009	0.0909	-0.3020	12.6678
China	174	0.0024	-0.0015	0.0887	1.3048	10.4881
Hungary	16	0.0038	0.0008	0.0640	0.4358	3.1708
Pakistan	87	-0.0038	-0.0046	0.0662	0.3327	4.3598
Peru	40	0.0006	-0.0033	0.0700	0.4898	2.878
Poland	28	0.0022	-0.0002	0.0689	-0.0469	1.7523
South Africa	65	0.0039	0.0013	0.0500	0.3664	1.8237
Sri Lanka	51	-0.0043	-0.0031	0.0605	0.0654	7.5937
Nigeria	16	0.0104	0.0066	0.0901	0.1232	8.8760
Zimbabwe	24	0.0071	0.0005	0.0812	0.2373	5.3194
All				0.0671	0.2645	5.5672

Table B.4 - Market Indices' Correlations - Weekly Total Returns, January 1990-December 1996
This table shows the correlation coefficients of the returns for emerging and mature markets' indices. Markets listed above China have complete series. The data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. FT&SP indices were obtained from Datastream.

I. Emerging Markets vs. World/Mature Markets: IFC/FT&SP Indices (US $)

	World	Japan	UK	US
Argentina	0.15	0.07	0.08	0.20
Brazil	0.20	0.15	0.10	0.16
Chile	0.06	-0.03	0.10	0.08
Colombia	0.03	0.01	0.01	0.01
Greece	0.26	0.22	0.22	0.06
India	-0.04	-0.02	0.03	-0.07
Indonesia	0.05	-0.01	0.07	0.00
Jordan	0.09	0.10	-0.02	0.02
Korea	0.21	0.19	0.08	0.13
Malaysia	0.45	0.33	0.33	0.23
Mexico	0.30	0.18	0.18	0.25
Philippines	0.22	0.11	0.19	0.16
Portugal	0.43	0.33	0.35	0.16
Taiwan	0.27	0.19	0.14	0.17
Thailand	0.32	0.19	0.23	0.23
Turkey	0.17	0.14	0.14	0.08
Venezuela	-0.04	-0.08	0.08	-0.01
China	-0.01	0.04	-0.04	-0.08
Hungary	0.17	0.04	0.10	0.12
Pakistan	0.02	0.02	0.01	0.03
Peru	0.26	0.14	0.18	0.18
Poland	0.08	-0.03	0.12	0.12
South Africa	0.25	0.15	0.18	0.08
Sri Lanka	-0.06	-0.02	-0.03	-0.08
Nigeria	-0.13	-0.20	0.00	0.04
Zimbabwe	0.05	-0.03	0.05	0.07
Composite	0.45	0.31	0.28	0.30

II. World/Mature Markets: FT&SP Indices (US $)

	World	Japan	UK	US	Germany	Spain
World	1.00					
Japan	0.84	1.00				
UK	0.62	0.36	1.00			
US	0.66	0.28	0.34	1.00		
Germany	0.58	0.37	0.54	0.27	1.00	
Spain	0.60	0.37	0.53	0.37	0.59	1.00

Table B.5 - Structural Change in Correlations - *z* Test

Emerging Markets vs. World

This table shows the correlation coefficients of monthly and weekly returns, between the IFC Global market indices and the MSCI (or the FT&SP) World index, for two sub-periods. Markets with very short series are excluded. *p*-values are for the z-statistic of testing if the difference in correlations for each sub-period is zero. The Data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank and Datastream.

Monthly Data

	Argent	Brazil	Chile	Colomb	Greece	India	Jordan	Korea	Malaysia	Mexico	Nigeria	Pakistan	Philipp	Taiwan	Thailand	Venez	Zimbab
Feb82-Jun87																	
N Months	65	65	65	29	65	65	65	65	29	65	29	29	29	29	65	29	65
Correlation	0.07	-0.09	0.12	0.11	0.08	-0.04	-0.02	0.14	-0.03	0.04	0.37	-0.07	0.09	0.14	-0.04	-0.07	0.07
Jan88-Aug95																	
N Months	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Correlation	-0.19	0.22	-0.03	0.13	0.11	-0.19	0.28	0.41	0.61	0.23	0.11	0.09	0.45	0.16	0.46	-0.11	0.06
p-z	(0.0885)	(0.0495)	(0.2236)	(0.4641)	(0.4443)	(0.2090)	(0.0505)	(0.0618)	(0.0011)	(0.1611)	(0.1251)	(0.2611)	(0.0505)	(0.4681)	(0.0020)	(0.4286)	(0.4801)

Table B.6 - Structural Change in Correlations - Wolak Inequality Test
Emerging Markets vs. World

This table reports the figures of the Wolak inequality test. Here I define three sub-periods and compare the world beta coefficients - from regressions of the IFC Global market returns on the MSCI (or FT&SP) World index - and test if those coefficients are monotonically increasing. Panel I shows the unrestricted betas. Panel II gives the betas from imposing the restriction dictated by the null hypothesis that betas are increasing. Panel III shows the Wald statistics. The first row gives the statistic of the test that betas are monotonically increasing; if this hypothesis is not rejected, one proceeds to test the null of constant world betas against the alternative of increasing world betas: the second row shows the statistic of that test. Finally, Panel IV shows the *p*-value for the tests on the differences in correlations for any two sub-periods. The analysis is restricted to those markets whose series are long enough to be partitioned in three sub-periods - respectively 10 and 17 markets for monthly and weekly data. Data was obtained from IFC and Datastream.

Monthly Data

I. Unrestricted Betas

Period	Argent	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Thailand	Zimbab
Mar82-Jul86	0.0214	0.1364	0.4477	-0.0614	0.0888	0.1739	0.4207	-0.0197	-0.0266	0.1227
Aug86-Jan91	-0.6213	0.4797	0.2916	0.4562	-0.2620	0.1592	0.4886	1.8191	1.2972	-0.1174
Feb91-Jun95	1.1804	1.3999	0.3496	0.8540	-0.3113	0.1392	0.4412	0.6040	0.2867	-0.0227

Note: The three sub-periods consist of 53 months.

II. Restricted Betas

	Argent	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Thailand	Zimbab
Mar82-Jul86	-0.4272	0.1274	0.3387	-0.0621	-0.1897	0.1553	0.4190	-0.0197	-0.0267	-0.0449
Aug86-Jan91	-0.4266	0.4803	0.3399	0.4560	-0.1892	0.1585	0.4757	1.4887	1.0258	-0.0440
Feb91-Jun95	1.1804	1.4014	0.3499	0.8555	-0.1862	0.1616	0.4779	1.4892	1.0263	0.5919

III. Wald Statistic*

	Argent	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Thailand	Zimbab
Inequality†	0.27	0.00	0.13	0.00	1.34	0.03	0.00	2.45	6.12	0.29
Equality††	3.60	2.41	0.00	4.49	0.00	0.00	0.04	3.44		1.96

Notes:

† Wolak Inequality Test

H0: World betas are monotonically increasing.

H1: World betas are unrestrained.

†† Wolak Equality Test

H0: World betas are constant.

H1: World betas are increasing.

* Wald Test Critical Values Bounds

Significance	Lower	Upper
5%	2.71	5.14
10%	1.64	3.81

Source: Kodde and Palm (1986, table 1, page 1246).

Table B.6 - Structural Change in Correlations - Wolak Inequality Test (cont.)
Emerging Markets vs. World

Monthly Data

IV. Equality *z* Test‡

	Argent	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Thailand	Zimbab
$Beta_{II}$>$Beta_{I}$	(0.6804)	(0.0409)	(0.3843)	(0.1244)	(0.8501)	(0.4040)	(0.2937)	(0.0145)	(0.0000)	(0.7868)
$Beta_{III}$>$Beta_{II}$	(0.0241)	(0.8523)	(0.5899)	(0.2007)	(0.3580)	(0.6224)	(0.7392)	(0.9108)	(0.9994)	(0.0586)
$Beta_{III}$>$Beta_{I}$	(0.0659)	(0.0754)	(0.4733)	(0.0232)	(0.7495)	(0.5275)	(0.5391)	(0.2008)	(0.2285)	(0.2203)

‡ The null hypothesis of the *z*-test is that the difference between two correlation coefficients from two different sub-periods is zero. The alternative hypothesis is that the coefficients are strictly increasing. Under the null, the *z*-statistic has a normal distribution. I, II and III refer to the first, second and third sub-periods here in analysis.

PART II : LITERATURE SURVEY

CHAPTER 3.

INTERNATIONAL ASSET PRICING AND PORTFOLIO DIVERSIFICATION

Chapter 2 has illustrated how stock markets in emerging markets have changed in recent years in terms of barriers. Documenting the removal of barriers does not, however, allow us to assert what happens with the pricing structure. Neither does the presence of foreigners. Yet the stylised facts suggest that these stock markets must have moved towards more integration with the world market. *A priori,* I expect that, in general, pricing in emerging markets has to be interpreted within a partial segmentation framework.

In this chapter I review how the International Asset Pricing literature has handled the integration of capital markets. I start by locating the issue of integration of stock markets within the International Asset Pricing theory and I then survey the work that has addressed this particular issue. I review the empirical literature and I dedicate a separate section to the literature on the benefits of international diversification. Given that extensive data on emerging markets is available from very recently, most of the existing evidence is from mature markets. Yet, in this decade, and following the importance of these markets to investors, an important set of papers has been completed. I dedicate separate sections to review those. I pay special attention to the studies on country funds, dual listings and factors in stock returns because these are the issues I investigate in the dissertation. For the purpose of this chapter I will address these issues from the point of view of international asset pricing. Alternative or complementary approaches to these issues will be discussed in more detail in the chapters that follow.

3.1 INTRODUCTION

International portfolio choice and asset pricing theories attempt to understand how the existence of country-specific investment and consumption opportunity sets affect the portfolios held by investors and the expected returns of assets (Stulz, 1994).

3.2 THE PARADIGM

<u>International Capital Asset Pricing Model (ICAPM)</u>

International asset pricing models emerged as an extension of their domestic counterparts. The ICAPM asserts that the real excess return of an asset depends on the sensitivity of that asset to the world market portfolio and on the world real risk premium. In countries where inflation has little systematic risk and under some other necessary assumptions, this result can be extended to nominal returns. The necessary assumptions are that either Purchasing Power Parity (PPP) holds, no correlation exists between exchange rate movements and stock returns and consumption deflators are deterministic; or a real risk free rate asset exists (money inflation has no influence in equilibrium consumption and investment decisions) and there is no correlation between exchange rate movements and stock returns; or that investors have logarithmic utility functions.

International Arbitrage Pricing Theory Model (IAPT)

Solnik (1983) shows that if the exchange rates follow the same factor structure as stock prices, the IAPT holds internationally. In this case, the currency of returns becomes irrelevant and the priced factors can be obtained from the universe of stock returns. Hence under Solnik's assumptions, the relation between the international APT and the domestic APT is the same as the relation between the international CAPM and the domestic CAPM.

Korajczyk and Viallet (1989) find that multi-factor models tend to outperform single index models in both domestic and international forms.

International Consumption Asset Pricing Model (IAPM)

While the CAPM and the IAPT perform reasonably well in predicting conditional expected excess returns, these models fail in the aspect that, empirically, investors show a strong preference for the assets of their home country. The literature proceeded thus in changing two assumptions that were crucial to the derivation of IAPM: investors no longer face identical consumption sets or investment sets.

In the case of different consumption sets, this could arise from different relative price changes across countries or different preferences across investors according to their country of residence. Purchasing Power Parity fails in both cases, and if PPP does not hold, then investors hold different portfolios across countries to hedge against unanticipated changes in the cost of their consumption basket, since that cost evolves differentially across countries. Changes in the relative costs of consumption baskets affect asset demands and hence expected returns. The resulting models are different from the ICAPM in that investors across countries no longer hold the same portfolio of risky assets. These models lead to a pricing equation where the risk of assets is measured in terms of the covariance of their return with consumption growth in what is traditionally called the international consumption beta model. The international consumption beta model has the advantage of holding, irrespective of the assumptions made about exchange rate dynamics, and of allowing for changes in the investment set.

Stulz (1981) develops a model of international asset pricing on the assumption of full integration. Consumption opportunity sets differ across countries. The real expected return of a risky asset is proportional to the covariance of the home country return of that asset with changes in the world real consumption rate. Adler and Dumas (1983) develop a similar consumption-based asset pricing model. Stulz (1984) shows how differences across countries - inflation rates, consumption baskets, investment opportunity sets - lead to different portfolios and different expected returns when one applies capital asset pricing models in an international setting.

Empirical evidence reveals that these models do rather well in explaining the cross-sectional distribution of returns across countries but they are not as well able to explain the huge differences in asset holdings across countries given the small variability in inflation rates. Cooper and Kaplanis (1991) provide evidence that the magnitude of the home bias cannot be explained solely by a framework with deviations from purchasing power parity, such as the Adler and Dumas (1983) model.

3.3 INTEGRATION/SEGMENTATION

Integration is defined as a situation where investors earn the same risk-adjusted expected returns on similar financial instruments in different national markets. If a market is segmented, international investors would not participate. Thus securities in the segmented market would be priced on the basis of local rather than international standards. There are different causes behind segmentation: information barriers, transaction costs, discriminatory taxation, foreign exchange risk, political risk and regulatory or foreigners' ownership restrictions. Examples of information barriers are language, accounting principles and quality of disclosure. Transaction costs could be a result of taxes, high quotation spreads, fixed brokerage commissions and lack of competition among brokers. Political risk involves government intervention and other unpredictable political behaviour and is a function of legal and political infrastructures (for example, capital markets laws and a proper judicial system). Strict controls on the use of foreign exchange or on the use of national capital markets by foreign firms and investors, restricted cross-border bank lending, high tariff walls and lack of both a liquid forward and a derivative market make a market unattractive. Similarly, small country markets' illiquidity discourages institutional investors' participation.

Documenting barriers to investment is not sufficient to prove segmentation. Also the covariance matrix says very little about the presence or absence of segmentation. Besides problems like rates of return non-stationarity and computations in nominal US $, the correlation matrix - individual securities vs. world market portfolio - reflects similarities in the cash-flow structures, and not only that the pricing rule is different or the same across countries.

Tests that used ICAPM or other models as the null hypothesis, i.e. assuming integration across international stock markets, are not very powerful when the abnormal returns resulting from barriers to international investment are small and the alternative hypothesis is not specified. As remarked by Adler and Dumas (1983)

"... tests should try to derive competing capital asset pricing models (or APT) with and without segmentation and to confront them with data to see which one fits better rather than just studying extreme situations; variations should employ continuous parameters of segmentation ... ".

These tests basically consist of fitting alternative international asset pricing models to stock price data. There have been relatively few works addressing explicitly the effects of barriers to international investment and testing these models has proved hard because it is very difficult first to isolate and quantify an important - effective, binding - barrier, and then, to investigate its impact on portfolio behaviour and on the asset pricing relationship. Additionally, these tests are always joint tests of the hypothesis that capital markets are integrated and of the asset pricing model itself. An alternative procedure assesses integration by examining whether the law of one-price holds for similar securities across markets.

Other approaches have been suggested to test segmentation. For example, several studies have looked at the stock price movements across different markets. The initial empirical studies were based on correlation analysis but more recent studies use co-integration, error correction and VAR analysis.[46] Other studies measure integration by looking at the commonality of important factors in explaining the cross-section of equity returns: if stock returns are influenced by the same factors then markets are considered integrated. The problem with all these tests is that they may fail to capture the degree of capital market integration. They may find similarities in index returns paths and in the return factor structure but this may be caused by a close cash flow structure of the

[46] See, for example, Eun and Shim (1989), Arshanapalli, Doukas and Lang (1995) or Engle and Susmel (1993).

economies of those markets (or stock markets' indices). Furthermore, these markets may have their capital markets segmented by virtue of frictions that limit accessibility to local capital markets.

3.3.1 EARLY INTERNATIONAL ASSET PRICING MODELS

The earlier papers of Solnik (1974[1], 1974[2], 1977) on international asset pricing focused on developing and testing the hypothesis that the Lintner-Mossin CAPM was valid across borders under certain restrictions concerning foreign exchange risks. These studies assumed integration and consequently that securities were priced according to their international systematic risk. In spite of their simplifying assumptions, these early studies revealed that the domestic beta of a stock gives useful information on the relative risks of a security, reflecting its large dependence on national factors.

Grauer, Litzenberger and Stehle (1976) showed that, under uncertainty, when commodities and assets flows are unrestricted across national boundaries, a country's demand for risk and riskless capital depends not only on the risk preferences of its residents but also on the risk preferences of other countries, the world real rate of interest and the market value of its holdings of securities relative to the market value of all securities. Barriers to trade can modify a country's demand for risk and riskless capital, however, because the real purchasing power of nominal payoffs changes and so do the equilibrium relative asset prices and portfolio allocation of assets across countries.

Stehle (1977) is the among the first to test whether a valuation model that assumes no barriers to international capital flows, predicts rates of return better than a model that assumes complete segmentation. The two models imply different definitions of security risk: in an integrated capital market, both the domestic and foreign securities will, in general, permit a greater degree of diversification than that available in a segmented capital market. Evidence from stocks on the New York Stock Exchange, for the period January 1986-December 1975, is not able to reject either of the two models.

Jorion and Schwartz (1986) study the integration/segmentation issue by looking at two types of Canadian firms: domestic and inter-listed stocks. If indirect barriers were to be the only source of segmentation then stocks listing in the US would be integrated as opposite to purely domestic stocks. The evidence using monthly returns for 749 securities, from January 1963 to December 1982, was not able to reject the ICAPM for both types of securities.

Cho, Eun and Senbet (1986) were the first to test the APT in an international setting. Using inter-battery factor analysis, they found, on average, three to four world-wide common factors. The number of factors may be understood as reflecting the complexity of the economic relationship between two countries. Using a sample of 349 stocks representing eleven countries for the period January 1973-December 1983, they reject the joint hypothesis that capital markets are integrated and that the IAPT holds.

Gultekin, Gultekin and Penati (1989) use an event study methodology to test whether government control barriers are effective and thus a source of segmentation. They studied the Japanese case before and after the Foreign Trade Control Law (12/80). If the controls were the only source of segmentation, it should be possible to reject the hypothesis that the price of risk - defined in terms of multi-factor asset pricing models - was the same in Tokyo and New York stock exchanges before the end of 1980 but not after. Their data consists of weekly stock returns from January 1977 to December 1980 and January 1981 to December 1984 for two sets of 110 securities in the US and in Japan. They reject integration before 1980 but are unable to reject the null hypothesis after 1980.

Wheatley (1988) provides some tests of international equity market integration that use a simple version of the consumption-based asset pricing model (Stulz, 1981). His sample consists of seventeen countries from January 1960 to December 1985. He finds weak evidence against the joint hypothesis that equity markets are integrated internationally and that the consumption-based asset pricing model holds.

In general the evidence of these papers, using models of expected returns, indicate weak rejection of international capital market integration.

3.3.2 MODELLING BARRIERS

3.3.2.1 Modelling Explicitly Barriers to International Investment

The literature addressing the effects of barriers on international investment can be divided into two broad approaches:

- the "tax" approach, that treats barriers as a tax. Investors have a cost in holding the international securities and, therefore, demand a higher gross return.

- the investment opportunity/diversification approach. In a fully integrated market only the systematic risk relative to the world market portfolio is priced. In a fully segmented market, however, only the risk associated with the local market factor is priced. The fact that investors have different benchmark portfolios and different risk premia results in different required returns. Investors hold less diversified portfolios, have lower diversification benefits and thus require higher returns. Integration can result in lower required returns and a higher price than under segmented markets because of the benefits of diversification.

One aspect that is often omitted is the way the prices are set. When both international and local investors trade on the same board, it is crucial to understand who are the marginal investors that set the price. Most of the time, implicitly, the models assume that price is given. If supply is introduced into the analysis one has to consider not only the effect on required returns that arises from different investment sets, but also the effect on returns resulting from demand and supply forces.

Whatever the approach used, all the models that appear in the literature rely on very similar frameworks with small differences in the investor's utility function (quadratic, negative exponential) and on the type of segmentation considered.

The "Tax" Approach

The "tax" approach was introduced by Black (1974) and modified later by Stulz (1981). The primary feature of this type of model is that they consider explicitly the barriers in terms of a cost associated with holding foreign securities in a portfolio. This cost may represent transaction costs, information costs, differential taxation or any other barriers, like the possibility of expatriation of foreign holdings, direct controls on import and export of capital, reserve requirements on bank deposits or other assets held by foreigners, or restrictions on the fraction of a company a foreigner can hold.

Both the two papers referred to above, assume that this cost can be represented as proportional taxation and use a two country single-period model for the analysis. In the Black model the tax is on an investor's net holdings (long minus short position) of risky foreign assets, while in the Stulz model the tax, on both the long and short positions, is positive (with the result that in his model some assets are not traded). Both models foresee that the expected return on a foreign asset held long will exceed the expected return on a free asset of equal risk, by the rate at which holdings of the asset are taxed. This assures that the after "tax" returns are the same. Both models show that the world market portfolio will not be efficient for any investor across markets.

The Investment Opportunity/Diversification Approach

The main problem with the previous models is that they do not explain why there are differential expected returns in the first place. In completely segmented markets, where international investors are absent, prices are set by local investors that do not face such barriers to investment and yet the pricing rule is different from that prevailing in the major markets.

Errunza and Losq (1985) address that issue. While in Stulz (1981), the cost of investing abroad is finite, in their model it is prohibitively high, and thus access to capital markets of many countries is severely restricted for international investors. In this model, international investors are prohibited from investing in a subset of foreign securities, whereas the local investors have unlimited access to the internationally traded securities.[47] The authors derive a closed-form solution for the equilibrium risk-return trade-off in such a structure of segmented markets with unequal access. The securities that are inaccessible to international investors command a super risk premium that is proportional to the conditional market risk. This super risk premium depends on the risk tolerance of the foreign investors and on the correlation structure of the returns. If it is the case that a "diversification home-made portfolio" can duplicate the ineligible securities, then the super risk premium disappears and assets are priced world-wide as if markets were integrated.[48] Using data from the US and from nine developing countries for the period 1976-1980, they find results that are not statistically inconsistent with the "mild" segmentation hypothesis.

Some papers test the predictions about portfolio holdings of foreign assets. The stylised fact is a very large home-bias. If all markets precluded the investment of non-residents, or informal barriers were infinitely high, then extreme home-bias would be expected. The facts suggest, however, that not all markets in the world are closed to foreign investors. One of the issues this approach tries to quantify is how large the costs of investing abroad have to be, to justify the loss in terms of diversification benefits the observed home-bias embodies.

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[47] This is a common assumed scenario that tried to capture the reality in emerging markets at the beginning of this decade. Yet, and as I have documented above, in general, emerging markets' investors face outward restrictions. The imperfect risk sharing for the restricted securities will be compensated by this: while emerging markets' investors would rather diversify their portfolios internationally, they have to live with the fact they are confined to local assets. In terms of the free securities, this assumption is not central because emerging markets' investors have little impact on the global market.

[48] Errunza, Hogan and Hung (1995) develop an asset pricing model that captures the time-varying ability of US traded assets to substitute restricted emerging markets' assets. Following Errunza and Losq (1985), the authors analyse the effects of time-varying correlations between a diversification portfolio and the restricted assets. Time-varying conditional market risk is captured using a bivariate GARCH. The "diversification portfolio" is a portfolio of eligible securities which is most correlated with the ineligible index. Specifically they use 3 US market indices, 12 US industry indices, 30 large US multinationals stocks, 7 country funds and 3 ADRs to proxy that portfolio. Using the E-L Integration index (given by the ratio of conditional and unconditional variance of ineligible securities) the authors analyse the degree and the variation of market integration over the period of 1976 to 1993, and find that either the removal of restrictions or the introduction of country funds is associated with increase in the integration index. Bekaert and Harvey (1995) perform a similar analysis to characterise the time path of integration for a group of 12 emerging markets but focusing on the impact of changing investment barriers.

The second part of the Cooper and Kaplanis (1991) paper looks for the level of dead-weight costs required to explain the part of the home country bias, that cannot be accounted for by PPP deviations.[49] Allowing the costs of holdings to vary by investor and asset held, they find estimates of dead-weight costs of the order of a few percent per annum consistent with observable direct costs like withholding taxes and other restrictions on portfolios. A recent article by Baxter and Jermann (1995) claims the home bias is even larger than has been documented. This results from the fact that the largest component of wealth consisting of non traded human capital is highly correlated with domestic marketable assets. To attain diversification, investors would have to have short position in domestic marketable assets.

Brealey and Kaplanis (1988) assess the effect of constraints on overseas portfolio investment, on the welfare of both the residents of the country that imposes the exchange controls, and those of the country that is free from such controls. They develop a model where the imposition of exchange controls on outgoing portfolio investment imposes a welfare loss on the international (free) investor and a gain on the foreign investor. This paper is innovative in that it considers two effects of the existence of barriers: the loss of diversification, as usual, and the inventory effect reflected on changes in relative prices.

Stulz and Wasserfallen (1995) analyse what is behind some regularities in the Swiss stock market; namely the existence of ownership restrictions, the different pricing of two classes of shares, and the observed adjustment on prices that follows a release of barriers. The authors propose a theory of foreign equity investment restrictions which shows the conditions under which the imposition of binding ownership restrictions maximises firm value. When there exist different demand functions - because of different dead-weight costs, in the domestic and in the foreign country - of Swiss shares for Swiss and international investors, price discrimination will be optimal if the international investors' demand is less price-elastic than the domestic demand. As the price elasticity of international investors' demand increases it may become optimal to remove all restrictions in share ownership. This model differs from previous models that assumed international investors' demand is perfectly price-elastic, and that consequently preclude price discrimination. The price elasticity is usually considered to be high because of the

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[49] Uppal (1992) provides an exhaustive survey of the literature on international portfolio choice models, focusing specifically on the ones that explain the home bias in equity portfolios. He identifies three major explanations: home inflation hedging; institutional barriers to foreign investment; and transaction costs and taxes. The literature does not provide unambiguous support to the first hypothesis. The existing studies suggest that the second and latter hypotheses can only account for a small part of the bias effectively observed.

presumption that there are many close substitutes for each individual security.[50] This model is also innovative in assuming that only a part of international investors (usually large investors) are interested in investing in those domestic securities. For most other investors, price discrimination and dead-weight costs make investment in Swiss shares unattractive. Empirical tests based on weekly data for 19 Swiss firms, for the period of 1985 to 1989, show that the asset supply is important in explaining the premium between unrestricted and restricted shares. This result is different from the results of traditional mean variance frameworks, where only the demand is relevant to price securities.

3.3.2.2 The Law of One Price

One would expect that two assets with identical claims have the same price in a world with perfect international capital markets and homogeneous investors. The law of one price should hold if international capital markets are integrated. When there are barriers to international portfolio investment, investors face different investment sets and have different pricing rules. If there is evidence that the law of one price does not hold, then we can reject the integration hypothesis. The papers described below model the different pricing rules in a mildly world market structure. Under mild segmentation, the expected returns of a restricted security consist of a global risk premium and a super risk premium that depends on the availability and uniqueness of that security.

Two Boards

These papers consider the existence of barriers that restrict but do not prohibit the ownership of assets and were motivated by stock markets like Thailand, the Phillipines and Malaysia. There are two boards. On the Main board, local investors trade the shares reserved for them; on the Alien board, either all investors, or international investors only, trade the unrestricted shares, as soon as the "quota" assigned to international investors is reached. Arbitrage is usually not allowed between the two markets.

Eun and Janakiramanan (1986) derive a closed-form valuation model in a two country, two investors' world in which the international investors are constrained to own at most a fraction of the number of shares outstanding of the local firms. They assume that these restrictions are constant across firms. There are no restrictions imposed upon investors of the local country who invest abroad.

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[50] In an international setting, however, it may be the case that some securities offer unique diversification benefits.

When the ownership constraint is binding on the international investors, their demand for the local security is higher than the supply of local securities assigned to them. International investors are willing to pay a price higher than they would have paid under no restrictions. Similarly for local investors: since their demand is less than the supply, they require higher returns. The securities will be selling at a discount for the local investors on the restricted board. Consequently, there will be two different prices for local securities. They show the premium of unrestricted to restricted shares depends on the covariance matrix of returns, on the aggregate risk aversion of international and local investors, and on the relative size of the local vs. the world markets. In order to preclude arbitrage opportunities, it is assumed that local investors cannot purchase the security at a lower price and sell it a higher price to the international investors.

Hietala (1989) develops and tests a similar asset pricing model which takes into account the legal restrictions in the Finnish stock market. From 1984 to 1986, Finns were prohibited from investing in international securities and international investors were allowed to invest in up to 20% of the shares of any Finnish company. There were two types of securities, trading on different boards. The most important implication from his equilibrium model is the fact that, for all stocks, there exist two separate prices, one for each group evaluating the stock. The equilibrium market prices for the unrestricted stocks (those that international investors may hold) are determined by the demand of the investor group, for which the required rate of return is lower. Thus, an unrestricted stock is traded at a premium, if the price of the unrestricted stock is determined by international investors that require a lower risk premium than Finnish investors do.

Hietala's evidence is based on 23 stocks traded on the restricted and the unrestricted boards (domestic investors can hold both types of shares), for the period of January 1984 to June 1985. The model is able to explain why some of the unrestricted stocks are traded at premium prices while some other unrestricted stocks carry no such premia depending on their exposures to the local market and on the liquidity of the stocks.

Bailey and Jagtiani (1994) look at the cross-sectional differences between local and foreign prices in the Thai market. When a restriction is binding for a specific security, the securities allocated to international investors trade in a different board - the Alien Board - from the one where local investors trade - the Main Board. The securities that trade on the Alien Board usually trade at premium relative to their counterparts trading on the Main Board. The authors investigate the pricing rule for each of the boards and the determinants of the cross-sectional differences in premia. Results based on monthly observations for 27 companies, from January 1988 to December 1992 show that Alien and Main Board returns have different loadings on the World and Thai risk factors. The difference between realised returns in the two boards seems to result not only from those differences in risk exposures but also from differential risk premia. The cross-sectional variability in premia is driven by the differences between the Alien and Main Board betas, by the severity of foreign ownership limits/relative supply, and by the liquidity and size of the stocks.

Domowitz, Glen and Madhavan (1997) investigate the cross-sectional and time series determinants of price premia in Mexico. Ownership restrictions result in different prices for restricted and unrestricted shares and premia variation may arise from different valuations of the underlying cash flows, relative scarcity of unrestricted shares or differences in liquidity.[51] They find strong support for the first two explanations.

Bailey, Chung and Kang (1996) extend this analysis to 11 markets. They analyse the period from January 1988 to February 1996. The authors analyse whether an international asset pricing-based explanation is able to explain these premia together with other alternative explanations. There is strong evidence of significant differences in risk exposures and risk premia in the unrestricted and restricted markets. The extra price foreign investors pay for unrestricted shares appears to reflect lower required returns due to market segmentation, that is reflected in different time varying risk premia. In addition, premia seem to reflect demand pressures and the presence of sentiment. There is also evidence that foreigners pay more for shares which are in relatively short supply and for large and more liquid firms.

Country Funds

Country funds are funds that hold and manage portfolios concentrating in the equity markets of a particular country (or in a variety of countries in a region, depending on how the fund is defined). These funds are typically traded on organised exchanges of developed countries such as the United States or the United Kingdom. Country funds may be the only feasible vehicle to invest in a number of emerging markets that have restrictions on portfolio capital inflows. Until recently, this used to be the case for markets like Taiwan or Chile.

Many country funds are closed-end mutual funds.[52] The finding that closed-end funds trade at different price than their underlying net asset values (NAV) is widely studied and

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[51] Even if expected cash flows are the same, foreign investors can value these assets higher, thanks to superior diversification benefits that are not experienced by local investors.

[52] Closed-end funds, called investment trusts in the UK, are publicly-traded investment companies that trade on the stock market. Chapter 4 below gives more details about the functioning of these funds and how they compare with open-end funds.

it is usually referred as the "closed-end fund puzzle".[53] Closed-end country funds, unlike domestic closed-end funds, sell many times at a premium in the long run.

Closed-end country funds offer an attractive research design with which to examine international equity pricing: if different risk factors are priced by the fund shareholders and the underlying assets' shareholders or the price of risk is not the same for the two types of investors, then one would expect prices and NAVs to differ and that difference would change over time and across countries.

Several approaches provide insights into the behaviour of closed-end country funds discounts/premia. I only survey here the studies that look at the impact of market segmentation on country fund premia.

In a framework of complete or mild segmentation, country factors' premia can be explained as follows. Country funds are assets traded on international exchanges and are held by international investors. *A priori*, these investors hold diversified portfolios and price these assets in accordance to the world price of risk. The underlying assets are held and priced by local investors. The risk sharing in these local markets is imperfect and therefore price of risk is expected to be above the world price of risk. The returns required by international investors for the funds is thus expected to be below those required by the foreign local investors for the underlying assets. Country funds' premia reflect the severity of barriers and time variation in premia is caused by time variation in barriers.

Most of the models that address country funds' premia ignore a few aspects. First, even if country funds behave as international assets, and may overcome some informal barriers, (for example, liquidity risks) international investors may still require a risk premium for being imperfectly informed, or to compensate for political risk. The premia are thus expected to be relatively lower in markets with high indirect barriers. Second, country funds may partially undo segmentation and lead to an increase in the prices of local assets because there is now better risk sharing for these assets, that are no longer held only by local investors, but also by the international funds. Finally, another misunderstanding in the literature has to do with the price used to compute the NAV. In markets with two boards, one for locals and one for international investors, and when the barriers are binding, if the NAV is computed based on the price that prevails on the Alien Board, there is no reason to expect a premium on such a country fund. As discussed

[53] Premia and discounts of closed-end funds are determined by comparing the closing prices with the underlying NAV. The NAV of a fund is the market value of the fund's securities less its liabilities divided by the number of shares outstanding at any point in time. When the market value of a share is above its NAV, the fund is selling at a premium. When the NAV is superior to the price then the fund is selling at a discount.

above, international investors already pay a higher price. This is the case for markets like Thailand.

The first studies that have addressed the issue of country funds' premia, used the general framework of the international asset pricing models reviewed above.

In the Black (1974) and Stulz (1981) framework, country funds represent long positions taken indirectly by international investors in foreign assets. The underlying shares of these funds are foreign assets while the fund's shares are considered as international assets. Consequently, the required rate of return for holding the fund would be lower than the required rate of return for holding foreign assets. There are two problems with this approach. On one hand, it does not consider that the underlying assets of country funds are priced by local investors, that do not face any informational or trading costs. On the other hand, this model assumes that when international investors hold country funds they no longer have to require a super risk premium to compensate for limited information or inadequate investors' protection.

The model of Eun and Janakiramanan (1986) has also been adapted to model country funds. Country funds are viewed as foreign assets held by international investors while their underlying assets are the foreign assets held by foreign local investors. If the ownership constraint is binding, i.e., if the supply of country funds is below the demand of international investors, funds should sell at a premium over their NAV. As the constraint becomes less binding, the premia should decrease. The main drawback of using this model is that it concentrates only on one direct barrier: ownership restrictions.

I review here two models that derived closed-form solutions for the premia of country funds. The main implications of the two models are very similar. Errunza, Senbet and Hogan (1998) assume a mildly segmented market structure as in Errunza and Losq (1985): international investors are restricted from holding securities in the market that the fund targets, while investors in that market are free to invest in securities world-wide. Their model suggests that, in equilibrium, the discount/premium will depend on the degree of access to the local foreign market, the degree of spanning of foreign assets within the domestic market, the degree of substitution between the fund and its underlying assets, and on a common global country fund premia. Country funds that have more idiosyncratic risk will generate larger premia, on the assumption that the local price of risk is greater than the world price of risk. Imperfect substitution between the fund and the underlying assets mitigates this effect.

The second model is from Eun, Janakiramanan and Senbet (1993). In their model, country funds hold a subset of the entire foreign stock market. Their initial framework assumes total segmentation except for the country fund but they also analyse a more realistic scenario with some freely tradable securities and generate similar implications.

Premia arise from different pricing for the fund and for its underlying assets, as long as the underlying assets of the fund are not spanned by the free world assets and cross border arbitrage is not possible or costless. *Ceteris paribus*, the fund will command a higher premium, the more (less) close substitute the fund is for the market portfolio of the foreign (domestic) country, the more risk averse the foreign (domestic) country investors are collectively, and the lower the fraction of foreign assets available to country funds. The pricing differential results thus from different benchmark valuations, for the country fund and its underlying assets, against which systematic risks are measured, and from different degrees of aggregate risk aversion. Additional funds will tend to lead the premium to zero or even to a discount.

Two types of tests have been suggested to evaluate if an international asset pricing explanation could explain premia: static regressions and tests assessing the impact of changes in barriers in closed-end country funds' premia.

Static Regressions Explaining Country Funds' Premia

This method investigates whether the country funds have the same pricing rule of their underlying assets.

Errunza *et al.* (1998) test their country fund model using a sample of all country funds publicly-traded on the New York Stock Exchange by the end of 1990 (18 funds from emerging markets and 14 from developed countries) for the 1989-90 period. They provide weak support for the hypotheses that premia are negatively related to the degree of access, to the degree of spanning of local foreign assets within the domestic market and positively related to the degree of substitution between the fund and its underlying assets.

Hardouvelis, La Porta and Wizman (1993) compare the results of country funds targeting restricted and unrestricted markets, for the period 1985-1993, and find no significant differences between the two groups, suggesting that segmentation plays no significant effect on country funds' premia.

Bekaert and Urias (1996) investigate whether there is a difference between the stochastic discount factor that prices country funds in the trading market and the stochastic discount factor that prices the assets of the funds, used by local foreign investors. If investment restrictions are binding, the price of a fund's shares should trade at a premium relative to its NAV by approximately the amount the marginal investor is willing to pay to avoid those restrictions.[54] Their results show that the world discount

[54] Under the law of one price, assets with the same payoffs must have the same price. Standard models of asset pricing are obtained by introducing explicit assumptions about the

factor cannot price three out of the six emerging markets they analyse. Yet they are unable to establish a relation between these results and the existing barriers in these markets.

Patro (1997) provides an empirical analysis of the pricing of country funds in the context of international asset pricing, as suggested by Errunza *et al.* (1998). He uses both unconditional and conditional tests to find out about the mean variance efficiency of the world market index and provides results on the determinants of cross-sectional variations in premia. In particular, he investigates the role of differential risk exposures of the fund and the underlying assets to the world market index, the degree of unspanning of the assets held by the fund (measured by the conditional variance of the NAV unspanned by the world index); the imperfect substitutability of the fund (measured by the variance ratio between the fund and the NAV returns); and the degree of access (using a dummy variable that assumes the value of 1 for developed markets and 0 for emerging markets; and the purchase of US residents as a fraction of global securities purchases). His sample includes 30 single country funds, of which 20 invested in emerging markets. His analysis covers the period January 1991 to August 1995. In general, unconditional tests show that (1) country funds and NAVs have significantly different risk exposures on the world and on the local market index; (2) NAVs are not spanned by the world market; (3) cross-sectional results confirm that the difference in risk exposures is important in explaining premia. The dummy for emerging markets is also significant. The other variables have mixed results. The conditional asset pricing tests support that markets are segmented by showing that funds and NAVs are not priced by the same discount factor.

Overall, these studies provide weak evidence that country funds' premia are explained by different pricing rules, but they are unable to establish a clear relation between the degree of segmentation and the premia observed.

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parameterisation of the discount factor (either a linear function of the market portfolio, or a function of a number of observable factors, or a linear combination of hedging portfolios). To avoid the problem of the joint hypothesis testing, a more general approach is proposed. Using asset market data of different markets, the implications for pricing are studied for an entire family of asset pricing models. They derive the maximum bounds on the first two moments of returns and establish a parallel with the traditional mean-variance frontier. If the pricing was the same across markets then the discount factor that prices one market, would also price other markets. Two tests are proposed: the intersection test and the spanning test. The first one relies on the distance between two frontiers: one with only one set of assets and the other enlarged by a second set of assets. If a discount factor is common to all assets, then all prices should be able to be priced as a function of the assets in the first set. The second test is based on the two fund separation theorem and says that if there are two points common in the two frontiers, then the frontiers must coincide

Tests Assessing the Impact of Changes in Barriers on Country Funds' Premia

If markets are segmented by binding formal barriers, the removal of these barriers should have a significant effect on the premia of country funds. The tests below are event studies that examine the effects of the liberalisation of capital markets. The main disadvantage of this approach is the fact that it focuses on one particular act of liberalisation.

The classical study is by Bonser-Neal, Brauer, Neal and Wheatley (1990). They test whether a relation exists between announcements of changes in investment restrictions and changes in premia or discounts of closed-end country funds. Binding restrictions will raise a country fund's price-net asset value ratio above the level prevailing in the absence of such restrictions by approximately the amount the marginal international investor would pay to avoid the restrictions. The authors analyse events that directly affect or signal changes in internal investors' ability to acquire share of foreign companies, or in the ability of investors to invest outside their own countries.

Using weekly data for the 1981-1989 period for country funds quoted in the US, they regress premium changes on dummy variables. The regression coefficients measure the average weekly effects of announced changes in investment restrictions on country fund premia. For four of the five country funds they consider, they find evidence for the hypothesis that changes in the price-NAV ratio are related to the announcements of changes in investment restrictions.

Hahn (1993) also investigates the factors affecting country funds with the Bonser-Neal *et al.* (1990) dummy regression, with and without controlling for the noise traders' sentiment hypothesis. The author calculates a world premium change index based on fourteen country funds and run a regression of the world adjusted premium changes on dummy variables. He replicates the Bonser-Neal *et al.* (1990) study but differentiates between inflow and outflow capital constraints, as suggested by Bergstrom *et al.* (1993) model.[55] Empirical evidence strongly suggests that premia are more sensible to US sentiment than to announcements of changes in capital market restrictions.

Demirgures (1993) also does not find evidence to support the Bonser-Neal *et al.* (1990) hypothesis. He suggests that the use of dummy variables can pick up something other than changes in restrictions, given that the event window includes 14 weeks for a

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in all points. With a set of orthogonality conditions, it is possible to use GMM to identify the parameters and test the overidentifying conditions.

single investment restriction change. In addition, he stresses that it is very difficult to define which events should be considered important international investment changes.

He re-examines the relation for a more recent period (from 1986 to 1992) and an extensive sample, covering 101 announcements. He finds that only 48 announcements are associated with significant changes, and of these, only 22 have the expected sign, i.e., support the hypothesis that relaxation in investment restrictions causes a decline in the premia of country funds. Excluding those that coincide with contemporaneous world events, only 16 changes are in the expected direction.

Chowdhury (1994) also tests the robustness of the findings of Bonser-Neal *et al.* (1990) using the evidence from four Asian countries: Hong Kong, Singapore, Taiwan and Korea. His sample period goes from January 1986 to December 1993 and regards funds listed in the US. For Hong Kong and Singapore, he finds no significant effects following the announcement of changes in investment restrictions, whereas for Korea and Taiwan, it is not possible to reject the hypothesis that the announcement of changes in investment restrictions have no impact on closed-end country funds.

Bekaert and Urias (1996) also report results for the impact of investment liberalisation on the difference between NAV's expected returns and the fund's expected returns. Their hypothesis is that foreign assets would not be spanned by a global benchmark before the liberalisation but they would be so after the liberalisation. Their analysis covers four restricted markets (Brazil, India, Korea and Taiwan) and identifies one date as the event related to liberalisation. In all four cases, they cannot reject the hypothesis that the foreign assets were equally spanned before and after the liberalisation.

Evidence from most of these studies is mixed. As in any event study, the difficult task is to identify which changes in barriers are relevant to the analysis and the exact moment they are learned by investors.

Dual Listings

Dual listed stocks are an alternative instrument to test international asset pricing theories. Instead of a group of assets, now the analysis is focused on an individual security. A decline in the expected return of a stock after the listing date may be explained in the following way: if markets were segmented before the dual-listing occurs

[55] Bergstrom *et al.* (1993) consider a binding switch currency constraint that makes foreign securities less attractive. This constraint and the ownership constraint operate in different directions.

and if the dual-listed security is unique, then dual-listing would mitigate segmentation by improving that stock's risk sharing.[56]

The change in the return characteristics of a firm that cross-lists on a foreign stock exchange can be related to issues other than international capital market segmentation. A public listing in a major exchange increases investor's awareness and improves liquidity and either of the two may induce a lower required rate of return. Alternatively, post-listing returns may be low because managers of small firms, for which listing requirements may be binding, time their application for listing to when firms have recently performed well. A recent monograph by Karolyi (1997) surveys the academic literature on the valuation and liquidity effects of the listing decision. He examines in detail the empirical evidence of over forty contributions to the literature on international listings. For the purpose of this survey I only review here the papers researching the international capital market segmentation-based explanation.

Theoretical Models

Stapleton and Subrahmanyam (1977) considered a case in which capital markets were completely segmented before an international listing took place. Using numerical analysis, they show that the equilibrium market price of a hypothetical stock rises when it becomes internationally listed.

Alexander, Eun and Janakiramanan (1987) provide a closed-form solution to the equilibrium asset pricing problem that arises when capital markets are completely segmented before an international listing takes place. They demonstrate that, *ceteris paribus*, we should observe a decline in the required return of a dual-listed stock, as long as the covariance of the dual-listed security with its local market portfolio is larger than the covariance with the market portfolio of the place where it dual-lists. They also derive pricing implications for securities that will keep on listing solely on the local market due to the fact that the markets for these securities are indirectly integrated via the dual-listing. The magnitude of this externality effect varies among different local securities since it depends on the correlation with the dual-listed security. In the case in which the pure local security is uncorrelated with the dual-listed security, the dual-listing produces no externality effects.

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[56] As pointed out by Alexander *et al.* (1987), a dual listing by itself cannot undo formal barriers (for example, general or sector specific ownership restrictions). In fact, some dual-listings have effectively resulted in the removal or decrease of ownership barriers. This was the case for the South Korean dual-listings on the NYSE.

Urias (1995) extends this model of security cross-listing by incorporating the major features of the ADR market. In his model, the impact of cross-listing depends not only on the degree of market segmentation, on the degree of spanning of the dual listed stock and on the differences in aggregate risk aversion in the two countries, but also on the supply changes for capital raising issues. The model describes, as in Alexander *et al.* (1987), the changes in stock market returns for the firms that are liberalised with ADR programs as well as for "pure" local stocks that may experience "spillover" effects. A priori, it is expected that the dual-listed stock's sensitivity to the local market will decrease and its sensitivity to the international market increases. If the required return in the international market is less than that observed in the local market, the firm's cost of capital will decline. Model simulations show that changes in the ADRs' risk are more dramatic on average with the establishment of its own ADR facility, and within the same market, for the first ADR program.

Tests Assessing the Impact of Dual Listing on Mean Return and Systematic Risk

The empirical studies on dual-listings started by looking at changes in location or dual-listing within the same country. In particular, researchers assessed whether investors require a lower rate of return on their investment following a public listing on a major stock exchange, given the greater availability of information about the firm and the consequent reduction in the firm' s uncertainty.

The literature on overseas listings is quite recent. Howe and Kelm's (1987) study, based on 165 US listings on the Basel, Frankfurt, Paris and Tokyo stock exchanges, for the period between 1962 and 1985, finds that foreign listings do not result in positive abnormal returns before listing (90 days) and that the post-listing period (40 days) does not show always negative abnormal returns.

Alexander, Eun and Janakiramanan (1988) analyse the effect of international listing on the stock prices with a sample of 34 non-US firms that listed either on NYSE, AMEX or NASDAQ between 1969 and 1982. Their results show a decline in the expected return for the 36 months after the dual-listing date for all dual-listed stocks except for Canadian firms. They conclude that this piece of evidence supports that the US and the Canadian capital markets are integrated.

Howe and Madura (1990) are the first to deal explicitly with the impact of international listing on systematic risk. If listing helps to integrate a previously segmented market then the local stock's beta should fall and the international stock's beta should rise. While previous research used mainly event study methodology, their research tests permanent shifts in risk parameters before and after the overseas listing. Evidence for 68 US stock listings on four foreign stock exchanges (Germany, France, Japan and

Switzerland), between 1969 and 1984, shows no significant changes in risk. Their results are robust with respect to location and year of listing. These findings suggest that either those markets were already reasonably well integrated or that listing is an ineffective mechanism for reducing segmentation. Lee (1991) provides further evidence on the stock price impacts of overseas listing by investigating US listings in London and Toronto. Results are consistent with the previous study: overseas listings of 141 US firms between January 1962 and December 1986 had no significant impact on shareholders' wealth even if the effects of foreign listings were different across overseas stock exchanges. Lau, Diltz and Apilado (1994) also analyse the valuation consequences of US firms' listing on a foreign stock exchange and find different evidence. Results, using application, acceptance and listing dates for a more extensive sample of 346 US firms on ten different stock exchanges, between 1962 and 1990, show positive abnormal returns around the date of acceptance on the foreign exchange, negative abnormal returns on the first trading day and negative abnormal returns in the post-listing period.

Varela and Lee (1993) use a modified Black (1974) model to test whether an overseas listing is related to a decrease in the required return and a structural decrease in systematic risk. Evidence on all US firms' listings on the London (68) and Tokyo (43) stock exchanges, for the period of 1984-1987 and 1973-1987, supports that some firm-specific integration benefits occurred, resulting in a decrease in the Security Market Line's intercept in both markets, but no significant changes occur for either the systematic risk parameter (except for Tokyo) or the risk premium.

Jayaraman, Shastri and Tandom (1993) analyse 95 foreign firms from mature markets, that began trading in the US in the form of ADRs over the period of 1983 to 1988, and find a permanent increase in the volatility of the underlying stocks. To test the hypothesis that the increase in volatility could be due to a change in the return generating process, they estimate the coefficients of the local and the US market factors, before and after the listing. They find that the listing of ADRs has an insignificant effect on both the local and the US betas and that the explanatory power of the two-index model remains constant. Urias (1995) also addresses the asset pricing effects of security cross-listing on the security's systematic risk. His paper tests the liberalisation effects and the "spillover" effects on the coefficients of a two-factor return generating model. If the ADRs could partially undo segmentation, then there would be a positive change in the coefficient of the international benchmark portfolio and a negative change in the coefficient of the local benchmark portfolio. Results based on data for seven Chilean ADRs and six Venezuelan ADRs, that began trading after January 1990 and were issued prior to 1994, are not conclusive.

Foerster and Karolyi (1996) study the stock price performance associated with the dual-listing of foreign stocks in US markets, testing the international capital market integration hypothesis among others. Using dummy regression methodology, that allows for changes in risk exposures before and after the listing, and allowing for time-varying risk parameters, they analyse a sample of 106 firms that listed their ADRs in the US, from 1976 to 1992. They find positive and negative significant abnormal returns, respectively before and after the listing. The way these abnormal returns differ by region is not, however, supportive of the segmentation hypothesis.

Mahajan and Furtado (1996) look at a particular barrier: exchange rate controls. They test whether the firms' stock price reactions are a function of whether the listing occurred during a highly regulated fixed exchange rate system or during a market determined floating rate system. Consistent with the segmentation hypothesis, evidence based on daily data from 43 non-US firms, supports the segmentation hypothesis: listings during the fixed exchange rate system show positive price reactions. In contrast, no effect is observed during the floating rate system and the difference between the two periods is statistically significant.

Miller (1996) looks at the effects of non-US firms' listings in the US (including listings, public quotes and private placements). His sample covers 183 firms from 35 countries over the period 1985 to 1995. The results, using event study methodology around announcement and listing dates, show there are negative returns after the listing date and that these are more pronounced for firms located in emerging markets.

Using the same sample, Errunza and Miller (1998) analyse the impact on the cost of capital resulting from first dual-listings, by looking at the changes in realised returns in the long run. The theoretical model that motivate their research is Errunza and Losq (1985) and they test, in particular, whether the change in expected returns varies according to the diversification benefits potential of the dual listed stock. Their most important result is that the decline in expected returns is less pronounced for firms that are more difficult to mimic with home-made portfolios. Yet their results do not show a larger decline in returns for the sub-sample of emerging markets' dual listings.

The vast empirical evidence surveyed here shows there are positive abnormal returns around the listing date (or announcement) and negative abnormal returns in the long run after the listing, both for US listings abroad and foreign listings on US exchanges. Yet the existing studies have not been able to establish a relation between the effects of dual listings and the severity of segmentation, as the international asset pricing models suggest.

3.3.3 EVIDENCE FROM EMERGING MARKETS

Most of the evidence on capital market integration/segmentation is drawn from studies of developed markets. The academic interest in emerging markets has followed the surge of capital flows and the availability of reliable data. Given that formal and informal barriers are more severe in emerging markets, the international asset pricing theory predicts that emerging markets should be more segmented. Therefore they provide an attractive case for research. Most of the law of one price tests discussed above use data from emerging markets. For example, Bailey and Jagtiani (1994) analyse the Thai market while Domowitz *et al.* (1997) study the Mexican market. Bonser-Neal *et al.* (1990), Errunza *et al.* (1998) and Bailey *et al.* (1996) analyse data for developed and emerging markets. Bekaert and Urias (1996) and Urias (1995) focus solely on emerging markets.

Here below, I review some other selected empirical studies on international capital market segmentation using emerging markets' data. With one or two exceptions, I do not include single-country studies.

Errunza and Losq (1985) test the mild segmentation hypothesis, that is suggested by their model, for nine developing countries.[57] They use home-made market indices obtained by equally weighting monthly emerging markets' returns series for the more heavily traded stocks. Their cross-sectional results for the period 1978-1980 are not inconsistent with their theoretical expectations. Yet results are very weak. Errunza, Losq and Padmanabhan (1992) also test the competing hypotheses of integration, segmentation and mild segmentation for a group of emerging markets, motivated by that same model. Their sample covers the same markets as the previous study (except Thailand) but a longer sample period from January 1976 to December 1987. Using 36 portfolio returns, they find support for the mild segmentation hypothesis. For all countries, both the complete integration and the complete segmentation structures are rejected. More recently, Errunza *et al.* (1995) allow for time-varying ability of US traded assets to substitute the restricted emerging markets' assets. Regression results for 12 IFCG indices, for the period of 1976 to 1993, show that market integration has increased following the removal of restrictions or the introduction of country funds.

De Santis (1993) tests whether emerging markets are priced as mature markets. Using a mature market index as the benchmark portfolio, he finds that emerging markets lead to a significant change in the volatility bounds.

Harvey (1995) analyses the unconditional risk of equity returns in emerging markets. His sample covers 20 emerging markets followed by IFC, from January 1976 to June

1992. His results are similar for a sub-period starting in March 1986. He tests a single (the world market factor) and a two-factor specification (the world market factor and the exchange risk factor). He also experiments conditional versions of the two-factor specification with time-varying betas and time-varying risk premia. These asset pricing models, that assume complete integration of capital markets, have very little power at explaining the expected returns in emerging markets.

Bekaert and Harvey (1995) formulate an expected return model of time-varying integration. Their model has two advantages: first, it considers a scenario of mild segmentation instead of the extreme cases of complete integration or complete segmentation. Second, the degree of segmentation is allowed to vary through time. Their model allows for different prices of variance risk across countries, conditional on country specific past information and a world price of risk depending on global information. The model is thus conditional in three ways: the covariances, the risk premia and the integration measure. They study 12 emerging markets from January 1976 to December 1992 and, in general, their evidence is against the model specification. In addition, the degree of integration suggested by the model, for each market, is not in accordance with the investment restrictions observed.

Korajczyk (1995) proposes an alternative methodology to measure integration in emerging markets. The pricing errors or deviations of returns, from the predictions generated by an APT model, are the proxy for the degree of segmentation. Using historical monthly equity returns for 6851 individual stocks trading in 20 emerging markets and four developed markets for the period of January 1976 to December 1992, he finds support for the hypothesis that emerging markets are more segmented than mature markets. In addition, he finds that the segmentation measure decreases through time.

Very few studies have dealt with specific barriers in emerging markets. Bekaert (1993) investigates the association between market integration and barriers to investment for the period of December 1985 to December 1992 in 19 emerging stock markets. He distinguishes three forms of barriers to investment: ownership barriers; exchange and capital controls; and indirect barriers related with the regulatory and accounting environment. He also considers the number of country funds and the number of cross-listed securities for each emerging market. He computes correlations between the barriers and integration that he proxies by the unconditional correlation of returns between the US and that particular emerging market. Except for the ownership barriers, he finds a negative relation between the severity of barriers to foreign investors and integration.

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[57] Argentina, Brazil, Chile, Greece, India, Korea, Mexico, Thailand and Zimbabwe.

Classens and Rhee (1993) test the impact of barriers. They use the degree of investability computed by IFC as a proxy for barriers. This index captures, for each stock, the barriers to free access by foreigners and comprises all kinds of legal barriers. They analyse 20 emerging markets (the number of companies for each country varies between 35 and 48) over the period 1989-1992. Their hypothesis is that higher barriers should be reflected in higher required returns reflecting poorer risk sharing, after controlling for systematic risk factors. Their results provide evidence against the integration hypothesis but they fail to reject the segmentation hypothesis. For the severity of barriers, the results are weak.

Kim and Singal (1995) assess the impact in the level and volatility of returns of a market opening. They conduct an event study around the actual opening dates of 18 emerging stock markets. They find negative abnormal returns in the second year after the opening date but these are not statistically significant.

Recently, Bekaert and Harvey (1998) study the impact of foreign investors in expected returns, volatility and correlation with the world market. They formulate a measure of cost of capital based on an extended Gordon model of dividend yields and changing conditional volatility. In particular, they examine the effect of liberalisation measures, dual listings of individual stocks, country funds and US portfolio investment flows. They find that the foreign investors' presence results in a lower cost of capital but the magnitude of the results is economically small. The impact on correlations is also positive as expected but this result is very weak and economically small.

Summarising, most of the studies analysing emerging markets' data have found support for a mild segmentation pricing structure. Regarding the impact of barriers, the empirical evidence supports the hypothesis that the removal of barriers impacts the pricing structure but this evidence is weak.

3.4 INTERNATIONAL PORTFOLIO DIVERSIFICATION

The previous section has reviewed the literature on integration of capital markets. Subjacent to most of the studies was the fact that international diversification is beneficial, through the reduction of domestic market risk. There is robust evidence of the benefits of international diversification and in particular of emerging markets' diversification benefits. This is caused by the less-than-perfect correlation between securities' returns across markets. As discussed in Chapter 2, the covariance of returns across markets is not stationary but evidence supporting increasing correlation is weak.[58]

The multivariate return structure can give information on how stock returns are correlated through their response to common economic, financial and industry factors. Yet low or high correlation and the role of common factors are necessary but not sufficient conditions to prove integration. If there is evidence supporting the existence of common factors, that are priced similarly, after controlling for economic similarities, then one can say that markets are financially integrated.

Here below I survey some selected studies that gathered evidence on the benefits of international segmentation, and then I review some of the studies that have investigated the role of country and industry factors in stock returns and the commonality of factors across markets.

3.4.1 Benefits and Important Factors

Levy and Sarnat (1970) were among the first to point out that:

"the existence of a relatively high degree of positive correlation within an economy suggested the possibility that risk reduction might be facilitated by diversifying securities portfolio internationally" "and the inclusion of these countries (referring to developing countries) *in the opportunity set materially improves the risk-return position"*.

Having established that there are gains from international diversification, the following step was to determine how those gains arise, or in other words, why are there low correlations between country indices' returns. To shed light on this issue, the literature started by assessing if the cross-market correlations of returns are determined by the industrial composition of market indices.

The early studies found that country factors are the most important element in the covariance of returns, reinforcing the view that the international dimension is particularly critical in reducing the risk through diversification and thus that there is more to gain

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[58] For a good summary on the evidence of correlation matrix stationarity, please refer to Longin and Solnik (1995). In particular, see:
- Kaplanis (1986) studied the stability of the correlation and covariance returns of monthly returns of 10 markets for the period of 1967 to 1982 and the hypothesis that the correlation matrix was constant could not be rejected at the 15% confidence level (Box and Jenrich tests);
- Longin and Solnik (1995) find that the conditional correlation matrices are unstable over the last thirty years (1960-1990).

from diversifying across countries, even within a single industry, than diversifying across industries within a country.

Back in 1974, Lessard shows that, with fully integrated markets, the only advantage to international diversification is the "pure diversification" effect, the contribution of non-systematic risk to the total risk of a diversified portfolio due to an increase in the number of securities available. This pure diversification benefit will be substantial given the existence of strong national risk elements that are diversifiable internationally. With segmentation, though, the gains in one country may be greater or less than those associated with pure diversification depending on the risk-return relationships in various markets, namely the transaction and informational costs involved in investing on foreign securities. Lessard provides evidence based on 14 national market indices and 30 international industry indices and 673 securities, for the period of 1959 to 1973. National risk factors are found to be more important than industry factors.

Grinold, Rudd and Stefek (1989) support these results. Their model breaks portfolios' returns into their component sources. Currency returns and local returns are the initial division. Local returns are then decomposed into local systematic returns, industry returns and returns related to other priced common attributes (for example volatility, size, and BTM). Instead of analysing the correlation structure from index returns, the authors analyse the correlation between the underlying country factors that are clear from any hidden industry and common factor effects. Their tests are based on monthly return data for the period of 1979 to 1988, for 24 countries and a total of 2454 assets. On average, diversification across countries is more important than across industries. Global industries have stronger effects, though. Countries for which they find strong country factor influence, are countries that, in reality, have more idiosyncratic behaviour and that are less integrated in the global economy.

Meric and Meric (1989) also analyse the patterns of the covariance among the national stock market indices. For the period of 1973 to 1987, they find that international industry portfolio returns are more closely correlated than national stock market returns, confirming that there is more to gain from diversification across countries than across industries.

In a similar study, Drummen and Zimmerman (1992) analyse daily local currency returns for 105 stocks from 11 European countries over the period of 1986-1989. They show that national stock market factors clearly dominate stock prices' variances. Factor loadings generated by factor analysis indicate a clear structure with respect to grouping stocks by their nationality. Multivariate analysis of variance confirms that the national market index explains the major part of stock price variation in detriment of currency or industry factors.

Beckers, Grinold, Rudd and Stefek (1992) test the relevance of some *a priori* specified common factors - across national boundaries or within a given country. Their data comprises 1391 European securities and covers the period from 1978 to 1990. Although a number of industries can be shown to impact stock returns across national borders, the local market component (domestic beta) remains the most significant force within most European equity markets.

The work of Roll (1992) brought contradictory evidence to this discussion. He shows that the industrial composition of the indices is important in explaining cross-sectional differences in the volatility as well as in the correlation structure of country index returns. The author uses equity price indices for 24 countries from April 1988 through March 1991. Global industry factors are indirectly obtained by regressing returns on the indices' industry weights. He finds that industry factors explain approximately 40% of the variance in country stock returns while exchange rates explain approximately 23%. Part of the benefits of international diversification therefore would stem from industrial diversification and the differences in industrial composition of the indices would also account for differential volatility across markets.

More recently, Heston and Rowenhorst (1994) argue that local monetary and fiscal policies, differences in institutional and legal regimes and regional economic shocks, may induce a large country specific variation in returns. They find that country specific components of returns are dominant when explaining country indices' performance while industry specific factors only explain 1% of the variances of equally-weighted country returns' indices. Their results contradict Roll's findings and establish that the existence of low correlation in returns between countries cannot be explained by the diverse industrial structures of the indices. Correlation between industries may even be high but country specific components of return variation justify international diversification. Their sample includes monthly total returns for 829 European companies from 1978 to 1992. The authors decompose stock returns into "pure" industry and "pure" country components and find that country specific absolute effects are on average twice as large as the absolute value of the industry effects. Concerning the returns' volatility across markets, the average standard deviation of the country effects is more than twice the average standard deviation of the industry effects. When explaining country index performance, they find that industry specific factors only explain 1% of the variances of an equally weighted country return index. They show that Roll's methodology to proxy industry effects overvalues industrial effects. Low correlation between countries cannot thus be explained by the diverse industrial structures as Roll claimed.

A paper by Beckers, Connor and Curd (1995) performs a very similar analysis. Their sample includes 2313 stocks, on average, and covers the period from December 1982 through February 1995. They use the same methodology and their results are similar to Heston and Rowenhorst's (1994) findings.

Griffin and Karolyi (1998) re-examine the role of country, industry and currency specific sources of variation in international asset returns using the Dow Jones World index, that has a more comprehensive and accurate industry classification (66 industry classifications, 25 countries and 2400 stocks). Daily returns from January 1992 to April 1995 confirm the Heston and Rowenhorst (1994) results and their findings are robust to the finer partitioned industrial classification.

Cavaglia (1994) re-examines the gains from international diversification. Starting from Roll's results, he addresses the importance of industry factors. The author uses the Financial Times Actuaries Indices for the G-7 countries, for the period 1986-1993. He confirms that cross-market correlations are lower than cross-industry correlations. Yet he finds that the correlations of certain industries across countries are even lower.

The set of studies surveyed here highlights the fact that cross-market correlations are low and that stock returns are driven by country factors. There is still ongoing debate over the importance of industrial factors.

3.4.2 THE FUNDAMENTALS IN STOCK RETURNS

Correlation in market returns reflects whether security prices across markets are influenced by similar factors and whether these factors are predominantly global or local. Finding or not common risk factors mirrors not only capital market segmentation but also similarities in the underlying economies. If factors affecting stock returns are common, this could be because cash flows are, overall, influenced by the same factors.

Chen, Roll and Ross (1986) have investigated the systematic variables that influence asset pricing in the US. Their evidence indicates macroeconomic betas are the most important determinants in cross-section pricing. Bodurtha, Cho and Senbet (1989) extend this paper to an international setting. In addition to domestic economic forces, they bring in international macroeconomic variables that may also impact stock returns. Both for domestic and international factors, economic variables impact stock returns either through their influence on risk premia or on expected cash flows. For seven of the largest industrial countries, from January 1973 to December 1983, they find that international factors are significant in explaining the cross-section of average returns in their sample. Further, their results suggest equality of risk premia across countries. Asprem (1989) investigates the relation between a major stock index and macroeconomic variables in 10 European countries using quarterly data from 1968 to 1984. His evidence shows that several macroeconomic variables are significantly related to stock returns. Stock returns are negatively correlated with imports, employment, inflation and interest rates while positively correlated with the S&P industrial index and the yield in the US stock market. Campbell and Hamao (1992) found that the common international component of expected returns explains more than 70% of the variance of expected returns in the US, and as much as 60% in Japan, for the period of January 1971 to March 1990. Furthermore, the main forecasting variables are similar across the two markets: dividends yields and short interest rates. They find a common movement in predictable excess returns, suggesting at least partial integration of US and Japanese stock markets.

Haugen and Baker (1996) test the importance of a multitude of factors in explaining security returns within a country. The different classes of factors they use in their empirical analysis are motivated by theoretical models of asset pricing or, in general, are variables that have power in explaining the variation of returns across stocks. They show that expected return factor models are surprisingly accurate in forecasting future returns to stocks in the major countries in the world (US, UK, Japan, Germany and France). On average, they find three to four world-wide common factors. While there is a very important degree of commonality in the important factors, the monthly payoffs to these factors are not highly correlated and Chow tests do not support a similar risk rule across countries. Specifically, none of the factors related to sensitivities to macroeconomic or other risk-related variables seems to be an important determinant of expected stock returns. Rather, it appears likely that the predictive accuracy can be attributed to bias in market pricing.

Heston, Rouwenhorst and Wessels (1995) also investigate the structure of international stock returns. Using data on 6000 firms in the US and 12 European countries, they find that countries share multiple risk factors. Still, there are large country specific sources of return variation. Most of the indices are correctly priced by factors estimated by the full sample of firms and rewards are identical across countries.

Ferson and Harvey (1998) present extended evidence on which factors are important to explain expected returns. Their empirical analysis, conducted at a country level, analyses 21 markets from January 1970 (or later in some cases) to May 1993. They reassess the importance of market attributes and economic factors. They scale the attributes to account for differential relations between risk or mispricing and the attributes across countries. Their cross-sectional results are strong and they manage to link market attributes (specifically, price to book ratio, a relative inflation measure and long term interest rates) to global economic variables (specifically the world beta).

A recent study by Fama and French (1998) investigates the *Value vs. Growth* relation around the world for the period 1975-1995 and finds that the difference between average returns of value and growth portfolios is positive and significant for 12 out of 13 major markets. Their evidence for 16 emerging markets also supports the existence of a (larger) value premium.

While some of the early studies had found some significance for macroeconomic factors, the more recent evidence is ambiguous about the explanatory power of these factors to explain the levels or changes in cross-country covariances. Karolyi and Stulz (1995), for example, find that adjusting for industry effects is not helpful in explaining the dynamics of covariance between eight Japanese ADRs and US stocks over the period May 1988 to May 1992. Furthermore, covariances are not higher on days of US macroeconomic announcements. Ammer and Mei (1996) use an innovative approach to evaluate the importance of economic and financial factors, either domestic or global, in determining stock returns. By decomposing current returns into news about future dividends, interest rates and equity risk premia, they find that news about future excess returns are the main determinants of return variation in the US and in the UK, followed by news about future dividend growth. Consequently, when they examine the covariance of returns across the two countries they find that correlated news about risk premia dominate. Yet the measure they use to proxy real activity - dividend growth - is also highly correlated across countries. When they extend the analysis to 15 industrialised countries they still find that common real and financial shocks affect significantly the return co-variation between these countries. Longuin and Solnik (1995) also find that correlations are significantly linked to dividend yields and interest rates. Dumas, Harvey and Ruiz (1998) link the correlations of stock returns to their fundamental determinants. Those determinants are taken to be the behaviour of output in various countries. Under the hypothesis of integrated stock markets, the theoretical correlations they derive, lie slightly below the observed correlations, suggesting that the assumption of international capital market integration is likely.

In summary, the studies here reviewed establish that there is an important commonality in important factors. Global factors are important but there is a lot of debate about their importance relative to local factors. Results are also mixed regarding the equality of risk premia across markets. Finally, most of these studies emphasise that the important factors may impact cash flows as well as market risk premia.

3.4.3 EVIDENCE FROM EMERGING MARKETS

I review here some additional studies, on the issues just surveyed, that use data from emerging stock markets.[59] Most of these studies focus on quantifying the benefits of international segmentation. Initial studies used a traditional mean-variance framework analysis but most of the recent studies are more general tests that evaluate the degree of spanning of a global discount factor. Most of the papers that use spanning tests to assess integration also evaluate the benefits of international diversification. This is the case, for example, of Harvey (1993) or Bekaert and Urias (1996).

Levy and Sarnat (1970) were the first to suggest that investment in developing countries could give substantial benefits. They used stock market indices' data, for the period 1951-1967. Several studies confirmed the benefits of emerging markets diversification during the late 70's and early 80's. More recently, many studies analyse these benefits for the early 1990's. There is overall consensus about the benefits of emerging markets' diversification over the last two decades for different sets of markets, different time periods, many types of data and different methodologies. Emerging markets assets contribute with low risk to global portfolios because most of their local risk is diversifiable thanks to low and sometimes negative return correlation *vis-à-vis* mature markets.

Following the methodology proposed by Lessard (1976) and described above, Errunza and Padmanabhan (1988) find that for the period from 1976 to 1984, for 179 firms from 10 emerging markets, correlations are low and country factors account for most of the variance of individual securities variance.

Divecha, Drach and Stefek (1992) apply Grinold, Rudd and Stefek (1989) division of total return (as described above) for 23 emerging markets, over the period 1986-1991. They find that industry factors account for 16% of total variance in emerging markets against 22% in developed markets. Country factors explanatory power accounts for 40% in emerging markets against 30% in developed markets.

Claessens, Dasgupta and Glen (1995) also investigate the cross-section of stock returns across 19 emerging markets. Their regressions use seven variables: market beta, size, price-to-book value, earnings/price, dividend yield, turnover and sensitivity to exchange rate changes. They find that size, PBV and E/P have explanatory power in may countries, but the signs of the coefficients are the reverse of what is expected and has been observed for mature markets.

[59] Errunza (1994, 1997) summarises the literature on gains from investing in emerging markets.

Bekaert, Erb, Harvey and Viskanta (1997[1]) explore a group of risk attributes that have been successfully applied in developed markets and could explain the risk-return relation in emerging markets. Their analysis, conducted at a market level, reveals that attributes such as market capitalisation to GDP, inflation, and survey-based risk measures are able to identify high and low expected returns environments.

Rouwenhorst (1998) finds that the factors that drive the cross-sectional differences in expected stock returns in emerging markets are qualitatively similar to those that have been found in developed markets: size, book-to-market, earnings-price and momentum. As has been documented for mature markets, beta is also not amongst the important pricing factors for emerging markets. The important factors seem, however, to be priced differently.

Bailey and Lim (1992) assert that country funds offer some diversification but are poor substitutes for direct holdings of foreign equities. They attribute this to the fact that country funds are priced more like domestic US stocks than foreign equities.[60] Chang, Eun and Kolodny (1995) perform a similar analysis on 15 funds listed in the US (of which seven invest in emerging markets), from January 1985 to December 1990 and conclude that country funds behave more like US securities than their underlying NAVs, but still provide non-trivial diversification gains.

Bekaert and Urias (1997) study the diversification benefits from investing in emerging equity markets for the period 1990 to 1996. They employ mean-variance spanning tests and show how the efficient frontier faced by US and UK investors, has expanded in a significant way, both statistically and economically, with the introduction of country funds and ADRs. Yet, similarly to the findings of the two previous studies, those benefits are not as dramatic as the ones that could have been obtained with IFC indices.

In sum, the evidence from emerging markets highlights the important benefits of international portfolio diversification and stresses that the more idiosyncratic character of these markets further amplifies these benefits. Even if most of these markets are not directly accessible to international investors, vehicles like country funds and ADRs allow them to capture a large part of those benefits. Only a few studies have compared the important factors in the cross-section in stock returns across emerging markets and *vis-à-vis* those identified for mature markets. The scarce evidence shows some commonality but also confirms different prices for the important factors.

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[60] As is acknowledged by the authors, their conclusion might result from the fact that the country fund is not representative of its underlying stock market.

3.5 CONCLUDING REMARKS

This chapter has reviewed the international asset pricing literature on integration of capital markets. Special emphasis was given to tests that have used emerging markets' data. In this review, I have also surveyed the empirical literature on international portfolio diversification.

Evidence on emerging stock markets is very recent. Most of the studies analysing emerging markets' data found support for a mild segmentation pricing structure. Regarding the impact of barriers to international investors, the empirical evidence seems to suggest that, in most cases, removal of formal and informal barriers impacts on the pricing structure, but this evidence is weak. There is also evidence of diversification benefits from investing in emerging stock markets, but further work remains to be done to understand what drives these results.

Based on the theoretical international asset pricing models here reviewed, I have derived testable hypotheses to revisit the pricing of country funds, the effects of dual listings and the cross-section of stock returns, for the particular case of emerging markets. Part III presents those studies.

PART III: TESTS OF INTERNATIONAL CAPITAL MARKET INTEGRATION

CHAPTER 4.

EMERGING MARKETS' COUNTRY FUNDS:

AN EXAMINATION OF INTERNATIONAL ASSET PRICING AND NOISE TRADERS' SENTIMENT THEORIES

Country funds sell many times at a premium from their underlying assets, well after their inception, and this seems to be more the case for funds that invest in emerging markets. As highlighted in chapter 3, International Asset Pricing models suggest that these premia could reflect the fact that markets are segmented.

This chapter re-examines the variation in funds' premia and investigates, in particular, the explanatory power of proxies for the degree of market segmentation. I also perform some tests to assess the validity of the noise traders' sentiment model, for the particular case of country funds.

The structure of this chapter is the following. The next section discusses further the issues of the analysis. Section 2 shows some stylised facts on country funds. Section 3 reviews the different explanations that have been proposed to understand the behaviour of country funds' pricing. I present the theoretical model that motivates the international asset pricing hypotheses here tested in section 4. The next session describes the empirical model and the tests that I propose. Session 6 describes the data set and presents the sample. Section 7 presents the results, explore other alternative explanations and discuss the implications of my findings. Section 8 contains the concluding remarks.

4.1 INTRODUCTION

There are two main interpretations for the behaviour of country funds' pricing:

- the first one is an asset pricing rational argument that emphasises market frictions or segmentation as the basis for discounts or premia. Discounts or premia occur when transactions to complete arbitrage strategies are costly, when there is asymmetric information, different preferences or different pricing rules resulting from barriers to free investment or from different clienteles.[61]

[61] See, for example, Low (1992), Frankel and Schmukler (1996) or Kramer and Smith (1998) for other approaches assuming rational agents other than the International Capital Market Segmentation-based explanation here investigated.

- the second literature is based on the irrationality of investors and the role of sentiment. This literature explores the role of irrational investors, who are predominant in the closed-end funds' market and who interact with rational investors. As long as only fund prices are subject to swings in sentiment, variation in sentiment could then explain the variation in discounts.

Another set of studies has used other arguments (for example, illiquidity, managerial performance) to explain the behaviour of country funds' pricing, focusing on the fact that net asset values (NAV) may be an inaccurate measure of the true value.[62]

Most of these studies are extensions of the traditional closed-end funds' puzzle literature. While these explanations may prove useful to understand country fund pricing, a distinct explanation must work for country funds in order to fit the stylised facts: while domestic closed-end funds trade in general at a discount, some country funds, especially those that target emerging markets, often sell at a premium.[63]

In this study, I investigate an explanation included in the first group above. The international asset pricing theory suggests premia arise as a consequence of segmentation of capital markets. When there are different pricing rules across countries, two assets with identical claims may have different prices. In the case of closed-end country funds, that means that prices and NAVs differ. Cross-market variability in premia would reflect different degrees of segmentation and time-varying premia would result from time-varying segmentation.

The central issue of my study is thus to test whether the International Asset Pricing theory can account for the time-series and cross-sectional variation in discounts. Following a model developed by Eun, Janakiramanan and Senbet (1993), I propose a fund discounts' return-generating process that depends on the covariances of the fund and its underlying assets returns with the world and the local emerging market risk factors, and on the severity of barriers across countries. My study is important because it not only provides additional evidence to understand the behaviour of country funds but also gives further evidence on the integration-segmentation issue using emerging markets' country funds.

The empirical literature on country funds has mainly researched the time-series variation in discounts, and the existing evidence suggests that the time variation in discounts seems to be related to changes in investor sentiment. There is some evidence

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[62] See, for example, Anderson and Born (1992) for a detailed summary of the literature on the "closed-end fund puzzle".

[63] Some mature markets' funds trade occasionally at a premia. That was the case of the Germany Fund after the fall of the Berlin Wall.

supporting the existence of different pricing rules for the country funds and their underlying assets, but the studies that explicitly investigate the relation between proxies of the degree of segmentation and country funds' premia are not conclusive.

Unlike the previous studies, I focus here on the wide differences in premia across funds. Thus I investigate the cross-sectional variation in premia but I also control for the part of the time-variation in discounts that may not be related to time-varying segmentation in capital markets.

The cross-section variation in premia could also be attributed to market liquidity differences and transaction costs, restrictions on short sales or immaturity of the arbitrage sector (Merrick, 1988).

Any idiosyncratic features, related to sentiment, managerial ability across funds or different institutional or microstructure factors regarding the place where the fund is domiciled and listed, are controlled by the panel data methodology. In addition, I test some implications of the noise traders' sentiment model. I restrain my analysis to emerging markets' funds but I use an extensive new data set on US, UK and off-shore emerging markets' country funds that covers a longer period and more emerging markets' country funds than any previous study.

4.2 EMERGING MARKETS' COUNTRY FUNDS

Country funds are funds that hold and manage portfolios that specialise in the equity market of a particular country (or variety of countries within a region or not, depending on how the fund is defined). These funds are typically traded on organised exchanges of countries such as the United States or the United Kingdom.

Many country funds are closed-end funds. Closed-end funds, called investment trusts in the UK, are publicly-traded investment companies that trade on the open market. Unlike open-end funds, they do not continuously issue (yet new issues can be made) or redeem ownership shares after the initial offering (unless the fund is liquidated or transformed into a open-end fund).[64] The shares of the closed-end funds are generally

[64] Open-end funds or unit trusts pool resources from several individual investors and use the proceeds to acquire and manage a portfolio of publicly-traded securities. Open-end funds continually issue and redeem shares to meet investor demand. Open-end mutual fund shares are redeemable at their net asset value and there is no secondary market for the shares. Investors may purchase shares directly from the fund or through a licensed broker. Any sales or redemption fees must be disclosed in the prospectus. Generally there are minimum investment dollar amounts and minimum subsequent investment dollar amounts; usually the latter is significantly smaller than the former. Unlike closed-end funds, open-end funds cannot be leveraged (no preferred stock or debt).

offered to the public by licensed brokers, as in most other IPOs. To obtain shares after a public offering is completed, an investor must purchase the shares from other investors in the secondary market, on one of the exchanges or on the OTC market.[65]

The finding that closed-end funds trade at a different price than their net asset value (NAV) is commonly referred to as the "closed-end fund puzzle". The NAV of a fund is the market value of the fund's portfolio securities less its liabilities, divided by the number of shares outstanding at any point in time. The share prices of closed-end funds are determined by the supply and the demand for the fund's shares rather than by the value of the portfolio of the securities of the fund. When the market value of a share is above its NAV, the fund is selling at a premium. When the NAV is superior to the stock market price, the fund is selling at a discount. Discounts/premia (*D*) are thus defined as:

$$D=(P-NAV)/NAV \qquad (4\text{-}1)$$

4.2.1 Stylised Facts

Section 2.2 in Chapter 2 has highlighted the importance of country funds for the particular case of emerging markets. By the end of 1995, there were around 1300 country funds targeting emerging markets, managing around US $ 110 billion.[66] Of these, 537 were single country funds, 452 were regional funds and the remaining 265 were global funds. There were around 300 closed-end country funds accounting for around 35% of the total country funds' assets.

Table C.1 in appendix shows some stylised facts regarding 45 emerging markets' country funds, of which 24 are listed in the US and 21 in London. These funds invest in 13 emerging markets, 2 regions, and one is a global fund.

The average discount across funds over the period August 1990 (or later) to August 1995 was -2.9%. The cross-sectional standard deviation is 10%. The minimum (time-series average) discount was -29.1% for the First Philippines Fund and the largest premia was for Argentina, with +9.8%. 16 out of the 45 funds traded at a premia. Fund by fund, there is also a lot of time-variation in discounts.

Although, on average, these emerging markets' country funds traded at a discount, this discount is not as large as the ones observed for domestic closed-end funds or for country funds that invest in mature markets. Bekaert and Urias (1996) report an average discount

[65] This procedure has changed slightly in the more recent years in the UK. Investors can now go to the investment company to buy and sell shares. The investment company itself will buy or sell the shares in the stock exchange. That is the case, for example, of Savings and Investment schemes.

of 0.9% for the emerging markets' country funds listed in the US and -9.5% for the emerging markets' country funds listed in the UK. For the mature markets' country funds, the average discount is -7.1% for those listed in the US, and -13.1% for those trading in the UK. For the domestic funds in their sample, the US funds trade, on average, at a discount of -8.3% while the UK funds trade at a discount of -14.6%. Their sample period goes from January 1986 to August 1993. By June 1995, mature markets' country funds were trading on average, at a discount of -12.3% against an average of -9.7% for emerging markets' country funds (source: Warburg).

By Country

Across countries, average discounts vary widely: 5 out of 13 countries registered an average positive premium. These were Argentina, India, Indonesia, Korea and Taiwan. Except for Argentina, all these markets still face formal and informal barriers as documented in chapter 2. Yet markets like Chile or Thailand, that still have important restrictions to free investment, traded at a discount.[67] Even within a country, the average variability of discounts was high, varying between 6% for Malaysia and 18% for India. I checked to see if the average discount in a country could be associated with some selected features of its underlying stock market. I looked at features like the within-country average funds' price absolute or relative (to NAV) volatility, the IFC investability index or Institutional Investor's country credit risk rating. The rank correlation between discounts and any of these features is not significant. There must thus to exist other fund-specific features that differentiate them.

By Stock Exchange

The average discount across the funds that traded in London was around 10.3%, against a positive premium of 3.5% for the average fund trading in the US. The two sub-samples have different compositions in terms of the regions the funds are exposed to. In particular, the sub-sample for the UK has a strong weight of regional Asian and global funds. I have investigated whether the differential of discounts between the two sub-samples was due to an effect associated to the place where the fund is located/and or traded or to the particular composition of our sub-samples. With that purpose, I have tested whether for each country, the difference between discounts across stock exchanges

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[66] Micropal Emerging Market Fund Monitor, November 1995.

[67] One of the reasons for the existence of an average negative discount in Thailand could be related to the fact that the prices used to compute NAVs are those set in the Alien Board that already reflect the higher valuations of international investors.

was significant. For all countries where there are funds listed on both US and UK exchanges, difference t-tests show that funds that trade in London exhibit always a larger discount than funds traded in the US and this difference is always statistically significant. It could be the case that the portfolio that UK funds hold are different from the ones held by US funds. This seems implausible, given that we know that international investors, in general, concentrate their holdings on the same large, more liquid stocks. The difference observed in the level of discounts across stock exchanges could instead be reflecting differences in institutional features like microstructure, market liquidity, capital structure or managerial ability.

4.3 RELATED LITERATURE

4.3.1 INTERNATIONAL CAPITAL MARKET SEGMENTATION

In chapter 3, I looked in detail at the literature on international capital market segmentation.

and I wrote a special section on country fund pricing.

Local stocks are held and priced by local investors. The presence of country funds in the local market will partially undo segmentation given that international investors may require a lower rate of return on these stocks as a result of the international diversification potential benefits. Yet to learn about and to set itself in a foreign market involves large fixed costs. International funds may require a risk premium for being imperfectly informed, to compensate for other risks and costs[68]. Investors trading the country funds' shares, back in the developed markets, do not face any of these costs, so they are able to buy these assets at a premium.

Country funds are particularly appealing to small investors who would like to diversify internationally but have neither the necessary scale nor the expertise (for example, keeping track of financial reports) nor the direct access to foreign markets. Investing through country funds, and even if they behave more like international securities when compared with the underlying foreign assets, allows to achieve international diversification without incurring excessive transaction costs. Moreover, and

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[68] For example, in India, even recently, settlement could take more than 30 days while registration of the purchased shares in the new owner's name could take from one week to many months. In Chile, some short-term investments are subject to a reserve requirement of 30%, which must be held in the central bank for one year and is not remunerated; capital and dividends can only be

even if these information and scale benefits were minor, it is common that foreign markets treat differently individual or institutional international investors. This is the case, for example, for Brazil, India or Taiwan. In Brazil, until 1992, foreign investors could only access the stock market through closed-end funds. After 1992, the range of foreign investors allowed to operate in Brazil was considerably broadened. Still, only large institutional investors, investment companies managed by banks, brokerage firms or securities' dealers can freely access the market. In India, only Qualified Authorised Investors - pension funds, mutual funds, investment trusts and asset management companies - are allowed to invest directly in the local stock markets. In Taiwan, Qualified Foreign Institutional Investors have been permitted since 1991. These include banks from the largest 1000 world-wide insurance companies, fund managers, pension funds and securities companies.

Country funds are thus "products of cross-market intermediation performed by the more efficient agents" (Eun *et al.*, 1993). In spite of their favoured position in comparison with international retail investors in terms of cost or legal status, institutional investors face barriers as well. As mentioned above, international funds have to deal with the lack of liquidity and the high transaction costs in these segmented markets. Moreover, institutional investors face ownership and other legal restrictions, individually and as a whole. If these barriers are binding, the equilibrium demand by international investors may not be met by total supply. For example, in India, Qualified Foreign investors (QFI) together with non-residents Indians face a 30% (raised from 14% in 1997) aggregate ownership limits and 10% (up from 5% in 1997) for the holdings of a single QFI. In Taiwan, as of end-1996, the ownership limits for non-Taiwanese QFI investors were: a maximum of US $ 400 million (US $ 200 million by the end of 1995) and this limit has to be met in six months. From 1997, individual foreign investors are allowed to invest, respectively, US $ million on aggregate and US $ 5 million each. On aggregate foreign investors are not allowed to invest more than 25% (15% in 1995) and 10% individually (5% in 1995) of the shares of any Taiwanese listed company.

If there was costless intermediation and assuming a competitive fund market, competition would drive out the premium to zero. In practice, the establishment of other intermediaries depends on the competitive advantage or cost efficiency.

Altogether the arguments above may explain why there are not there more country funds to undo the premium.

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repatriated or remitted after one year. In Taiwan, until 1996, dividends' remittance could only be done once a year.

Two models derived closed-form solutions for the premium of country funds. Country funds would trade at a premium if markets were mild or completely segmented, as long as some necessary conditions were maintained: the assets held by the fund are not completely spanned by the international traded assets, and the risk premium is higher in the restricted markets.

If these models are valid, the stylised facts of observed premia reflect that markets are indeed segmented and cross-sectional analysis should, *ceteris paribus*, show that funds that target markets where barriers are more severe (and binding) should trade at higher premia.

The empirical literature provides weak evidence supporting different pricing rules for the fund and the underlying assets. Yet the studies that have investigated the impact of barriers on country funds' premia show mixed results.

4.3.2 Noise Traders' Sentiment

The model of investor sentiment has its origin in a paper by De Long, Shleifer, Summers and Waldman (1990). Lee and Thaler (1991) extend this model to the "closed-end fund puzzle". Noise risk implies that closed-end funds should trade, on average, at a discount because funds are riskier than their underlying assets. Rational investors are not able to arbitrage when sentiment drives price away from fundamentals because holding positions in funds, that are mainly held by noise traders, involves supporting systematic risk, common to all funds. Variation in discounts over time would be driven by movements in sentiment: discounts would shrink when investors are bullish and widen when investors are bearish.

Lee and Thaler (1991) found evidence of a large co-movement between US domestic closed-end funds. Additionally they find that domestic closed-end fund discounts' changes are highly positively correlated with small stocks' returns.

Differently, Sias and Tinic (1992)'s results do not support the noise traders' model to explain the discounts on domestic closed-end funds. Not only do they find evidence of short-term mean reversion in discounts which contradicts the assumption that noise traders' sentiment cannot be predicted, but also, the several proxies they use for the noise traders' sentiment are unable to explain the cross-section of funds' returns.

Another assumption of the noise traders' model is that there must be differential clienteles for the closed-end fund and for its underlying assets, otherwise sentiment would similarly affect both assets. Hardouvelis, La Porta and Wizman (1993), Bodurtha, Kim and Lee (1995) use country funds to measure the sentiment of US investors. As country funds, that trade on US exchanges, are held by US investors and the underlying assets are held mainly by foreign local investors, the discount gives a measure of the differential sentiment between the two clienteles.

Both studies find that fund price returns are above NAV returns as the noise traders' sentiment model predicts.

Hardouvelis *et al.* (1993) includes the excess return of US small capitalisation firms over large US stocks to explain country funds' discount changes. Both in univariate regressions and multivariate regressions (together with local, world, exchange risk factors and the level of discounts) at 1, 4 and 13 weeks horizon, they find significant positive coefficients on the small capitalisation portfolio returns.

Bodurtha *et al.* (1995) tests a multi-factor pricing model and their evidence reveals that both prices and premia changes move with the US market while the underlying NAVs do not. To check if sentiment affects all the classes of assets which have a clientele that resembles that of country funds, they follow an approach in line with what Lee and Thaler (1991) did for domestic closed-end funds. They regress size decile portfolios of NYSE and AMEX firms on a foreign country fund index of discount changes (after controlling for the US market and for the effects of domestic closed-end fund index). For all but the decile of larger firms, they found significant positive coefficients on the foreign country fund index.

Both studies look for mean reversion and predictability. Hardouvelis *et al.* (1993) checked for mean reversion by looking at the relation between country fund discount changes and the level of discounts at the beginning of the holding period. They find a very significant negative parameter for this variable and associate this effect to mean reversion. Bodurtha *et al.* (1995) (and Bailey and Jagtiani, 1994, in a similar context) think that this relation between fund price or discount returns and the level of discounts is expected because small discounts are associated necessarily with lower short-term returns. To check for mean reversion and predictability, they instead suggest regressing discount changes on recent lagged discount changes. They aggregate weekly returns over four-week intervals and regress them on the cumulative return on the previous four weeks. They find a positively significant sign and conclude that there is no mean reversion, supporting the noise traders' model.

Klibanoff, Lamont and Wizman (1998) also get results that are consistent with irrational behaviour. They investigate the behaviour of 39 country funds for the period from January 1986 to March 1993 and find evidence that fund prices overreact to salient news and under-react to fundamentals.

4.4 THEORETICAL FRAMEWORK AND TESTABLE HYPOTHESES

Eun and Janakiramanan and Senbet (1993) provide a closed form solution for the premium of closed-end country funds under segmented capital markets. Their model is based on the following assumptions:

- the capital market is perfectly competitive;
- investors have homogeneous expectations as to risk and return characteristics of all assets;
- investors have exponential utility functions (utility maximisers investors). a^D and a^L are the aggregate absolute risk aversion of, respectively, international and foreign local investors;
- asset prices (P_i) are normal distributed with finite first and second moments (respectively μ_i and Var_i);
- investors can borrow and lend at the same risk free rate (r);[69]
- there are three categories of assets: foreign assets (l) that are restrained for individual domestic investors to invest directly; international assets (d) that are restrained for foreign investors; and a country fund (c) that holds eligible foreign assets (a subset and not a fraction of the entire portfolio);
- there are no restrictions on short sales;
- there exists a fixed exchange rate.

The authors assume that markets are completely segmented except for the country fund.

They develop a static two-period mean variance model where the investors in each country maximise their expected utility subject to the appropriate restrictions. Asset demands are aggregated and then equated to the aggregate supply of securities to derive the following equilibrium prices.[70]

$$P_d = (1/r)\left[\mu_d - a^D\left\{Var\left(P_d\right) + Cov\left(P_d P_c\right)\right\}\right] \tag{4-2}$$

$$P_c = (1/r)\left[\mu_c - a^D\left\{Var\left(P_c\right) + Cov\left(P_d P_c\right)\right\}\right] \tag{4-3}$$

$$P_{nav} = (1/r)\left[\mu_{nav} - a^L\left\{Var\left(P_{nav}\right) + Cov\left(P_{nav} P_{l*}\right)\right\}\right] \tag{4-4}$$

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69 I ignore the impact of segmentation at the monetary market.

70 I use here prices and NAV per share while Eun *et al.* (1993) derive their results in terms of a portfolio of securities. I assume that the fund has only one asset and that the number of shares/units of the country fund are the same as the number of the eligible foreign shares owned by

$$P_{l*} = (1/r)\left[\mu_{l*} - a^L\left\{Var\left(P_{l*}\right) + Cov\left(P_{nav} P_{l*}\right)\right\}\right] \tag{4-5}$$

The foreign assets include the eligible foreign assets (*nav*) and the ineligible foreign assets (l^*); By assumption eligible stocks are marginally priced by local foreign investors and that results from the fact that the "quota" available to country funds is fixed. The price is formed locally by the equilibrium between the remaining supply and the local demand. Eun *et al.*, in their analysis, include the eligible shares that the country fund does not hold in l^*. Given that all eligible shares are priced by the local stock market investors, and have only one price, I have considered them altogether as a group regardless if they are held by foreign investors or country funds.

The country fund premium (π) is the difference between the country fund price and the NAV per country fund share. Assuming that the stream of expected cash flows is the same for the two types of investors, *i.e.*, $\mu_c = \mu_{nav}$,

$$\pi = P_c - P_{nav} = (1/r)\left[a^L Cov P_l P_{nav} - a^D Cov P_d P_c - (a^D + a^L) Var P_c\right] \tag{4-6}$$

The fund trades at a premium if P_{nav} is lower than P_c and that will depend on the different degrees of risk aversion for the two types of investors and the different pricing portfolios for the local and international investors. The fund will show a higher premium,

- the less (more) risk averse international (local) investors are;
- the higher (lower) the covariance is between the fund and the local (international) assets.

In the case where the foreign market is an emerging market with limited risk capacity and the country fund is traded in the US or in the UK, this model generates a premium, *ceteris paribus*. The premium will be higher if the assets that compose the fund portfolio have idiosyncratic features that cannot be replicated with international assets.

When the model is extended to a more realistic framework, *i.e.*, when it allows for the existence of some assets that are freely tradable internationally, the expression for the country fund premium is quite similar to before. The covariances of interest now are the partial covariances that give the part that is not replicable by the internationally tradable securities. In the extreme case that the international tradable securities are uncorrelated with the component assets of the country fund, then we are back to the results stated above. In the other extreme case, where the two types of assets were perfectly correlated, then the country funds' underlying securities are priced as if the markets were completely integrated and the premium would fall to zero.

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the fund. I have also assume there is only one international asset and one ineligible foreign local asset.

$$P_c = P_{nav} = (1/r)\left[\mu_{nav} - a^W \left\{Cov(P_d P_{nav}) + Cov(P_l P_{nav})\right\}\right] \qquad (4\text{-}7)$$

where a^W is the aggregate world risk aversion coefficient.

Summarising, the model yields the three following testable hypotheses:

H1: Ceteris paribus, a fund will command a higher premium, the more (less) the fund is a close substitute for the emerging (world) market portfolio.

H2: Ceteris paribus, a fund will command a higher premium, the more (less) risk averse the emerging (international) investors are collectively.

H3: Ceteris paribus, a fund will command a higher premium, the higher the degree of segmentation.

I expect thus that the effects of international asset pricing will be more pronounced for segmented and smaller markets and for funds that hold assets that have more idiosyncratic features.

These are the core hypotheses I test. The international segmentation-based explanation does not rule out other possible explanations that have been outlined above. Therefore I control for the funds' idiosyncratic effects. I also test the validity of two implications of the noise traders' model.

4.5 METHODOLOGY

4.5.1 EMPIRICAL SPECIFICATION

Eun *et al.* (1993)'s model suggest return generating processes for the country fund and for the underlying assets as in a setting of complete segmentation. For a particular fund:

$$R_{Pt} - r_t = \alpha_P + \beta_P^W \lambda_{Wt} + e_t \qquad (4\text{-}8)$$

$$R_{NAVt} - r_t = \alpha_{NAV} + \beta_{NAV}^L \lambda_{Lt} + u_t \qquad (4\text{-}9)$$

where β and λ are respectively the betas and risk premiums relative to the World (W) and the local (L) market risk factors. R_P and R_{NAV} denote, respectively, the returns of the country fund and of the fund's underlying assets. r is the risk free rate. I assume that the market where the fund trades is a large market, financially integrated with the rest of the world, and therefore I consider the World market portfolio the benchmark used by international investors.

Among emerging markets, and as I have documented above, there is a wide variation in terms of capital market segmentation, from almost completely closed markets to completely integrated markets. To accommodate the different pricing structures, I propose a two-factor model. If markets are mildly segmented, the stocks are priced for their exposures to local and world risk factors. I have considered that country funds are priced with a similar two-factor return generating model. Section 4.7.2 below discusses further the validity of this choice. For a particular fund:

$$R_{Pt} - r_t = \alpha_P + \beta_P^W \lambda_{Pt}^W + \beta_P^L \lambda_{Pt}^L + e_t \tag{4-10}$$

$$R_{NAVt} - r_t = \alpha_{NAV} + \beta_{NAV}^W \lambda_{NAVt}^W + \beta_{NAV}^L \lambda_{NAVt}^L + u_t \tag{4-11}$$

The cross-sectional variation in discounts results from differences in risk exposures and in risk premia. The time-series variation in discounts results from the difference between risk premiums over time namely due to changes in barriers.

Cross-sectional variation can also be explained by features related with the market where the fund trades (taxation, stock exchange liquidity, leverage or managerial ability) or by features of the market where the fund invests (direct legal barriers, taxes, transaction costs or currency risk). Over time variation in discounts can also be due to investor sentiment.

4.5.2 Discussion of Variables

International Asset Pricing

My empirical analysis involves two steps. First I run rolling time-series regressions of the returns of the fund and the NAV to obtain a time series of estimated betas: $\beta_P{}^L$, $\beta_{NAV}{}^L$, $\beta_P{}^W$ and $\beta_{NAV}{}^W$.[71] Second, I run a pooled regression of the discounts on the time-series cross-section of betas and on the other explanatory variables described below.

I include the size of the emerging market (natural logarith of the market capitalisation) where the fund invests to proxy the risk-sharing ability in that market: the wealthier the emerging market, the lower the price of risk and, therefore, the lower the premium the fund trades over its underlying assets.

71 A practical problem in implementing the two-factor model above is the correlation between the local index and the world index. I also use orthogonalised local returns obtained by regressing local returns on the world market returns. The residuals plus the intercept give the idiosyncratic returns of a particular emerging market.

To account for the degree of segmentation, I use the IFC investability indices (0-100% investable).[72] As observed in Chapter 2, these indices seem to be a good proxy for the severity of barriers. I also look at the Institutional Investor's country credit ratings.[73] The effect of this variable may be confounding. If, as is my intention, this variable proxies the degree of segmentation in the market where the fund invests, then it should be negatively related with premia. Yet if this measure reflects that international investors require higher returns for holding assets in that particular country, then its coefficient should be positive, reflecting that the higher the rating, the lower the required risk premium for international investors, and thus the higher the fund premia.

I also investigate whether or not the relative supply of country funds has any significant effect on premia. I use the ratio of country fund assets (open and closed-end) in a given emerging market over the market capitalisation and the number of country funds operating in that market. The premia should be larger, the less the securities available to foreign investors. These measures could cause a simultaneous equation problem. On one hand, it is true that the fewer the funds operating in a particular emerging market, the lower is the risk sharing and the more is the potential for a premia to occur. On the other hand, one would expect to see more country funds in markets where barriers are severe and, moreover, the supply of funds should be directly related to the premium at which funds are selling in that market.

<u>Other Explanations</u>

Diverse features of each country fund, together with differences in the institutional domicile and trading place, must also impact the different pricing for the country fund and its underlying assets.

The managerial performance hypothesis, for example, says that discounts are attributed to investors' rational expectation of inferior or superior investment skills of fund managers. If managers do not have the ability to generate superior performance then the discount of a fund should equal the present value of the expected future expenses of the fund (Ammer, 1990). Cross-sectional variation in discounts may thus reflect

[72] These indices reflect the share of stocks that can be held by foreigners. The index varies from 0 to 100. The lowest and highest values correspond to a completely restricted market and a free market, respectively. IFC considers restrictions of access by non-residents, and government, sector and firm aggregate ownership limits. Further, IFC considers liquidity and size criteria: minimum investable market capitalisation of US \$ 25 million and value-traded of at least US \$ 10 million over the prior year. For more details, see the "IFC indices - Methodology, Definitions and Practices".

[73] Please refer to section 2.3 for more details about these ratings.

differential net performance (after subtracting expenses from the gross performance) among funds in the future. When the investor expects that the future gross abnormal returns to be achieved by the fund manager will cover more than the expenses of running the fund and rewarding the managers, the share price will exceed the net asset value.

The managerial performance hypothesis is appealing because it can explain occasional premia observed from country funds if the net performance of the management is expected to exceed the benchmark used by the investor. The managerial performance hypothesis does not, however, explain the common variation in discounts and the future perceived performance is unlikely to vary such as to explain the observed time series movement in discounts.

The empirical results in the domestic closed-end fund literature are mixed regarding the association of fund discounts and managerial performance. Chay (1992) finds evidence that discounted funds are inferior performers. In the context of country funds, I believe that this same effect can occur: a fund will command a higher premium, the better its portfolio is expected to perform, and variation over time in discounts should reflect the updating of investors' beliefs.[74]

As seen above, UK funds trade on average, at larger discounts than US funds.[75] The institutional features that may be behind different pricing behaviour may dictate opposite directions: on one hand, one would expect UK country funds to be less exposed to noise trader's sentiment because their ownership base is more institutionalised; on the other hand, US funds trade usually on more liquid markets. This enumeration could go further on aspects like capital structure, taxation or managerial ability.

To incorporate the specificity of each country fund, I have considered a fund fixed effect across funds under the assumption that that specificity is consistent over time. To account for unobservable aggregate fund-invariant variables, such as sentiment, in some specifications, I have also included a period specific effect. Finally, to account for the effects arising from the place where the fund is traded, I have included dummy variables corresponding to the stock exchange where the fund is listed.

Summarising, the reference regression equation is:

$$D_{it} = a_{1i} + a_{2t} + b_1\beta^L_{P\,it} + b_2\beta^W_{P\,it} + b_3\beta^L_{NAV\,it} + b_4\beta^W_{NAV\,it} + cB_{it} + dM_{it} + \sum e_i SE_i + u_{it} \tag{4-12}$$

[74] A paper from Shukla and van Inwegen (1995) analyses the differential ability depending on the nationality of the manager and finds that differences in information lead to differential performance.

[75] There are funds that specialise in arbitrage movements between London and New York - shorting US funds and buying London listed funds - (Hogg, 1994).

In the above specification, D_{it} denotes the discount or premium of fund *i* in period *t*. a_{1i} and a_{2t} represent, respectively, the fund-specific and the period specific fixed effects. β denote the exposures of the fund's shares *(P)* or its underlying assets *(NAV)* to the local *(L)* and world *(W)* risk factors. *B* is a proxy for the degree of segmentation, *M* is the emerging market (log) capitalisation and SE_i are the place of listing dummies.

The premium will be positively correlated with the exposure of NAV returns to the local market and with the severity of the barriers to foreign investment and negatively correlated with the exposure of the country fund's returns to the world market and with the emerging markets' size.

Discounts/Premia

My data set does not include discount levels. Instead, I use changes in discounts (discount returns from here after). I use natural log returns instead of simple returns. One of the advantages for using this transformation is that changes in discounts correspond approximately to the difference between log price returns and log NAV returns. If one defines R_P^* as $log(P_t/P_{t-1})$ and R_{NAV}^* as $log(NAV_t/NAV_{t-1})$ and express discounts as $D_t = log(P_t/NAV_t)$ then the change in discounts is given by:

$$R_D = D_t - D_{t-1} = log(P_t/NAV_t) - log(P_{t-1}/NAV_{t-1}) = log[(P_t/P_{t-1}) / (NAV_t/NAV_{t-1})] = R_P^* - R_{NAV}^*. \quad (4\text{-}13)$$

As long as dividends *(DIV)* represent a small part of the total returns, the change in discounts (R_D) can be expressed as the difference between price returns ($R_P = log(P_t + DIV_t)/P_{t-1}$) and NAV returns ($R_{NAV} = log(NAV_t + D_t)/NAV_{t-1}$).

My hypotheses and the signs of the explanatory variables in regression (4.12) were developed in terms of discount levels. The implications of the substitution between discount levels and discount returns has thus to be analysed carefully.

A premium implies that international investors have higher valuations of the future income stream than local investors. This could result even if expectations of future dividends are the same, as in the model outlined above, as long as the value of diversification is greater for international investors. If dividends are different from zero, and the fund sells at a premium, then local investors' expected (total) returns are higher than those for international investors. If there are no dividends, ceteris paribus, expected returns should be the same ensuring a constant premium, reflecting a set of structural factors, in particular the level of segmentation. To say that R_P is close R_{NAV} is the same to say that discount returns are close to zero. Yet in the short run, discounts could change if there is mean reversion. Previous literature has established a negative relationship between mispricing changes and lagged mispricing. I try here to make use of that mean reverting behaviour to establish such a relationship between discount levels and discount returns.

Based on that relationship, I analyse my regression, that was set to explain the cross-sectional variation in discount levels, in terms of the cross-sectional variation in discount returns.

Previous evidence shows that observed basis changes appear strongly negatively autocorrelated for different price-change interval lengths and for different markets. Similarly, research has shown that when mispricing deviates from its mean value, it reverts towards the mean. Traditionally any of these mean-reverting behaviours had been attributed to arbitrage. There is, however, a recent controversy about how should mean reversion in mispricing be measured. There are two alternatives. The first suggested, for example, by Miller, Muthuswamy and Whaley, 1994 (and used in the context of country funds by Bodhurta et al., 1995) it is given by the relationship between mispricing changes and its lag regressor; in other words, the autocorrelation (negative) parameter of the mispricing changes. The other definition suggested, for example by Yadav and Pope, 1993 (and used in the context of country funds by Hardouvelis *et al.*, 1993), considers the (negative) relationship between changes in mispricing and the level of mispricing at the end of the previous period.

Using one or the other definition is not indifferent in order to establish what are the causes of mean reversion. Several authors investigated the behaviour of stock index futures mispricing changes series. Miller *et al.* (1994) show that the negative coefficient for the lagged regressor is spurious and reflects, at least partially, infrequent trading in the underlying market. Thus, whenever the price change or return series of two securities or portfolios of securities are differenced, (spurious) negative autocorrelation results, particularly when returns are measured over very short term intervals. Yadav and Pope (1993)'s results, find negative coefficients on lagged mispricing in both the US and the UK. They show that there is relatively little association between mean reversion in the mispricing levels and the existence of negative serial correlation in mispricing changes. Mean reversion, as they define it, seems to be arbitrage-induced. In view of the established empirical evidence on negative serial correlation in mispricing changes persisting over several time periods, they add lagged terms of mispricing until the estimated regression residuals are purged of significant serial correlation. The augmented Dickey-Fuller type regressions ensure that ϕ, the measure of mean reversion in the mispricing series, reflects only the dependence on the level of mispricing in the previous period. Their model is:

$$X_t - X_{t-1} = -\phi X_{t-1} + \delta_0 + \sum_{g=1}^{p} \delta_g (X_{t-g} - X_{t-g-1}) + \varepsilon_t \qquad (4\text{-}14)$$

where X stands for the mispricing, δ_0 is the intercept and δ_g are autocorrelation coefficients of the relevant lag regressors and ε is a white noise error term. They test the hypothesis that $\phi=0$ (Fuller statistic) against the alternative hypothesis $\phi>0$, that is equivalent to testing for the presence of (first) unit roots in mispricing levels[76].

Previous research has found that the mispricing changes series seems to be path dependent. A non-linear model in mean (for example, a polynomial model or first-order threshold autoregression model) may fit the series. The intercept and the slope coefficients (on lagged values of X_t) depend on the value of X_{t-1} in relation to a threshold.

In spite of the cross-section dimension of my analysis, it seems to be important to include a lagged discount, because cross-sectional differences in discount returns may reflect the conditions in terms of discount levels. Regarding the lagged discount returns, and even if we take the negative parameters as spurious, its inclusion in the regression could be important to avoid misspecification.

The nonlinearity discussion is especially relevant when discussing the time series regressions. The dimension of my analysis is cross-sectional; still, across funds, it may be relevant to consider that the relation between the level of discount and the associated mean reversion is state dependent, reflecting that the process entails different coefficients ϕ for every level of discounts.

I have investigated the behaviour of my discount returns series. Monthly discount returns are strongly negatively autocorrelated for the first three lags; furthermore, for a smaller sample, I find that the coefficient on the lagged discount level is negative, varying between -0.1 and -0.2, depending on the aggregation procedure.

To establish the relationship between discount returns and contemporaneous discount levels, I have assumed that the time series of discount levels does not have unit roots and, therefore, that the measure of mean reversion in the discount series is statistically different from zero (positive).

For the sake of simplicity, I ignore here the lagged discount changes and non-linearity in the processes. I also assume that the mean reversion parameters are the same across funds but, as the discussion above has suggested, mean reversion parameters may indeed reflect trading structures or investors behaviour (for example different arbitrage trading strategies).

Under these very simplifying assumptions, it is possible to define the following relationship:

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[76] In alternative they could have used a simple process without the lagging differenced variables as long as the Fuller statistic was adjusted for serial correlation and heterokesdasticity.

$$R_D = \frac{-\phi}{1-\phi} D_t \qquad (4\text{-}15)$$

where R_D and D_t are defined as above.

The specification with discounts returns will yield estimates for the coefficients of the explanatory variables that will relate, broadly, with the ones discussed for the specification with discounts returns, through the relationship above. Thus the estimates from discount levels should be the estimates from discount returns multiplied by the factor $-(1+\phi)/\phi$.

I have investigated the relation between the average discount level and the differential between expected fund returns and NAV returns, for a sub-sample of funds for which I have information on discount levels. The correlation between discount levels and discount returns is not significant.

4.5.3 Noise Traders' Sentiment Tests

Two important testable implications arise from the noise traders' model:

- the first one is that noise traders' beliefs are unpredictable in the short term; sentiment risk is thus non-diversifiable and assets subject to sentiment should be rewarded with higher returns.

- the second is that assets subject to sentiment should move in the same direction. Closed-end funds should co-move and, moreover, move together with other assets subject to sentiment.

I perform two types of tests to assess the noise traders' sentiment hypothesis validity for the specific case of emerging markets' country funds:

- I test for the predictability in discounts. I look for mean reversion both at an index level and on an individual fund basis.

- I test for the co-movement between country funds' and small stocks' returns. I regress the fund returns on excess returns of a portfolio of small firms, after controlling for world and local risk.

4.6 DATA

4.6.1 Micropal Data Base

Micropal is a UK compiler that provides quantitative information on emerging markets' country funds traded in the UK, in the US, and in some other major trading places in the world. The data set also includes offshore funds. By November 1995, Micropal Emerging Market Fund Monitor listed 1430 country funds, of which 1263 were equity country funds managing over US $ 110 million.[77]

By the end of 1995 the equity funds covered by the Micropal data base, represented around 70% of all the existing equity funds. For single country funds, the data base covers over 80% of the total funds.

The data base covers three categories of emerging markets' funds: open-end funds; closed-end funds and private funds. By the end of 1995, closed-end funds represented around 35% of the total emerging markets' funds (open and closed-end). Micropal followed 328 closed-end funds, of which 299 were equity funds, managing around US $ 40 million. Asian equity funds accounted for the large stake with 47% of the assets under management, followed by Global equity funds with 22%.

The data set includes prices and NAV data. The information is only available on an index format. Prices are closing prices when available and mid-market prices or market makers' quotes otherwise. NAV information is obtained directly from fund investment management companies. NAV per unit is not diluted.[78] Both NAV and prices are measured in US dollars.[79]

In addition, the data base has information on:

- the fund name and its Micropal code;
- the fund's management firm;
- the stock exchange where the fund trades;
- the currency in which the fund is denominated;
- the geographical area where the fund invests;
- the type of fund (single, regional, global);
- the fund's launch date and launch price and
- the fund's first price.

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77 Micropal Emerging Markets Fund Monitor is a monthly publication by Micropal that covers almost all existing country funds investing in emerging markets.

78 The NAV and price data may be slightly asynchronous because of the exchange rate or different closing times for the country funds' market and the market where the underlying assets trade.

79 I assume here that investors in emerging markets value their wealth in US dollars. If PPP does not hold I am introducing a distortion here because I am comparing the returns of the fund with the returns of the funds' underlying assets, plus an appreciation or depreciation of the US dollar.

4.6.2 SAMPLE DESCRIPTION

After removing debt funds and other funds with missing or misleading information, there were 209 equity closed-end funds across 36 countries/regions. The time-series for each fund went back to the launch date of the fund and ended in December 1995. I have excluded further those funds that appeared after August 1995 and those whose underlying markets were not followed by IFC or had short series for the respective local market index (China, Hungary, Peru, Poland, Sri Lanka). My final sample consists of 105 funds. I have monthly data on funds representing 15 markets, and 3 regions.[80] The full sample panel consists of 5857 fund-months observations. My sample represents over one third of the universe of equity closed-end country funds.

Table C.2 in the appendix lists the funds in my sample. Table C.3 shows the breakdown of the sample by country/region and stock exchange. Only for a few countries is the number of constituent funds above 10. These are Korea, Indonesia and Thailand. These figures highlight the difficulty of performing the analysis within countries.

The sample is dominated by UK (London or Dublin) listed funds. A point that stands out is the different geographical composition of the two sub-samples of UK and US listed funds. UK country funds are more specialised in funds investing in Asia while US funds prefer to invest in Latin America.

To enable a better comparison across funds and to allow joint estimation across funds, the results of the cross-sectional analysis focus on a sub-sample of 70 funds. This is a balanced panel that includes funds that had at least 60 months of available data from August 1990 through August 1995. The total number of observations, fund-months, is 4200 across 12 markets.

[80] My study focuses on emerging markets' funds. Micropal and Datastream, the databases from which I have downloaded my data, only have information on mature markets' funds registered in the UK.

4.7 EMPIRICAL RESULTS

4.7.1 SUMMARY STATISTICS

Table 4.1 shows the cross-sectional averages for the funds' time-series summary statistics on price, NAV and discount returns.[81] On average, NAV returns were larger than price returns and that is reflected in negative discount returns. These figures show that local investors in emerging markets have required higher returns than international investors have required for country funds, as the segmentation-based explanation suggests. This difference is, however, very small. In annualised terms, it amounts to around 1%.

The volatility is very high both for price and NAV returns and as a result for discount returns. This result agrees with the results of Hardouvelis *et al.* (1993), Bekaert and Urias (1995), Bodurtha *et al.* (1995) and Errunza *et al.* (1998) for different sample periods.[82]

The volatility of the funds' price returns is however, well above the volatility of their underlying assets. This is true on average and for all but eight of the country funds in my sample, and for all countries/regions except for Turkey. The cross-sectional mean volatility-ratio over the 105 funds is 1.4. This result is even more striking when we think that we are comparing the volatility of assets that trade on NYSE or in London with assets trading in emerging markets, which traditionally register very high volatility. Errunza *et al.* (1998) consider this ratio as a proxy of how well a fund replicates its underlying assets. Hardouvelis *et al.* (1993) believe that this ratio is greater than one because of sentiment: there is a risk that cannot be diversified in country funds, as a consequence of these funds being traded and held by noise traders, that are driven by sentiment.

Miller *et. al.* (1994) show how microstructure effects alone can cause the variance ratio of observed future price changes to observed level index level changes to exceed one. That is for example the case if there is nonsynchronous trading in the index portfolio stocks and the bid-ask bounce is significant in the futures markets. For country funds, the microstructure effects may impact the variance ratio even if I do not use high frequency data.

[81] Price and NAV returns denote total log returns, respectively for the fund and for its underlying assets. As stated above in expression (4.13), the difference between price and NAV returns gives approximately the change in discounts/premia and will be referred as discount returns here below.

[82] Respectively January 1985 to January 1993; January 1986 to August 1993; February 1986 to December 1990 and fund inception to June 1991. All these studies use weekly data.

Table 4.1 - Country Funds' Time-Series Statistics

Cross-Sectional Means

These tables contain the cross-sectional averages of time-series statistics on price, NAV and discount returns, for the 105 country funds in my sample. Returns are average monthly log returns over the period from August 1990 (or later) to August 1995. "Price/NAV" denotes the price to NAV variance ratio. The discount returns are computed as the differential between price and NAV returns. Details for each individual fund are available upon request. The sample data is from Micropal.

I. All Funds

Variable	Average	Std. Dev.
Price Returns	0.0073	0.1008
NAV Returns	0.0082	0.0762
Discount Returns	-0.0009	0.0806

II. By Market

		Average			Standard Deviation			
	Number of Funds	Price Returns	NAV Returns	Discount Returns	Price Returns	NAV Returns	Discount Returns	Price/ NAV
Argentina	1	-0.0028	0.0029	-0.0057	0.0886	0.0715	0.0575	1.2382
Asian Regional	13	0.0095	0.0088	0.0007	0.0879	0.0659	0.0685	1.3664
Brazil	2	0.0168	0.0143	0.0025	0.1153	0.1157	0.0891	1.0423
Chile	4	0.0247	0.0292	-0.0045	0.1123	0.0722	0.0888	1.5555
Global	10	0.0111	0.0121	-0.0010	0.0802	0.0577	0.0602	1.3953
Greece	1	-0.0072	-0.0010	-0.0062	0.1272	0.0454	0.1036	2.8023
India	4	0.0053	0.0066	-0.0013	0.1123	0.0946	0.1141	1.2317
Indonesia	10	-0.0016	-0.0014	-0.0002	0.1060	0.0676	0.0853	1.5808
Korea	14	0.0060	0.0074	-0.0014	0.1121	0.0662	0.0996	1.6960
Latin America	6	0.0096	0.0133	-0.0037	0.1061	0.0777	0.0833	1.3871
Malaysia	5	0.0127	0.0126	0.0001	0.0974	0.0803	0.0796	1.2154
Mexico	3	0.0116	0.0072	0.0044	0.1155	0.0997	0.0825	1.1730
Pakistan	1	0.0037	0.0054	-0.0017	0.1134	0.0918	0.0869	1.2351
Philippines	3	0.0195	0.0163	0.0032	0.1075	0.0922	0.0921	1.1746
Portugal	4	-0.0017	0.0015	-0.0032	0.1064	0.0615	0.0888	1.7286
Taiwan	7	0.0037	0.0038	-0.0001	0.1166	0.0837	0.0803	1.4195
Thailand	15	0.0062	0.0077	-0.0015	0.1030	0.0951	0.0735	1.0878
Turkey	2	-0.0044	-0.0029	-0.0015	0.1223	0.1464	0.1189	0.8286

III. By Listing Place

		Average			Standard Deviation			
	Number of Funds	Price Returns	NAV Returns	Discount Returns	Price Returns	NAV Returns	Discount Returns	Price/ NAV
London	50	0.0081	0.0090	-0.0009	0.0976	0.0763	0.0771	1.3152
NYSE	25	0.0067	0.0081	-0.0015	0.1116	0.0823	0.0894	1.4350
Dublin	10	0.0052	0.0059	-0.0007	0.1008	0.0776	0.0917	1.3186
Hong Kong	6	0.0075	0.0093	-0.0018	0.1069	0.0763	0.0984	1.4145
AMEX	4	0.0095	0.0079	0.0016	0.1118	0.0775	0.0894	1.5215

It is important to highlight the two results: on one hand, we observe that fund price and fund NAV average returns are very close; on the other hand, we see that the volatility of the funds' returns is significantly higher than that of their underlying assets. The implications that can be taken from these results are several. First, this wide variation in returns will necessarily cloud any examination of the determinants of discounts. Second, while there may be sentiment driving price behaviour, and that may be what the magnitude of the relative volatilities reflects, this sentiment does not seem to be reflected in returns. If this extra noise was priced, fund required returns should be higher than the returns of the underlying assets. This may not occur either because sentiment is not priced, or because other factors are working in the opposite direction driving the NAV returns up.

I tested for the presence of autocorrelation using the Durbin-Watson test. For price returns, the hypothesis of no first-order (positive for some funds and negative for others) autocorrelation can be rejected for only 8 funds at a 5% level of significance. For NAV returns, however, it is possible to reject the null of no first-order positive autocorrelation for more than 50% of the funds. For discounts returns, it is never possible to reject the hypothesis of no first-order negative serial correlation.

This autocorrelation may result from "real" factors. For example, discount and price returns may show mean reversion due to overreaction followed by a correction. Yet for the case of NAV returns it seems more the case that these highly significant first-order autocorrelation Durbin-Watson test statistics merely show that many of these emerging markets have a thin trading problem. Even on a monthly basis, the positive autocorrelation in the NAV returns can be caused by non-synchronous trading.

By Country

The breakdown of the time-series averages and standard deviations by country/regions does not seem to reflect any systematic pattern. The ranking of discount returns does not allow us to conclude that the more negative values occur for countries where barriers to investment are more severe. I have investigated whether there was any relation between average discount returns and the average IFC investability indices, the price return volatility and the price/NAV volatility ratios. None of the rank correlation coefficients was significantly different from zero.

By Stock Exchange

On average, all major listing places show negative discount returns but of small magnitude and none of them are significantly different from zero at a 5% significance level. The average standard deviations and volatility ratios are similar to the grand average above.

Correlation between Fund Price, NAV, and Discount Returns

Table 4.2 reports the cross-sectional statistics over the 105 funds' correlation coefficients between price, NAV and discount returns.

Price returns and NAV returns are positively and highly correlated reflecting an important degree of co-movement over the period. Miller *et al.* (1994), show that when the correlation between these two series is very high, for variance ratios above 1, very large, spurious autocorrelation can result in discount returns even though the value of the autoregressive parameter in the NAV series (positive autocorrelation caused by non-synchronous trading) is close to zero.

The correlation coefficients between discount returns and price and NAV returns suggest that the major driver of the variation in discount returns is the fund's price: while the average correlation coefficient between price returns and discount returns is 0.65, NAV returns and discount returns show, on average, a correlation of -0.16.

Correlation between Fund Returns and Risk Factors

Country funds are often seen as major markets' assets that comply with the same pricing rules of any assets trading in those markets. To get a preliminary idea of which factors drive the pricing of funds and of their underlying assets, I have computed the correlation between fund returns, their respective local market index and the world market index, for the 105 funds in my sample.

Table 4.2 - Correlation between Price, NAV, and Discount Returns
Cross-Sectional Means

This table contains the cross-sectional summary statistics of the pairwise Pearson correlation coefficients between price, NAV and discount monthly returns for the 105 country funds in my sample. Returns are monthly log returns over the period from August 1990 (or later) to August 1995. The discount returns are computed as the differential between price and NAV returns. Details for each individual fund are available upon request. The sample data is from Micropal.

	Price vs. NAV Returns	Price vs. Discount Returns	NAV vs. Discount Returns
Minimum	-0.075	0.11	-0.70
First Quartile	0.54	0.56	-0.30
Median	0.62	0.70	-0.14
Third Quartile	0.73	0.78	0.00
Maximum	0.90	0.94	0.36
Mean	0.61	0.65	-0.16
Std. Deviation (Cross-Sectional)	0.17	0.18	0.22

Table 4.3 - Correlation of Fund Returns with Risk Factors

This table contains cross-sectional summary statistics of the pairwise Pearson correlation coefficients of price returns, NAV returns and discount monthly returns with the local and world market returns. The local market returns are the total returns of the corresponding IFC Global emerging market index in US dollars. The world market returns are the total returns of the MSCI World market index in US dollars. Returns are monthly log returns over the period from August 1990 (or later) to August 1995. The discount returns are computed as the differential between price and NAV returns. Details for each individual fund are available upon request. The sample data is from Micropal.

I. Price Returns

	Local Risk	World Risk
N	105	105
Minimum	0.08	-0.23
First Quartile	0.50	0.14
Median	0.61	0.33
Third Quartile	0.71	0.42
Maximum	0.90	0.67
Mean	0.59	0.29
Std. Deviation (Cross-Sectional)	0.17	0.19

II. NAV Returns

	Local Risk	World Risk
N	105	105
Minimum	0.15	-0.21
First Quartile	0.75	0.18
Median	0.85	0.29
Third Quartile	0.91	0.38
Maximum	0.99	0.58
Mean	0.82	0.28
Std. Deviation (Cross-Sectional)	0.13	0.17

III. Discount Returns

	Local Risk	World Risk
N	105	105
Minimum	-0.59	-0.48
First Quartile	-0.20	-0.04
Median	-0.02	0.13
Third Quartile	0.09	0.26
Maximum	0.82	0.68
Mean	-0.03	0.11
Std. Deviation (Cross-Sectional)	0.25	0.21

Table 4.3 shows the cross-sectional statistics for these coefficients. On average, fund price returns are more correlated with their local market index than with the world market index. Average correlation for the former is 0.59 (ranging between 0.08 to 0.90) against 0.29 for the latter (ranging from 0.25 to 0.67).

NAV returns are even more closely correlated with the local market index (average correlation coefficient of 0.82). The co-movement with the world market is, on average, 0.29, similar to what was found for price returns.

For discount returns, on average, the correlation is positive with the world market index (0.11) and negative with the local market index (0.03) (marginally significant at a 10% level of significance).

To make sure my results are not confounded by the mean reversion in price and discount returns that is usually observed following the fund's IPO, I have removed the first six observations for all funds. The panel shrinks only slightly from 5857 observations to 5632 observations, reflecting that my core panel did already exclude those initial observations. Therefore, the summary statistics remain very similar to the results just discussed above.

4.7.2 UNCONDITIONAL RISK EXPOSURES

J-Test

To assess whether the two risk factor-specification suggested by a mild segmentation scenario made sense, I have looked at a *J*-test to compare two competing single models that correspond to extreme scenarios of complete segmentation and complete integration. The *J*-test allows us to validate one of two models that are considered to be non-nested "in the sense that they have separate parametric families and one model cannot be obtained from the other as a limiting process" (Pesaran, 1974). The *J*-test produces better results than the traditional *F*-test but in the presence of collinear sets of explanatory variables, it does not provide great help in discriminating among the two hypotheses.

The first hypothesis, (H0) is that the fund return generating process involves only one priced factor: the local return risk factor (RL).

$$R_{it} = a_i + b_i RL_{it} + e_{it} \quad (4\text{-}16)$$

where R_{it} denotes the returns of the country fund i on a particular month t.

The second hypothesis (H1) considers, instead, that the world market risk factor (RW) drives the fund returns:

$$R_{it} = c_i + d_i RW_{it} + u_{it} \quad (4\text{-}17)$$

As, by assumption the two hypotheses are non-nested, the truth of one implies the falsity of the other. To test the first hypothesis, I ran the following regression:

$$R_{it} = a^*_i + b^*_i \, RL_{it} + k_i \bar{\bar{R}}_{it}^{H1} + v_{it} \qquad (4\text{-}18)$$

where $\bar{\bar{R}}_{it}^{H1}$ are the predicted values from (4.15).

Davidson and Mackinnon (1981) show that H0 is true if the true value of k is zero. Asymptotically, it is correct to use a conventional t-test to test if k is zero. It is not possible to infer about the alternative hypothesis on the basis of this first test because t-statistics are conditional on the truth of the null hypothesis. Thus even if we find k very close to 1 and significant, it is necessary to use the reverse procedure to validate H1, as follows:

$$R_{it} = c^*_i + d^*_i \, RL_{it} + h_i \bar{\bar{R}}_{it}^{H0} + v_{it} \qquad (4\text{-}19)$$

where $\bar{\bar{R}}_{it}^{H0}$ are now the predicted values from (4.18). H1 is true if h is zero.

I ran the test for each of the funds in my sample and computed the average coefficients over the 105 funds. Results are available upon request. For price returns the average slope coefficient on the local risk factor is 0.62 with a t-statistic of 54.3. The average coefficient on the predicted returns using H1 (k) is 0.55 with a t-statistic of 20.3. When I reversed the procedure to try to validate H1, I got an average h coefficient of 0.92 and a t-statistic of 58.4. Thus the J-test does not allow us to discriminate between the two hypotheses.

I have performed the same analysis for NAV and discount returns. Again, it is not possible to discriminate between the two competing hypotheses. For the NAV returns, however, these seem to be reasonably described using the local risk factor only.

In sum, the two factor-model seems to produce better results in explaining country funds' returns that any of the two single risk factor models.

Market Risk Exposures

I have estimated time-series betas for all funds in my sample, for the fund price and NAV monthly returns on two risk factors: the corresponding IFC Global market index and the MSCI World market index.

Table 4.4 reports the cross-sectional statistics of the risk factors' exposures. My results are robust to general heteroskedasticity and autocorrelation.[83] The two risk factors explain, on average, 69% of NAV returns variation (the median adjusted R^2 is 72%). The local market risk factor is highly significant for 104 out of 105 funds. The world market index is only significant 29 times out of 105.

[83] I have run the regressions using GMM. The average coefficients are significantly different from zero whether I use a t-test based on the standard deviation of mean coefficients or a precision-weighted average of the standard errors of each estimate.

Table 4.4 - Country Funds' Risk Exposures
Cross-Sectional Statistics

This table reports cross-sectional statistics for the GMM estimates and fit of the 105 funds' time series regressions of monthly price and NAV returns on two risk factors: the world market index and the local market index. The local market returns are the total returns of the respective IFC Global emerging market index in US dollars. The world market returns are the total returns of the MSCI World market index in US dollars.

I. Price Returns

	Local Market	World Market	R^2	Adj. R^2
Minimum	0.0601	-1.0192	0.01	-0.05
First Quartile	0.4966	-0.0072	0.30	0.27
Median	0.6773	0.3623	0.45	0.43
Third Quartile	0.8511	0.7141	0.55	0.53
Maximum	1.2402	1.4903	0.82	0.81
Mean	0.6785	0.3526	0.41	0.39
Std. Deviation	0.2263	0.4942	0.18	0.19
Proportion Significant at 5% (*t*- test)				
	101/105	44/105		

II. NAV Returns

	Local Market	World Market	R^2	Adj. R^2
Minimum	0.1321	-0.4098	0.04	-0.01
First Quartile	0.5922	-0.0626	0.58	0.56
Median	0.7317	0.0903	0.72	0.71
Third Quartile	0.8954	0.2449	0.83	0.83
Maximum	1.0439	0.9278	0.97	0.97
Mean	0.7225	0.0866	0.69	0.68
Std. Deviation	0.2009	0.2257	0.18	0.19
Proportion Significant at 5% (*t*- test)				
	104/105	29/105		

The same two risk factors have a lower power in explaining variation in price returns. The median adjusted R^2 is now 43%. It may be the case that the pricing of country funds involves other systematic risk factors not shared by their NAV counterpart. For example, Hardouvelis *et al.* (1993) use an index representing US small firms' returns.[84] Bodurtha

[84] Instead of using one regression for each fund, they stack all fund regressions together and impose common slope parameters. Thus, their R^2 gives a measure of the joint fit of all funds. Their country fund return generating equations include some additional explanatory variables: the level

et al. (1995) use an equally-weighted index of discounts on domestic closed-end funds.[85] Both try to proxy for variation in noise trader sentiment. Errunza *et al.* (1998) also use an equally-weighted index of discounts on country funds but, instead, they aim to proxy the imperfect substitution between the fund and its underlying assets.

I would expect, *a priori*, country funds' prices to show more significant world risk factor exposures. In effect, while for NAV returns, only 29 world risk factor parameters were significant, for price returns, I find that the world market risk factor is significant for 44 out of the 105 funds. The local factor remains highly significant. Hardouvelis *et al.* (1993) and Bodurtha *et al.* (1995) have found even more significance for the world risk factor when controlling for local risk factors.[86]

Bailey and Lim (1992) conclude that country funds behave more like US stocks than foreign stocks. Their conclusion is based on the comparison of the correlation of returns between funds and the US and the local foreign market index.[87]

To find out if the risk exposures for price and NAV returns were identical, I have used a Wald test that compares the residuals from the price and NAV regression stacked together, with the residuals from the restricted model that requires the same loadings on the risk factors for price and NAV returns.[88] I can never reject the hypothesis of similar exposures to any of the two factors or to the two factors together. Differently, Bailey and Jagtiani (1994) found that Alien and Main Board returns on the Thai stock market had different loadings on the world and Thai risk factors. Patro (1997) also finds weak evidence supporting different price and NAV exposures.

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of discounts; exchange rate changes; the dollar return on an index of large US stocks and the dollar return on an index of small US stocks.

[85] Their country fund return generating regression includes, in addition to the US and local risk factors, exchange rate changes and an equally-weighted index of closed-end funds' discount changes.

[86] Chang, Eun and Kolodny (1995) find similar results for 15 country funds, 11 investing in mature markets and 5 in emerging markets, over a five year period ending in December 1990. Moreover, they find that world betas are higher than local betas for price returns.

[87] Three reasons might explain why I obtain different results. First, they use daily returns, and daily correlations tend to be lower than monthly correlations because of non-synchronous trading, especially in markets that are less liquid. Second, their sample period includes October 1987, and that may lead to a higher correlation between the returns of the funds and the NYSE index. Third, they do not report the corresponding correlations for these country funds' underlying assets; therefore it is not possible to find out whether their results are driven by the singularities of their sample.

[88] This test was proposed by Gallant and Jorgenson (1979). The difference between the residuals has an asymptotical Chi-square distribution.

This piece of evidence by itself is insufficient to establish that the pricing rules for the fund and the underlying assets are the same and therefore reject the international segmentation-based explanation that predicts that premia occur because of that. The next section investigates this issue further.

Multicollinearity

Chapter 2 has documented that the correlation of returns between the world and emerging markets are low. To overcome any multicollinearity between the two explanatory variables I have also looked at the betas that resulted from using orthogonalised local market returns instead of the raw local market returns.[89] Results are similar except that now the slope of the world market return index becomes more significant: while before we had 39 out of 105 significant world risk factor exposures, with orthogonalisation that figure jumps to 49.[90]

Non-Synchronous Trading

Another problem one faces when working with emerging markets is non-synchronous trading.[91] On one hand, as some country funds are very illiquid, I would expect them to lag the world market index. On the other hand, most of the underlying assets of country funds are the larger and more liquid securities in that particular emerging market; therefore those assets are expected to lead the local market index. Furthermore, it is possible that this asynchronicity may result from time differences in trading hours. Following the procedure suggested by Dimson (1979), I have run a specification that includes one lagged, one matching and one leaded local and world market returns and aggregated the three slope coefficients. On average, the estimates of the risk exposures are larger, especially in the case of local market exposures.[92] The significance of the lagged and the leaded parameters is not, however, as expected. For the local risk factor, the lagged market return is significant both for price and NAV returns. For the world risk factor, only the leaded market return for price returns is significant.

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[89] See, for example, Stehle (1977) or Bailey and Jagtiani (1994).

[90] With the orthogonalisation, the parameter of the local factor exposures and variances are not affected; the exposures to the world risk factor change and their variances decrease.

[91] Infrequent trading causes an upward bias in frequently traded stocks' betas and more severely, downward bias in infrequent traded stocks' betas.

[92] The average absolute value of local betas are up from around 0.7 to 0.8.

Other Specifications

A specification including the foreign exchange rate factor only slightly improves the results. The mean adjusted R^2 improves from 8.4% to 10.6% but the exchange rate change factor is only significant 14 out of 75 times.[93]

To accommodate the possibility of an additional risk factor in the country fund return-generating process, I have included an additional regressor: the index of the country funds in the sample. This factor is positively significant in explaining the time series variation in fund price returns.[94] The local risk exposures remain almost the same with the introduction of this variable but the world risk factor beta decreases slightly in the regression of discount returns. This decrease may result from the fact that the world market index and the country fund index are significantly correlated (with a correlation coefficient of 53%).

I have also included a lagged regressor to avoid misspecification. The resulting risk factors were very similar.

4.7.3 Panel Data Results

In this section, I first describe the econometric techniques I have used to assess the role of a set of determinants, suggested by the international asset pricing theory, in explaining the joint variation of discount returns across funds and over time. I then turn to the discussion of the results.

Estimation Techniques

The core regression regresses discount returns against the price and NAV exposures on local and world risk factors.[95] For each month, these exposures are computed from a

93 Regional and global funds are removed when testing this specification.

94 The average exposure of price returns to this country fund index is 0.94.

95 Bailey and Jagtiani (1994) regress discount returns (log price returns minus log NAV returns) on world and local market returns to generate discount risk factors loadings. They assume that the coefficients they get on these discount risk exposures are realised differential risk premia. To make such an assumption, they omit the last four terms on the RHS of the last equation below.

multivariate regression using all the information of the period except the observation of that particular month[96,97]. Estimates obtained using one single beta for each fund over the entire sample period alleviate the Error-In-Variables problem, and avoid extremes in the time-series resulting from deleting an observation that strongly influences the results. I had to use the overlapping beta estimates since the panel data estimation requires time variability in the dependent variables.[98]

The core regression includes, in addition, the size of the market that is targeted, a proxy for segmentation and dummy variables for each stock exchange. Finally, the regression includes two proxies for the constrained supply of the funds in the emerging market: the number of country funds in that market (open and closed-end) and the size of those funds normalised by the respective market capitalisation.[99]

As discussed above, the country funds' pricing reflects the institutional features related to the place where the funds trade or to the market where they invest. To control for this specificity, I consider a fund fixed effect that aggregates the different unobservable fund-varying variables and a time period fixed effect that aggregates fund-invariant unobservable effects.

The most important benefit of panel data is the ability to control for the unobservable fund and period-specific effects and therefore to avoid the biases that result from ignoring

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$$R_P = \gamma_0 + \gamma_1 \hat{\beta}_P^L + \gamma_2 \hat{\beta}_P^W$$

$$R_{NAV} = \alpha_0 + \alpha_1 \hat{\beta}_{NAV}^L + \alpha_2 \hat{\beta}_{NAV}^W$$

$$R_P - R_{NAV} = \gamma_0 - \alpha_0 + \gamma_1 \hat{\beta}_P^L - \alpha_1 \hat{\beta}_{NAV}^L + \gamma_2 \hat{\beta}_P^W - \alpha_2 \hat{\beta}_{NAV}^W$$

$$\begin{aligned} R_P - R_{NAV} &= \gamma_0 - \alpha_0 + (\gamma_1 - \alpha_1)(\hat{\beta}_P^L - \hat{\beta}_{NAV}^L) + (\gamma_2 - \alpha_2)(\hat{\beta}_P^W - \hat{\beta}_{NAV}^W) \\ &\quad + (\gamma_1 - 2\alpha_1)\hat{\beta}_{NAV}^L + \alpha_1 \hat{\beta}_P^L + (\gamma_2 - 2\alpha_2)\hat{\beta}_{NAV}^W + \alpha_2 \hat{\beta}_P^W \end{aligned}$$

96 For example, for September 1993, the estimates for the exposures result from regressing the fund returns on the realised risk factors for the period from August 1990 to August 1993 and from October 1993 to August 1995.

97 This procedure produces similar results to the more common procedure of using a previous period to estimate the parameter for a particular month (see Kothari, Shanken an Sloan, 1995). I have also used a mixed procedure, using all the sample information for the first 36 months and the previous rolling 36 observations for the remaining 24 months. The risk exposures obtained in this manner are very similar to the overlapping betas obtained as described above.

98 This time variability does not mean to capture changes in exposures over time. As Shanken (1992) remarks, by assuming that risk exposures are constant for overlapping periods, one is effectively assuming constancy over the entire period.

99 As I have only yearly data, I had to expand the series using a step function for the number of funds and a linear spine for the total assets.

heterogeneous intercepts (and/or slopes). Furthermore, panel data estimation allows us to reduce the co-linearity among the explanatory variables.[100]

I use the Within-Group estimator. The coefficients of the regressors are estimated using OLS on transformed data, obtained by subtracting, for each variable, its mean value over time. This estimator arises from a model where the fixed effect is treated as a constant. I made this assumption given that I am trying to make inferences conditional on the funds in my sample. I present a Hausman misspecification test that compares fixed and random effects models and gives evidence on the validity of this choice.

In addition, I also show the estimates obtained from two other estimation techniques. In particular, I present the results for:

- a simple pooled regression using OLS.
- the Fama and MacBeth (1973)-type regressions.

The FM technique involves running a cross-sectional regression of returns on beta estimates for each period. The sample mean of the beta estimates gives the final beta estimate. Standard errors are computed as if the series of estimates were independent and identically distributed.[101] The t-values are given by the sample mean coefficient divided by the standard error of this mean.

Amihud, Christensen and Mendelson (1993) show that "if assets are serially and cross-sectionally homoskedastic and uncorrelated, then the OLS estimator in the joint pooled model is optimal and more efficient than the Fama and Macbeth (1973) estimator and leads to a more powerful test on the beta coefficients".

When the homoskedasticity assumption is violated, OLS estimators are inefficient for either a cross-sectional regression in period t, or a pooled time series and cross-sectional regression. Litzenberger and Ramaswamy (1979) propose an estimator that is given by the weighted mean of the independent GLS monthly estimates, where the weights are inversely proportional to the variances of these estimates.[102] Shanken (1992) shows that this approach is similar to the MLE estimator (Gibbons, 1982) and produces, not only more efficient, but asymptotically consistent estimators, alleviating the error-in-variables problem.

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[100] Details regarding panel data estimation are available upon request. Please refer to Urga (1992) for a selective summary of panel data estimation or Hsiao (1986) for a complete analysis of panel data.

[101] The independence assumption may not, however, be strictly satisfied because of measurement error in the overlapping beta estimates. If that is the case, estimates are biased in small samples and their precision is overstated (Shanken, 1992).

Results

Table 4.5 shows the results. Overall, they are very weak. The fixed effects model seems to produces better results than the OLS pooled model supporting my expectation that idiosyncratic features of the fund have to be controlled for. Yet an *F*-test comparing the two specifications is not able to reject the null hypothesis that the efficient estimator is pooled least squares.

The Hausman chi-squared statistic that compares the random effects and the fixed effects model, favours the fixed effects model for the specification with fund specific effects. When both fund and period specific effects are included, the fit improves slightly but it is still very poor. The *F*-test now rejects the null hypothesis that the efficient estimator is pooled least squares. However the Hausman test is no longer able to reject the random effects model.

The Fama and Macbeth (1973) type regressions are also very weak, as reflected in the *t*-values. The fit of these different specifications are not, however, directly comparable. The discussion below focuses on the results of the first panel data specification. Two coefficients are statistically different from zero:

- the first is the coefficient on the fund's exposure to the world market factor. The positive sign is as expected: the more a fund is correlated with the world market after controlling for that same NAV exposure, the higher the fund's expected returns. The estimate of the world market risk exposure can be read as follows: if the price beta of a fund is 0.1 higher, then the monthly discount return on that fund increases by around 0.8%. Using the relationship established in (4.15), and assuming, for example, ϕ=0.15, then if the world beta of a fund increases by 0.1, the premium should decrease by around 0.05.

Alternatively, this coefficient can be understood as the emerging markets' average risk premia paid to compensate a fund's exposure to the world market after controlling for its underlying assets' exposure to the same factor.

- the second is the underlying assets' exposure to the world risk factor. A negative sign seems to reflect that the world market factor is also priced and the higher this exposure, the higher the NAV expected returns and therefore the lower the discount returns. As remarked by Bailey and Jagtiani (1994) the coefficients on the fund and on the underlying assets' exposures to the world market risk don't have to be the same, and that difference could reflect different risk premiums for the two types of investors when markets are segmented.

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102 I use GMM to obtain these monthly cross-sectional estimates.

Table 4.5 - Country Funds: Time-Series Cross-Sectional Variation in Discount Returns (I)
- Local and World Risk Exposures -
Balanced Panel: 70 Funds, 4200 Observations
August 1990 to August 1995

This table contains the coefficient estimates, the associated *t*-values and statistics of fit and misspecification for five models to explain time-series cross-sectional monthly variation in country funds' discount returns. The "Fixed Effects" models are two panel data models. The "Unit" model adjusts for unobservable fund fixed effects; the "Unit and Period" model adjusts for both fund and period fixed effects. The "Pooled Regression" model is the pooled time series cross-sectional regression by OLS. The "Cross-Sectional Regressions" are monthly cross-sectional Fama and Macbeth (1973) type regressions. The GMM estimates are aggregated using (FM) simple or precision (LR: Litzenberger and Ramawasmy, 1979) weighted averages. Discount returns are computed as the differential between fund price and NAV returns and are measured in US dollars. *BPL*, *BPW*, *BNAVL* and *BNAVW* refer to the exposure of price and NAV returns to respectively local and world risk factors. *t*-statistics in parentheses, are computed as usual. *EP* is known in the literature as Explanatory Power. For each month, I compute the sum of square residuals (SSR_t) and the sum of total squared variance (SST_t) as usual. I then sum across all the sample months and this statistic results from $\Sigma(SST_t - SSR_t) / \Sigma SST_t$. *p-F* All refers to an overall significance test. The first specification test refers to an *F*-test: under the null there are no fixed effects; the second specification test is the Hausman test and the null is that effects are random.

	Fixed Effects		Pooled Regression	Cross-Sectional Regressions	
	Unit	Unit and Period		FM	LR
Estimates and *t*-values					
Constant	...	...	0.0006	0.0005	0.0094
			(0.08)	(0.00)	(1.69)
BPL	0.0177	-0.0244	-0.0036	-0.0037	-0.0019
	(0.27)	(-0.38)	(-0.54)	(0.00)	(-0.18)
BPW	0.0764	0.0093	-0.0005	-0.0006	-0.0016
	(2.54)	(0.30)	(-0.18)	(0.00)	(-0.73)
BNAVL	0.0342	0.0051	0.0012	0.0010	-0.0073
	(0.30)	(0.44)	(0.14)	(0.00)	(-1.19)
BNAVW	-0.1510	-0.0833	0.0018	0.0025	0.0013
	(-2.31)	(-1.27)	(0.30)	(0.00)	(0.29)
Fit					
R^2	0.00	0.07	0.00		
Adj. R^2	-0.01	0.03	0.00		
p-F-All	(1.0000)	(0.0000)	(0.9800)		
EP				0.12	
Specification Tests					
(*p*-values)					
1. Fixed Effects vs. Pooled	(1.0000)	(0.0000)			
2. Random vs. Fixed Effects	(0.0540)	(0.6612)			

I would expect that the coefficient on the exposure of the underlying assets to the local factor was significantly negative reflecting that, the more the underlying assets were correlated with the local market, the lower the discount returns (and the higher the premium). This is not the case: this exposure does not seem to be priced.

Table 4.6 compares the results when other independent variables are added. The results remain almost unchanged. The estimate of the coefficient on the (log) market value of the associated emerging market (country or region) is positive, consistent with the hypothesis that the larger the emerging market where the fund invests, the lower the premium. The estimate of the coefficient of the IFC investability index is also positive supporting the hypothesis that the lower the barriers to foreign investment, the better the risk sharing, the lower the premium[103]. Yet none of these coefficients is significant.

Results for the other regressors are available upon request. Some points are worthwhile to note:

- the coefficients on the stock exchange dummies are not significant and the results remain as above;

- the coefficient on the Institutional Investor's country credit rating is not significant; neither are the coefficients on the variables that proxy the relative supply of country funds[104].

In some of these specifications, I include variables that are country-invariant, like the country rating or the capitalisation of the market where the fund belongs. This may lead to very little variation in a variable to calculate with confidence the effect is has on the dependent variable. On the other hand, some of these variables are collinear; multicollinearity results in inadequate or insufficient variability of the regressors in the data set. An estimate based on little information cannot be held with much confidence and therefore hypothesis testing is not powerful. The estimates may be unbiased, and so may be the R^2 but the standard errors of the estimates will be quite large. Furthermore in the case of multicollinearity a specification problem may arise given that diverse hypotheses about the parameter values cannot be rejected.

[103] For global and regional funds, the investability index can also be computed and is defined as before, by the ratio between the restricted to unrestricted capitalisation for the relevant markets.

[104] This specification was ran only for individual markets' country funds.

Table 4.6 - Country Funds: Time-Series Cross-Sectional Variation in Discount Returns (II)
- Local and World Risk Exposures, Size and Barriers -
Balanced Panel: 70 Funds, 4200 Observations
August 1990 to August 1995

This table contains the coefficient estimates, the associated *t*-values and statistics of fit for three models to explain time-series cross-sectional monthly variation in country funds' discount returns. The "Fixed Effects Unit" model adjusts for unobservable fund fixed effects. The "Pooled Regression" model is the pooled time series cross-sectional regression by OLS. The "Cross-Sectional Regressions" are monthly cross-sectional Fama and Macbeth (1973) type regressions. The GMM estimates are aggregated using precision (LR: Litzenberger and Ramawasmy, 1979) weighted averages. Discount returns are computed as the differential between fund price and NAV returns and are measured in US dollars. *BPL, BPW, BNAVL* and *BNAVW* refer to the exposure of price and NAV returns to respectively local and world risk factors. *MV* denotes the natural logarithm of the capitalisation for the emerging market where the country fund is specialised. *II* denotes the IFC investability index. The index varies from 0 to 100, corresponding to a completely restricted market and a free market, respectively. *t*-statistics in parentheses, are computed as usual. *EP* is known in the literature as Explanatory Power. For each month, I compute the sum of square residuals (SSR_t) and the sum of total squared variance (SST_t) as usual. I then sum across all the sample months and this statistic results from $\Sigma(SST_t - SSR_t) / \Sigma SST_t$.

	Fixed Effects (Unit)			Pooled Regression			Cross-Sectional Regressions (LR)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Estimates									
Constant	...	...	...	0.0006	-0.0100	0.0004	0.0094	-0.0050	0.0097
				(0.08)	(-0.61)	(0.05)	(1.69)	(-0.38)	(1.70)
BPL	0.0177	0.0181	0.0193	-0.0036	-0.0035	-0.0032	-0.0019	-0.0006	-0.0019
	(0.27)	(0.29)	(0.31)	(-0.54)	(-0.50)	(-0.48)	(-0.18)	(-0.11)	(-0.34)
BPW	0.0764	0.0759	0.0767	-0.0005	-0.0004	-0.0002	-0.0016	-0.0018	-0.0015
	(2.54)	(2.47)	(2.49)	(-0.18)	(-0.10)	(-0.08)	(-0.73)	(-0.83)	(-0.65)
BNAVL	0.0342	0.0457	0.0410	0.0012	0.0030	-0.0021	-0.0073	-0.0061	-0.0046
	(0.30)	(0.43)	(0.38)	(0.14)	(0.30)	(-0.23)	(-1.19)	(-0.96)	(-0.70)
BNAVW	-0.1510	-0.1505	-0.1505	0.0018	-0.0014	0.0030	0.0013	0.0016	0.1150
	(-2.31)	(-2.50)	(-2.50)	(0.30)	(-0.19)	(0.49)	(0.29)	(0.26)	(0.24)
MV		0.0021			0.0009			0.0006	
		(0.96)			(0.74)			(0.64)	
II			0.0115			0.0058			-0.0077
			(0.75)			(0.85)			(-1.33)
Fit									
R^2	0.00	0.00	0.00	0.00	0.00	0.00			
Adj. R^2	-0.01	-0.02	-0.02	0.00	0.00	0.00			
EP							0.12	0.13	0.14

One of the reasons for these insignificant coefficients could be the fact that I am imposing the same risk premia across countries.[105] To overcome this potential misspecification, I have run a regression for each emerging market. As before I allow for fund varying intercepts.

There are countries for which the estimates have the expected signs and are statistically significant but I also find highly significant estimates with the wrong sign.

When I tested for a common slope across markets I could not find any trace of homogeneity across countries, suggesting that any type of pooling may lead to biases in estimates.[106]

Robustness of the Results

GMM Panel Data Estimator

The Within Groups estimator ("Fixed Effects Unit") above is obtained by applying the classical regression model (OLS) to data in the form of deviations from their time-series mean. Given the disparate nature of the country funds in my sample, I have also employed a generalised method of moments (GMM) estimator. The advantage of using GMM is to correct for heteroskedasticity of unknown form in the error components.

Using GMM estimation, none of the coefficients is significant.

Other Panels

The results for the unbalanced panel of 105 funds are available upon request. The panel data coefficients are more significant than those of the balanced panel. The fund's exposures to the local and the world market now earn a negative premium and the underlying assets' exposure to the local market is now priced but the sign of coefficient is not as expected.

Other Specifications

- Country Index Exposure

I have shown above that a country fund index was significant in explaining the time series variation in fund price returns. To find out whether this factor was priced, I have

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105 Let's suppose there are two assets, one for each country, one with beta 1.5 and the other with 0.75. The risk premium on the first market is 10% and 20% on the second. Ignoring this may lead us to conclude that a return generating process does not fit the returns because two stocks with different betas earn the same risk premium of 15%.

106 I have used a Wald test to test this constraint.

included this exposure together with the exposures to the local and world risk factors. This factor seems indeed to be priced. Yet with the inclusion of this variable the coefficient on the world risk factor is no longer significant.

- Lagged Dependent Variable

Hardouvelis *et al.* (1993) and Bodurtha *et al.* (1995) have stressed the importance of variables like lagged discount levels or lagged discounts returns in explaining the time-series variation in discount returns. To avoid misspecification I include the lagged regressor on the regression. The coefficient on this variable is negative but this is not surprising given that, as I mentioned above, all funds showed first-order autocorrelation in discount returns. I discuss this result in more detail below.

With the inclusion of this variable, the strict exogeneity in the regression with transformed data in the form of deviations from the mean is violated, and the Within-Group estimator is inconsistent. Yet both the pooled and the cross-sectional regression generate estimates that are very close to that fixed effects unit estimate.

US vs. UK Country Funds

I could not find any significance for the stock exchange dummies. To investigate further whether there is a differential behaviour depending on the place where the country fund trades and/or is domiciled, I have repeated the analysis with two sub-samples, respectively for UK and US funds. The results for the two sub-samples differ significantly. For any of the sub-samples, the significance of some of the individual parameters improves. For UK funds, however, the signs of the parameters contradict my expectations. For US funds, the coefficients on the NAV risk exposures to risk factors are as expected, but it is difficult to interpret the magnitude of these coefficients.

Discounts Levels vs. Discount Returns

I have also performed the analysis with a sub-sample of country funds for which I have information about discount levels. I only have level data for 45 funds of which 23 are listed in the NYSE and 21 in London, across 13 markets. Of these, 31 have balanced data for the period from August 1990 to August 1995. In relation to my core panel, this sub-sample is less dominated by UK funds (London or Dublin-listed). On what concerns the breakdown across regions there are no striking differences.

Results are not as expected. The signs of the coefficients contradict my expectations. The relationship between the estimates does not seem to conform with the one established in (4.15) above, but, given that these are different samples and parameters are seldom significant in any of the two specifications, these results are very little informative.

Anyway it seems that the weakness of the results does not seem to be driven by the fact that I use discount returns and not discount levels.

Error-In-Variables Problem

When the independent variables are measured with error, estimates are biased due to the negative correlation between the observed regressors and the disturbance term. This bias is magnified in the within dimension.

If the Within-Group and the GLS estimates differ and if difference estimates also differ significantly from those, errors in measurement may well be present. If the error correlation structure is known, a GLS estimator solves the problem. The alternative is to estimate a set of estimators on difference data (different lengths) or outside instruments by IV or GMM.

Above, I have reported that the Within-Group estimates and the GLS estimates are statistically different. I have also used a first difference estimator. These estimates are very different from the "Fixed Effects Unit" but as before, not significant. Thus the evidence seems to indicate an error-in- variables problem.

The results so far are not very encouraging. The estimates are insignificant and when I examine different panels and alternative specifications, results change dramatically. In sum, the evidence presented does not support that an International Asset Pricing-based explanation accounts for the time-series cross-sectional variation in discounts.

4.7.4 Noise Traders' Sentiment Results

Two pieces of evidence from the preliminary findings section are worthwhile to recall:

- first, and unlike the previous literature, I find that NAV realised returns are, on average, over the sample period, above fund price returns, even if this difference is insignificant; the standard deviation is, however, much higher for fund prices than for their underlying assets. The noise traders' sentiment model predicts that country funds' returns are above its NAV returns because fund's returns have to compensate for an undiversifiable source of risk: sentiment.

- second, I find some support for a common behaviour across funds: the exposures of price returns to a country fund index are, on average, positive and statistically significant. This variable may be capturing an extra systematic risk that is common for all funds.

These results, together with the weakness of the previous results and the importance of the lagged dependent variable in the time-series cross-sectional regressions, motivated further investigation of the behaviour of country funds' pricing. Below I test whether two implications from the noise traders' sentiment model hold for the particular case of emerging markets' country funds.

Size and Liquidity Deciles

The first implication of the noise traders' model is that all assets held by noise traders should co-move, reflecting the sentiment that drives their behaviour.

I have first looked at the co-movement of country funds' returns with small stocks. I have constructed two indices, one with the 29 funds listed in the US, and the other with the 54 funds listed in the UK.[107,108] I compare the returns of a US country fund index with the returns of a portfolio composed of the smaller firms in the US. Similarly, I compare the returns of a UK country fund index with the returns of the less liquid and smaller stocks listed in London.

US Sentiment

I use the CRSP (Center for Research in Security Prices) returns for the deciles 9 and 10 of the stocks listed in the NYSE.

Table 4.7 - US Sentiment
- Country Funds and Small Firms, Multivariate Regression -
August 1990 to August 1995
This table reports the results of time-series regressions of price and discount monthly returns of an equally-weighted index of 29 emerging markets' country funds listed in the US, on the emerging markets' index (*REM*), on the US risk factor (*RUK*) and on the excess returns of a portfolio of NYSE listed small firms (*RSMALL US*). The emerging markets' returns are the total returns of IFC Global Composite emerging markets' indices in US dollars. The world market returns are the total returns of the MSCI US market index in US dollars. The parameters are estimated using GMM.

	REM	RUS	RSMALL US	Adj. R^2
Fund Price Returns				
Coefficient Estimate	0.911	0.491	-0.006	0.76
t-statistic	(10.24)	(3.22)	(-0.08)	
Fund Discount Returns				
Coefficient Estimate	0.157	0.500	-0.003	0.29
t-statistic	(1.86)	(3.44)	(-0.35)	

107 These indices are not driven by the particular behaviour of an individual fund. For the US index, the number of funds composing the fund has a lower bound of 22 funds in August 1990. For the UK fund index, that lower bound is 39 funds.

108 I conducted the same analysis on an individual fund basis. The results are essentially the same.

These decile portfolios are obtained by ranking all eligible companies in the NYSE and splitting them into ten equally populated groups. Re-balancing occurs every quarter. Base security returns are monthly holding period total returns. The return on a portfolio for one month is calculated as the value-weighted average of the returns for the individual stocks in the portfolio.

The correlation of returns between country funds and small firms is around 40%. I have regressed the returns of the US country fund index on the IFC Composite index, on the MSCI US index and on the returns of a portfolio of small firms (in excess the US market return). This portfolio is intended to capture the noise traders' sentiment. Table 4.7 reports the results: the coefficient of the proxy for sentiment is never significant.

UK Sentiment

To proxy the UK sentiment I use two variables: the returns of a portfolio that comprises the smallest size decile stocks; and the returns of a portfolio that comprises the lowest liquid decile stocks.

Size and liquidity deciles were obtained by ranking all companies listed in the UK, that had at least 36 months available data, and by taking the lowest decile in terms of market capitalisation and trading frequency.[109] I have excluded stocks that had a beta equal to zero or that had negative market capitalisation. A decile had, on average between 150-160 constituents. Re-balancing occurs every quarter. I have used quarterly data from the Risk Measurement Service from July 1990 to September 1995, in a total of 21 quarters.[110] The return on a portfolio for one quarter is calculated as the value-weighted average of the quarterly holding period total returns for the individual stocks in that portfolio.

I have regressed the returns of the UK country fund index on the smallest decile returns in excess of the MSCI UK index, controlling for the IFC Global Composite index and for the UK index returns. I have repeated the regression for the lowest liquidity decile portfolio.

Table 4.8 shows the results. The evidence for the UK is different from what was observed for the US. To start with, the correlation between funds' returns and small firms' returns is now around 55%. The correlation coefficient for discount returns is even higher, around 70%.

The multivariate analysis confirms that the returns of the portfolio of firms in the smallest decile portfolio move together with the emerging markets' country funds price

109 The trading frequency is expressed as the average number of days from the previous recorded transaction to the month end.

110 I use quarterly total returns and not quarterly abnormal returns.

and discount returns. For the portfolio with the least liquid companies, the co-movement is not significant.

Table 4.8 - UK Sentiment
- Country Funds and Small Firms, Multivariate Regression -
August 1990 to August 1995

This table reports the results of time-series regressions of price and discount monthly returns of an equally-weighted index of 54 emerging markets' country funds listed in the UK, on the emerging markets' index (*REM*), on the UK risk factor (*RUK*) and on excess returns of a value-weighted portfolio of UK small firms (*RSMALL UK*). The emerging markets' returns are the total returns of IFC Global Composite index in US dollars. The world market returns are the total returns of the MSCI UK market index in US dollars. The regressions are estimated using GMM.

	REM	RUK	RSMALL UK	Adj. R^2
Fund Price Returns				
Coefficient	1.024	0.184	0.245	0.95
t-statistic	(14.86)	(1.89)	(3.92)	
Fund Discount Returns				
Coefficient		0.199	0.251	0.48
t-statistic		(2.33)	(4.21)	

There seems to be evidence that, at least for UK funds, the noise traders' sentiment has a role to play in explaining the time variation in fund price and discount returns. This result is surprising given that the participation of institutional investors in country funds' shareholdings is much larger in the US than in the UK.

Mean Reversion

The second implication of the noise traders' sentiment model is that country funds' pricing behaviour is unpredictable. If that was not the case, rational traders would arbitrage and would bring the price close to its fundamental value.

As in the previous literature, I have checked for mean reversion in the funds' returns. If there is mean reversion, then present returns should be inversely associated with lagged returns. Mean reversion means that, in the long run, and *ceteris paribus*, an average discount (or premium) prevails for a fund. Mean reversion in discount returns may show that funds over-react to fundamentals in the short run but adjust to fundamentals in the long run. Alternatively, it may show that the NAV takes time to express changes in fundamentals due, for example, to illiquidity in the local market. As referred before, there is controversy about how should mean reversion be measured so that it can be truly attributed to arbitrage behavior. Miller *et al.* (1988) show that differencial microstructures can result in negative autocorrelation for discount returns. Yadav and Pope (1993) and Merrick (1988) for example, define mean reversion as the relationship between changes in mispricing and the level of mispricing at the end of the previous period and show that, computed in this way, the negative relationship is not spurious.

I have checked for mean reversion in the funds' returns. Due to limited data, I looked at the relation between present returns and lagged returns. Even if I use monthly data, non-synchronous trading is a severe problem in emerging markets and that alone may induce spurious negative autocorrelation in discount returns.

Index Level

I use the one-month lagged discount return in the multivariate regression together with the emerging market and the World market indices returns. To account for spurious negative correlation caused by the presence of the contemporaneous price in the lagged and in the contemporaneous returns, I have also looked at the coefficient of the two-period lagged returns.

Table 4.9 shows the results. At an index level, there seems to be no mean reversion in the funds' returns. Bodurtha *et al.* (1995) have also tested mean reversion in fund returns at an index level. They find a positive significant coefficient on the lagged variable. My evidence does not support that result. Like them, however, I find that NAV returns are positively correlated with the one-period or the two-period lagged returns.

Table 4.9 - Mean Reversion
- All Country Funds' Index -
September 1990 to August 1995

This table reports the results of time-series regressions of price, NAV and discount monthly returns of an equally-weighted index of 105 emerging markets' country funds, on the emerging markets' index (*REM*), on the World returns (*RW*) and on the one-period lagged dependent variable (*LAG1*). The emerging markets' returns are the total returns of the IFC Global Composite index in US dollars. The world market returns are the total returns of the MSCI World market index in US dollars. The regressions are estimated using GMM.

	REM	RW	LAG1	Adj. R^2
Fund Discount Returns				
Coefficient Estimate	0.064	0.169	-0.006	0.17
t-statistic	(1.38)	(2.69)	(-0.05)	
Fund Price Returns				
Coefficient Estimate	0.770	0.261	0.126	0.83
t-statistic	(11.71)	(2.68)	(0.89)	
Fund NAV Returns				
Coefficient Estimate	0.710	0.098	0.125	0.82
t-statistic	(11.60)	(2.69)	(2.13)	

Individual Fund Level

My indices are reasonably balanced in terms of number of constituents. I have decided, nevertheless, to repeat the analysis on an individual fund basis. I run a cross-sectional regression for each month and aggregate the period estimates to obtain the final estimates of mean reversion.

This methodology was proposed by Jegadeesh (1993) to analyse predictability of individual stock returns as an alternative to the approach of aggregating individual fund estimates, that ignores any cross-sectional dependence between these estimates. An additional advantage of this methodology is that it does not require very long time series data on individual funds.

As in Jegadeesh (1993), I consider $\widetilde{R}_{it}$ the (price, NAV or discount) return on the fund i on month t given by:

$$\widetilde{R}_{it} = E(R_i) + \eta_{it} \tag{4-20}$$

where $E(R_i)$ is the unconditional expected return on fund i and η_{it} is the unexpected return on month t in an unconditional sense. Jegadeesh proposes the following cross-sectional model:

$$\widetilde{R}_{it} - \overline{R}_{it} = a_{0t} + \sum_{j=1}^{J} a_{jt} R_{it-j} + \mu_{it} \tag{4-21}$$

where $\overline{R}_{it}$ is the mean monthly return on security i in the sample period and J is the number of lagged periods consider to be relevant in predicting the returns. In his analysis, Jegadeesh considers the monthly lags 1 to 12, 24 and 36.[111,112]

Because of my short sample, I restrict the analysis to short term dependencies in country funds' returns and consider only 1, 2 and 3 monthly lagged returns. I include all the funds in the unbalanced panel. Therefore, my estimates result from an average of a minimum of 70 funds in September 1990, to a maximum of 105 funds after August 1992.

For each month, the difference between the realised and expected (price, NAV or discount) returns is regressed on the three previous months.[113] I then proceed to aggregate the 57 monthly estimates. The aggregate estimates and the associated t-statistics are

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[111] Jegadeesh's (1993) results are not sensitive to the choice of sample period over which the mean return is estimated.

[112] Sias and Tinic (1992) apply this same methodology to analyse the noise traders' sentiment and mean reversion, for 57 domestic US funds, over the period of July 1965 to December 1990.

[113] I have assumed that the serial correlation coefficients were the same for all country funds. This does not seem to be a very severe restriction.

computed using the methodology proposed by Litzenberger and Ramaswamy (1979).[114] I use two approaches to define expected returns: I consider the mean return over the sample period as in Jegadeesh (1993); and I use the expected return generated by a two factor model as defined above.

Table 4.10 presents the results. Contrarily to what I have found at an index level, mean reversion is very strong on an individual fund basis. Fund discount and price returns exhibit significant negative correlation with their returns on the preceding 3 months. Both the magnitudes of the coefficients of the lagged returns and their *t* statistics decline monotonically. The one-month lagged return has the greatest impact and predictive power for month *t* returns. My results are robust to the definition of expected returns.

Table 4.10 - Mean Reversion
- Cross-Sectional Results -
November 1990-August 1995

This tables reports the results of cross-sectional regressions of unexpected monthly returns of emerging markets' country funds on the first three lags of the dependent variable (*LG1R*, *LG2R* and *LG3R*). "Unexpected Returns" are the differential between raw returns and mean returns over the sample period. The regressions are based on Jegadeesh (1990) and estimated using GMM. Aggregation over periods is made using precision weighted averages.

	LG1R	LG2R	LG3R
Discount Returns			
Coefficient Estimate	-0.283		
t-statistic	(-20.96)		
Coefficient Estimate	-0.339	-0.150	-0.0681
t-statistic	(-23.00)	(-10.59)	(-5.63)
Price Returns			
Coefficient Estimate	-0.123		
t-statistic	(-9.92)		
Coefficient Estimate	-0.136	-0.086	-0.047
t-statistic	(-10.38)	(-6.75)	(-4.00)
NAV Returns			
Coefficient Estimate	0.003		
t-statistic	(2.78)		
Coefficient Estimate	0.004	0.005	-0.048
t-statistic	(3.43)	(0.38)	(-4.01)

114 The simple weighted average estimates are very similar to the ones presented above. The *t*-statistics computed as suggested in Fama and Macbeth (1973) are lower but the inference does not change.

Negative autocorrelation for discount returns could result from distortions in the statistical characteristics of the differenced series as suggested by Miller et al. (1988). Yet I find that price returns show a similar behaviour.

These results are very similar to the findings of Sias and Tinic (1992) for domestic US funds. If negative autocorrelation can be associated to mean reversion, then the resulting predictability of returns evidenced here and in their paper is inconsistent with the proposition of the noise traders' model for short term horizons.

The evidence presented in this section is mixed in relation to the noise traders' model. I observe that UK emerging markets' country funds co-move with other classes of assets subject to sentiment. Yet I also find negative autocorrelation in price and discount returns. If this predictability is not spurious, my evidence is inconsistent with the noise traders' sentiment model.

Further work is required to establish the nature of this mean reversion in discount returns.

4.8 CONCLUSIONS

In this study, I have tested whether an international asset pricing theory could account for the time-series cross-sectional variation in funds' discounts/premia. The theory suggests that if markets were, at some degree, segmented, emerging markets' investors valuations would be below those from mature markets' investors; therefore country funds would trade at a premium. The effects of international asset pricing would be more pronounced for segmented and smaller markets and for funds whose assets have more idiosyncratic features. Cross-market variability in premia would reflect different degrees of segmentation and time-varying premia would result from time-varying segmentation.

My findings support the past literature that discounts returns are driven mainly by the price component. However, I find little evidence of emerging markets' country funds behaving more like "world stocks" than local stocks.

Using panel data estimation to control for the fund's idiosyncratic features, I find that discount returns are significantly and positively correlated with the fund's exposure to the world market factor but I find no significance for the underlying assets' exposure to the local market factor. The evidence is also inconclusive regarding the impact of barriers: the coefficient of the variable that proxies the degree of segmentation is not significant. I look at the robustness of the results' alternative specifications to avoid misspecification. I include a foreign exchange risk factor, a common country fund factor and lagged mispriced returns. Results change but the coefficients that relate to the international capital market based-segmentation remain insignificant. I examine different panels and

UK and US sub-samples of funds. I use powerful estimation techniques to account for fund specific intercepts and slopes, autocorrelation and heterokedasticity.

Overall, results suggest that an IAP-based explanation is insufficient to explain the time-series and cross-sectional variation in discounts.

The evidence on investor sentiment is mixed: some country funds' returns co-move with small firms' excess returns; yet price and discount returns seem to be predictable from their recent past history.

The main constraint of this analysis seems to be related to the huge time-series variation in premia that changes in unconditional risk exposures or time-varying segmentation measures are unable to account for.

APPENDIX C - ADDITIONAL TABLES FOR CHAPTER 4

Table C.1 - Country Funds' Discounts - Stylised Facts

This table reports summary statistics on 45 country funds. 21 funds are listed in the UK and 24 in the US. Panel I contains the information for each individual fund. Panel II contains the average fund premia across markets. Funds listed here had at least 36 months of price and NAV data. The statistics are based on monthly observations for the period from August 1990 (or later), to August 1995. The data was obtained in Datastream and in Bloomberg.

I. Funds

Fund	Country/Region	Stock Exchange	Average Discount/Premium	Range
Argentina Fund	Argentina	New York	9.8%	[-3.4%, +38.4%]
Abtrust New Dawn	Asian Regional	London	-15.1%	[-27.2%, -5.4%]
EFM Dragon	Asian Regional	London	-7.8%	[-17.4%, +3.8%]
Gartmore Emerging Pacific	Asian Regional	London	-13.2%	[-24.3%, -1.8%]
Pacific Horizon	Asian Regional	London	-14.2%	[-23.8%, -4.3%]
TR Pacific	Asian Regional	London	-4.4%	[-19.9%, +7.5%]
Thornton Asian Emerg Mkts	Asian Regional	London	-14.1%	[-25.4%, +8.2%]
Asia Pacific Fund Inc	Asian Regional	AMEX	6.4%	[-17.1%, +29.7%]
Brazilian Smaller Cos IT	Brazil	London	-12.3%	[-22.6%, +10.0%]
Brazil Fund	Brazil	New York	2.1%	[-21.3%, +28.8%]
Chile Fund	Chile	New York	-7.7%	[-26.3%, +15.2%]
Beta Global Emerging Mkts	Global	London	-8.5%	[-23.3%, +0.5%]
F&C Emerging Mkts	Global	London	-13.8%	[-44.2%, +8.4%]
Fleming Emerging Mkts	Global	London	-5.4%	[-15.9%, +7.6%]
Genesis Emerging Markets	Global	London	-2.4%	[18.0%, +9.9%]
Templeton Emerging Mkts	Global	London	-2.5%	[-16.2%, +7.8%]
Templeton Emerg Mkts Inc.	Global	New York	15.3%	[-14.2%, +31.8%]
Emerging Markets Fund Inc.	Global	New York	6.3%	[-6.0%, +16.1%]
Emerging Mkts Telecomms	Global	New York	3.2%	[-14.7%, +26.3%]
India Growth Fund Inc.	India	New York	1.1%	[-26.2%, +53.5%]
Edinburgh Java	Indonesia	London	-8.8%	[-22.3%, +17.9%]
Indonesia Fund Inc.	Indonesia	New York	15.9%	[-14.9%, +47.9%]
Jakarta Growth Fund	Indonesia	New York	7.4%	[-10.3%, +34.9%]
Invesco Korea	Korea	London	-9.6%	[-25.5%, +3.9%]
Korea Europe	Korea	London	5.4%	[-32.6%, +42.8%]
Schroder Korea	Korea	London	-0.9%	[-23.7%, +26.3%]
Korea Fund	Korea	New York	21.8%	[-2.2%, +60.0%]
Korea Investment Fund Inc.	Korea	New York	9.1%	[-12.7%, +44.9%]
Latin American Inv Trust	Latin America	London	-11.3%	[-27.0%, +4.7%]
Latin American Equity Fund	Latin America	New York	-2.7%	[-16.9%, +19.9%]
Latin American Discovery	Latin America	New York	-2.7%	[-14.4%, +16.4%]
Malaysia Fund Inc.	Malaysia	New York	-3.5%	[-16.9%, +15.2%]
Emerging Mexico Fund Inc	Mexico	New York	1.7%	[-14.9%, +37.9%]
Mexico Equity & Income	Mexico	New York	0.2%	[-15.5%, +39.6%]
Mexico Fund Inc.	Mexico	New York	-5.8%	[-22.1%, +17.8%]
First Philippine	Philippines	London	-29.1%	[-50.5%, +16.3%]
Portugal Fund	Portugal	New York	-7.2%	[-25.6%, +9.2%]
Taiwan Fund Inc.	Taiwan	New York	11.0%	[-16.0%, +46.4%]
ROC Taiwan Fund	Taiwan	New York	-0.1%	[-20.6%, +29.5%]
Abtrust New Thai	Thailand	London	-21.0%	[-31.7%, -1.59%]
Siam Selective Growth	Thailand	London	-14.2%	[-39.0%, +15.2%]
Thai Fund Inc.	Thailand	New York	-2.0%	[-21.4%, +20.9%]
Thai Capital Fund Inc.	Thailand	New York	-8.3%	[-24.0%, +2.9%]
Turkey Trust	Turkey	London	-13.8%	[-33.5%, +51.4%]
Turkish Investment Fund	Turkey	New York	13.4%	[-32.9%, +100.3%]
All	Average		-2.9%	
	Std Deviation		9.6%	
UK	Average		-10.3%	
	Std Deviation		7.4%	
US	Average		3.5%	
	Std Deviation		8.2%	

Table C.1 - Country Funds' Discounts - Stylised Facts (cont.)

II. Breakdown by Market

Country/Region	Number of Funds	Average
Argentina	1	9.9%
Asian Regional	*7*	*-8.9%*
Brazil	2	-5.1%
Chile	1	-7.7%
Global	*8*	*-1%*
India	1	1.1%
Indonesia	3	4.8%
Korea	5	5.2%
Latin America	*3*	*-5.6%*
Malaysia	1	-3.5%
Mexico	3	-1.3%
Philippines	1	-29.1%
Portugal	1	-7.2%
Taiwan	2	5.4%
Thailand	4	-11.4%
Turkey	2	-0.2%

Table C.2 - Country Funds: Sample Description

This table lists the country funds in my sample. Funds had at least 36 months of price and NAV data, from August 1990 (or later) to August 1995. The sample data is from Micropal.

Fund	Country/Region	Trading	Fund	Country/Region	Trading
Argentina Fund	Argentina	New York	Korea Asia Fund	Korea	Hong Kong
Abtrust New Dawn	Asian Regional	London	Korea International Trust	Korea	Dublin
EFM Dragon	Asian Regional	London	Korea Equity Trust	Korea	Hong Kong
Gartmore Emerging Pacific	Asian Regional	London	Korea 1990 Trust	Korea	Hong Kong
Murray J Scottish Asian	Asian Regional	London	Seoul Asia Index Trust	Korea	Singapore
Asian Smaller Companies	Asian Regional	London	Clemente Korea Emerg Gth	Korea	London
Pacific Horizon	Asian Regional	London	Korea Growth	Korea	Dublin
TR Pacific	Asian Regional	London	Genesis Condor	Latin America	Dublin
Thornton Asian Emerg Mkts	Asian Regional	London	Latin American Inv Trust	Latin America	London
New Asia Fund	Asian Regional	AMEX	Latin America Inv Fund	Latin America	New York
Asia Pacific Fund Inc	Asian Regional	AMEX	Latin American Equity Fund	Latin America	New York
ASEAN Fund Ltd.	Asian Regional	New York	South America Fund	Latin America	London
JF Asia Select Ltd	Asian Regional	Singapore	Latin American Discovery	Latin America	New York
Korea Pacific Trust	Asian Regional	Hong Kong	Genesis Malaysia Maju	Malaysia	London
Brazilian Smaller Cos IT	Brazil	London	Buchanan Special Emg Mkts	Malaysia	London
Brazil Fund	Brazil	New York	Malaysia Capital Fund	Malaysia	London
Five Arrows Chile Fund	Chile	London	Malaysia Fund Inc.	Malaysia	New York
Genesis Chile	Chile	London	Malaysia Equity	Malaysia	London
Chile Fund	Chile	New York	Emerging Mexico Fund Inc	Mexico	New York
GT Chile Growth	Chile	London	Mexico Equity & Income	Mexico	New York
Beta Global Emerging Mkts	Global	London	Mexico Fund Inc.	Mexico	New York
F&C Emerging Mkts	Global	London	Pakistan Fund	Pakistan	Hong Kong
Fleming Emerging Mkts	Global	London	First Philippine	Philippines	London
Genesis Emerging Markets	Global	London	JF Philippine Inc.	Philippines	London
Templeton Emerging Mkts	Global	London	Manila Fund (Cayman) Ltd.	Philippines	London
Templeton Emerg Mkts Inc.	Global	New York	Portugal Fund	Portugal	New York
Emerging Markets Fund Inc.	Global	New York	Portugal Fund	Portugal	London
Emerging Mkts Telecomms	Global	New York	Lehman Bros Portugal Grth	Portugal	London
Quantum Emerging Growth	Global	Privately	Capital Portugal Fund	Portugal	Lisbon
Baring Chrysalis	Global	London	Formosa Fund	Taiwan	London
Greek Progress Fund	Greece	Athens	Taipei Fund	Taiwan	London
India Fund	India	Dublin	Taiwan Fund Inc.	Taiwan	New York
India Growth Fund Inc.	India	New York	Taiwan Index	Taiwan	Hong Kong
India Magnum Fund	India	AMEX	Formosa Growth Fund	Taiwan	Hong Kong
Himalayan Fund	India	London	ROC Taiwan Fund	Taiwan	New York
Edinburgh Java	Indonesia	London	Abtrust New Thai	Thailand	London
JF Indonesia	Indonesia	Hong Kong	Siam Selective Growth	Thailand	London
Indonesia Fund Inc.	Indonesia	New York	Thai-Asia Fund	Thailand	Hong Kong
Jakarta Growth Fund	Indonesia	New York	Thai Prime Fund	Thailand	London
Indonesia Development Fund	Indonesia	Singapore	Thai-Euro Fund Ltd	Thailand	London
Jakarta Fund (Cayman) Ltd	Indonesia	London	Thailand International	Thailand	London
Batavia Fund	Indonesia	Dublin	Thai Development Capital	Thailand	London
Indonesia Equity Fund	Indonesia	London	Thai Fund Inc.	Thailand	New York
Indonesia Capital Fund	Indonesia	AMEX	Thai Capital Fund Inc.	Thailand	New York
Malacca Fund (Cayman) Ltd.	Indonesia	London	Thai Asset Fund	Thailand	Hong Kong
Invesco Korea	Korea	London	Ruam Pattana Two	Thailand	Thailand
Korea Trust	Korea	London	Sinpinyo Four	Thailand	Thailand
Korea Europe	Korea	London	Sinpinyo Five	Thailand	Thailand
Korea Liberalisation	Korea	London	Thana Phum	Thailand	London
Schroder Korea	Korea	London	Sub Thawee Two	Thailand	Thailand
Korea Fund	Korea	New York	Turkey Trust	Turkey	London
Korea Investment Fund Inc.	Korea	New York	Turkish Investment Fund	Turkey	New York
Seoul Horizon Trust	Korea	Dublin			

Table C.3 - Country Funds: Sample Descriptive Statistics

This table describes the country funds in my sample. Funds had at least 36 months of price and NAV data, from August 1990 to August 1995. The sample data is from Micropal.

	All		London	New York	Dublin	HK	AMEX	Others
Argentina	1	1%		1				0
Asia	13	12%	8	1		1	2	1
Brazil	2	2%	1	1				0
Chile	4	4%	3	1				0
Global	10	10%	6	3				1
Greece	1	1%						1
India	4	4%	1	1	1		1	0
Indonesia	10	10%	4	2	1	1	1	1
Korea	14	13%	6	2	3	3		0
Latin America	6	6%	2	3	1			0
Malaysia	5	5%	4	1				0
Mexico	3	3%		3				0
Pakistan	1	1%				1		0
Philippines	3	3%	3					0
Portugal	4	4%	2	1				1
Taiwan	7	7%	2	2		1		2
Thailand	15	14%	7	2		1		5
Turkey	2	2%	1	1				0
	105	100%	50	25	6	8	4	12

CHAPTER 5.
DUAL LISTINGS OF EMERGING MARKETS' STOCKS ON INTERNATIONAL EXCHANGES

Chapter 3 has surveyed in detail the studies that used dual listings to test segmentation. The literature has not, however, unambiguously established a relation between the degree of segmentation and the magnitude of the dual-listing effects. Given that some of these effects are also predicted by other different explanations, it is important to try to disentangle which effects are ascribed to each explanation.

Here, I measure the valuation impact of international dual-listings for the particular case of emerging markets' firms and investigate explicitly the role of an International Asset Pricing-based explanation.

The chapter is arranged as follows. The next section introduces the issue generically. Section 2 presents the American Depositary Receipts (ADR) and SEAQ-I markets. Section 3 briefly reviews the relevant literature. Section 4 presents the international asset pricing model that has motivated my hypotheses. Section 5 reviews the methodology. Section 6 describes the data sources and the sample. Section 7 shows the results of the empirical tests and discusses the findings. Section 8 concludes.

5.1 INTRODUCTION

Dual-listing can mitigate segmentation by improving risk sharing. In the particular case of emerging markets, where barriers to investment are more severe in the sense that international investment is limited by regulatory, ownership or informal barriers, those effects should be more pronounced.

Even if markets are integrated, a public listing in a major exchange increases investor awareness and improves liquidity, and either of these two factors may induce a lower required rate of return. If a foreign listing enables the cost of capital to be lowered, then firms have an incentive to cross-list. The choice of exchange is not neutral to the impact on the stocks' expected return.

For those firms that are willing to pay the price, a listing on the NYSE should improve liquidity of their shares more than could be achieved with an international listing elsewhere. The NYSE specialist system offers a more liquid market for the less popular shares and the same liquidity for the most actively traded shares: transaction costs measured by spreads are lower (London and NASDAQ spreads are comparable);

moreover, the system seems to be superior in terms of fairness because orders are executed chronologically and crisis management has proved more effective on the NYSE.

It would be difficult to understand why a firm, that could choose to trade in any international market, would not choose the New York Stock Exchange (NYSE), except for the costs involved.[115,116]

Previous literature has looked at the effects of foreign listings for the arguments outlined above. The evidence provides support for investor recognition and liquidity as sources of value but is inconclusive regarding the international capital market segmentation-based explanation. The goal of this paper is to provide evidence regarding the valuation impact of emerging markets firms' dual-listings in international markets and to study the link between these effects and market segmentation. If markets were segmented before the dual-listing, significant positive abnormal returns should be observed around the listing date: the value of the firm increases, reflecting lower expected returns. In the long run, significant negative abnormal returns should occur reflecting those lower required returns. The magnitude of the abnormal returns should vary in the same direction of the severity of segmentation and depend on the stock's idiosyncratic features.

My analysis focuses on the effects on emerging markets' dual-listings and this study is the first one to include dual-listings in London, on the Stock Exchange Automated Quotation International (SEAQ-I) Developing Markets' sector.

The contribution of this paper is three-fold. First, it re-examines the effects of international dual-listings on local stock returns with a sample of emerging markets' firms that is more extensive than any other used before, and assesses the robustness of earlier findings to the use of non-parametric tests. Second, it compares the impact of US and London SEAQ-I listings. Third, it explicitly investigates to what extent international asset pricing theory can explain the valuation effects of dual-listings.

This study is important because it generalises previous results to emerging markets; it allows us to extract inferences about capital segmentation and it evaluates the merits of

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115 Firms face earnings, size, shares' dispersion and other requirements to obtain a listing on a public exchange (see appendix D for details). Many firms, especially those firms originating from emerging markets, will not meet these requirements. If a firm is admitted, it must support initial and continuation fees together with the costs of meeting disclosure requirements.

116 Aggarwal and Angel (1997) suggest NASDAQ (National Association of Security Dealers Automated Quotation) provides more visibility than NYSE. Very large firms, that are able to bypass the high trading costs in NASDAQ through trading on INSTINET or POSIT, could thus have superior benefits listing on NASDAQ. See also Cowen, Carter, Dark and Singh (1992).

listing in different places with the necessary implications for corporate managers wishing to decrease the firm's cost of capital.

5.2 DUAL LISTED STOCKS FROM EMERGING MARKETS

5.2.1 STYLISED FACTS

As documented in chapter 2, equity placements in the international capital market have registered a huge increase over the last decade. Developing markets' share represents close to 40% of those issues, if we exclude the retreat observed after the Mexican crisis of December 1994.

In recent years, international cross-listing started taking place in special shares of the foreign firm, depositary receipts (DRs).[117] Depositary receipts are claims issued by a depositary institution to an underlying foreign security. When issuers raise money in two or more markets, they issue Global Depositary Receipts (GDRs). GDRs placed in Europe are usually listed on Luxembourg or quoted on SEAQ-I. Depositary receipts can be publicly offered or privately placed. Public traded securities in the US are called American Depositary Receipts (ADRs). There are three levels of ADRs which differ on whether they trade on the over-the-counter market (level-one) or are exchange-listed and involve (level-three) or not (level-two) raising capital with new shares. These different facilities have different US reporting requirements and Generally Accepted Accounting Principles (GAAP) compliance. In the US, Rule 144A also allows the placement of privately placed foreign securities to Qualified Institutional Buyers (QIBs).

Depositary receipts offer several advantages for international investors and facilitate diversification into foreign securities. For US investors, ADRs are regarded as domestic assets for foreign assets ceilings. Investors can trade, clear, settle and collect dividends in accordance with the requirements of the market on which they usually trade; and, if DRs are exchange-listed, investors also benefit from accessibility of price, trading information and research.

At the end of 1996, only 375 of the 1733 depositary receipts traded in the US, were exchange listed. The dollar value of ADR shares traded on US stock exchanges soared during 1996, reaching US $ 345 billion, 6 times more than in 1990.[118] The 20 large

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[117] Please refer to the appendix D for a more detailed description of these facilities.

[118] NYSE ADRs represented 70% of this total, around US $ 240 billion. Total annual turnover in domestic securities was around US $ 3 000 billion. Thus ADRs still represented only a small share of the NYSE market turnover (around 7%).

ADRs represented a share of 65% of that value. At the end of June 1996, there were around 100 emerging markets' firms from 15 countries listed on the three main exchanges, representing around 50% of total ADR turnover.

By the end of June 1996, the SEAQ-I Developing Markets Sector in London had 104 quoted foreign firms from 16 countries. Together with listings and excluding South Africa, there were 120 firms trading US $ 24 billion, respectively.[119] Most of the participants in this market are institutional investors.

In 1994 alone, more than 70 emerging markets' firms listed their shares abroad. Altogether, US and UK emerging markets' listings traded around US $ 180 billion in 1996, more than 10% of emerging markets' local total turnover.[120]

Figure 5.1 shows the breakdown by exchange of the emerging markets' foreign listings by the end of 1996.

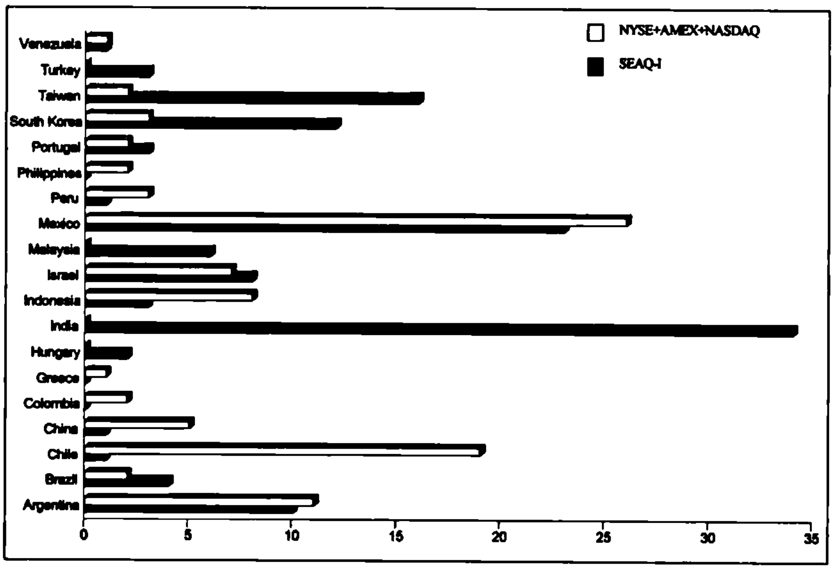

Figure 5.1 - Dual Listed Stocks from Emerging Markets: End 1996
This figure shows the breakdown between US and UK exchanges, of some selected emerging markets' foreign listings. Data was obtained directly from the stock exchanges.

[119] In 1995, foreign firms traded US $ 400 billion on the London Stock Exchange, close to the US $ 470 billion observed for domestic equities.

5.2.2 Listing Procedures

In appendix, I summarise the several steps to establish a depositary receipt and to have it listed on a US public exchange or traded on SEAQ-I.

In the US, the time required to complete this process depends on the type of depositary receipt a firm chooses and whether the firm applies or not for listing. In the case of level-two and level-three ADRs, that are the ones that involve a public listing, the process takes, on average, 14 to 15 weeks. Foreign issuers must register the depositary shares with the Securities and Exchange Commission (SEC) and must also obtain SEC approval regarding the fulfilment of US reporting requirements. Additionally, the issuers must file an application with the exchange where they wish their depositary receipts to trade.

The process to list a depositary receipt on SEAQ-I is reduced to about 8 to 12 weeks. The exchange is responsible both for the approval of the prospectus and for admitting the firm to trade on the exchange.

5.3 RELATED LITERATURE

A recent monograph by Karolyi (1997) surveys the academic literature on the valuation and liquidity effects of the listing decision. He examines in detail the empirical evidence of over 40 contributions to the literature on international listings. Here below I summarise some selected papers.

5.3.1 Theoretical Background

There are several potential explanations for the observed phenomenon of negative post-listing abnormal stock returns. The first three arguments below have been put forward to explain the behaviour of post-listing returns in a domestic setting.[121]

Merton (1987) refers to changes in investor recognition as a source of value. Investors only invest in the assets of which they are aware. Investors require higher returns to compensate not only for market risk but also for the shadow cost of incomplete information. Listing on a major exchange, by expanding the firm's investor base could

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[120] In 1996, local turnover of All Emerging Markets was slightly above US $ 1580 billion (Source: IFC).

[121] Most of these studies concentrate on firms that "upgraded", i.e., that moved trading from the over-the-counter (OTC) market or from the National Association of Security Dealers Automated Quotation (NASDAQ) to the NYSE or to the American Stock Exchange (AMEX).

result in a decrease of its expected return. The diversification gains would be proportional to the firm's specific risk and to the weight of its capitalisation in the world market capitalisation.

Amihud and Mendelson (1986) claim that liquidity is what is behind the negative post-listing abnormal returns, through changes in the bid-ask spread. When a stock trades on an exchange that provides superior liquidity services, its required return falls. Market competition ensures these effects are transmitted to the local market. The liquidity benefits of dual listing can arise from more investors and more traders. These benefits should be greatest for larger companies with active trading in both domestic and foreign markets.

Recent literature refers to the fact that managers time their application for listing, which could explain the decline in expected returns observed after listing. As there is evidence that this decline is more pronounced for small firms, for which listing requirements may be binding, it may be the case that managers choose to list when firms have recently performed well. This line of argument does not address why firms are motivated to dual-list.

Cantale (1996) and Fuerst (1997) propose a different argument, saying that the strictness of the regulatory regime may attract highly profitable firms that use the listing decision to signal future positive prospects. They use signalling models that assume that the listing decision is exogenous and that the resolution of uncertainty, and thus the benefits associated to listing, are only related to the disclosure requirements that differ across exchanges.

While these explanations may also be valid for international listings, an international asset pricing framework provides a distinctive argument for the effects of international dual-listings. Besides, even if Merton's awareness explanation assists the home bias observed in equity portfolios, given that the shadow cost of incomplete information may prevent international investors from holding foreign assets, it is unable to explain the different pricing in completely segmented markets where international investors do not affect the price formation.

Alexander, Eun and Janakiramanan (1987) provide a closed-form solution to the equilibrium asset pricing problem that arises when capital markets are completely segmented before an international listing takes place. They demonstrate that, *ceteris paribus*, we should observe a decline in the required return of a dual-listed stock, as long as the covariance of the dual-listed security with its local market portfolio is larger than the covariance with the market portfolio of the place where it dual-lists.

Most of the empirical tests have concentrated on quantifying the impact of dual-listing on mean expected returns and variances. The usual approach to assess the effects of dual-listings has been the event study methodology. If a dual-listing creates value, one would expect that the announcement of a listing generates positive abnormal returns. The movement in price should be associated with the changing expectations about future returns. After the listing, then, firms should observe negative abnormal returns reflecting the decrease in expected returns. Below I briefly review some selected empirical studies. Table 5.1 summarises the most important results.

Table 5.1 - Selected Findings on the Impact of Dual Listing

	Abnormal Returns		Explanations				
	Before (+ve)	After (-ve)	Segmentation	Awareness	Liquidity	Timing	Signalling
DOMESTIC LISTINGS (UPGRADINGS)							
Sanger and McConnell (1986,1987)	YES	YES			✓	✓weak	
Kadlec and McConnell (1994)	YES	NO		✓	✓weak		
Dharan and Ikenberry (1995)		YES		✓indirect		✓	
FOREIGN LISTINGS IN THE US							
Alexander, Eun and Janakiramanan (1988)	YES	YES	✓weak				
Foerster and Karolyi (1996)	YES	YES	×	✓	✓ indirect		
Miller (1996)	YES	YES	✓weak				
Cantale (1996)	YES						✓

5.3.2 Previous Findings on the Impact of Dual Listings

Domestic Listings

The empirical studies on dual-listing started by looking at changes in location or dual-listing within the same country[122].

Sanger and McConnell (1986) look at the behaviour of US OTC firms that were listed on the NYSE over the period of 1966 to 1977 and find significant positive abnormal returns before the application date and negative returns around and after the listing date. McConnell and Sanger (1987) use a more extensive sample, over the period of 1926 to 1987, to investigate the persistence of negative abnormal returns following listing. They find similar results. They test a variety of possible explanations but are not able to find significance for any of them. Kadlec and McConnell (1994) look at the same effects in the eighties and find similar results for the pre-listing and listing weeks but fail to find any negative abnormal returns after the listing date. Their cross-sectional regressions

122 See also Reints and Vanderberger (1975), Dhahwal (1983), and Baker, Khan and Edelman (1995).

provide support for both investor recognition - proxied by changes in the number of shareholders - and liquidity - proxied by the change in the bid-ask spread - as sources of value from exchange listing.

Dharan and Ikenberry (1995) analyse 2889 US firms that have moved the trading in their stock to the AMEX or NYSE, over the period of 1962-1990. Post-listing stock returns are negative and this effect is persistent over time and across industries and exchanges. These abnormal returns are not so dramatic when the benchmark model accounts for size and book-to-market risk factors, and when they account for IPOs and equity issues. Yet the post-listing effect prevails. However, when the sample is partitioned between small and large firms, the effect is only present for small firms. The authors believe their evidence supports the managerial timing hypothesis.

International Listings

Alexander, Eun and Janakiramanan (1988) analyse a sample of 34 non-US firms that were listed in the US between 1969 and 1982. They find a decline in the expected return for the 36 months after the dual-listing date except for Canadian firms. They conclude that this evidence implies that the US and Canada capital markets are integrated. Mahajan and Furtado (1996) point out that Alexander *et al.* (1988) sub-sample of non-Canadian firms only includes listings on the OTC, while the Canadian firms are fully listed on the NYSE or AMEX. This fact is against a possible stock exchange effect that would proxy awareness or liquidity.

Foerster and Karolyi (1996) use dummy regression methodology, that allows for changes in risk exposures before and after the listing, and time-varying risk parameters, to analyse a sample of 106 firms that listed their ADRs in the US from 1976 to 1992. Again, there are positive and negative significant abnormal returns, respectively before and after the listing. Their evidence suggests that abnormal returns are related to shareholders' base change and stock exchange location, providing support for the investor's awareness and the liquidity hypotheses. They do not find larger abnormal returns for emerging markets' listings. Miller (1996) considers not only exchange listings but private placements (RADRs) and public quotes (OTC). His sample covers 183 firms from 35 countries over the period 1985 to 1995. He finds larger abnormal returns for firms that originate from emerging markets.

Cantale (1996) also observes positive abnormal returns for a sample of 72 European firms listed on the NYSE, around the announcement of listing. This effect is more pronounced for continental than UK firms. He also finds positive abnormal returns for European listings on the London Stock Exchange and the Paris Stock Exchange, but these are less pronounced than the ones observed for NYSE listings. Finally, he does not observe any effect for a sample of 55 US companies listed either on the London or the Paris stock exchange. His results suggest that a dual-listing is more valuable in a more prestigious exchange and for firms that originate from markets where disclosure requirements are relatively less strict.

In summary, the bulk of the existing evidence shows that there are positive abnormal returns around the announcement of listing and negative abnormal returns following international listings. The evidence is inconclusive regarding the role of the international market segmentation hypothesis but provides support for investor recognition and liquidity hypotheses.

Impact of Dual-Listing on Total Risk

A different set of studies focuses on the effects of dual-listing on the volatility of stock returns. These studies try to assess if dual-listing has some effect on total risk. Freedman (1989) develops a model where dual-listing provides informed traders with more opportunity to trade which results in more information revealed. If dual-listing, by increasing trading volume, increases trading noise, the variance of the stock will increase after the listing. Without a significant increase in trading noise, providing informed traders greater opportunities to trade on their information may not, however, result in an increase in variance after dual-listing.

There seems to be a consensus on the effects of dual-listing on total risk: variance of returns increases after listing for the non-US foreign listings and this seems to result from an increase in informed trading.[123] The existing evidence is, however, not clear about the effects on liquidity - measured by bid-ask spreads or trading volume - in the local market. Globally, the value and volume of trading increase giving indirect support to Merton's awareness hypothesis.

5.4 TESTABLE HYPOTHESES

Alexander, Eun and Janakiramanan's (1987) international asset pricing model motivates the testable hypotheses of the empirical analysis that follows.

The framework is the following. There are two countries: the international (UK, for example) and the local (emerging market) country. Only one local security (*0*) is dual-listed on the international market. Besides this, the two stock markets are completely

[123] See, for example, Barclay, Litzenberger and Warner (1988), Damodaran, Liu and Van Harlow (1993), Jayaraman, Shastri and Tandom (1993) Domovitz, Glen and Madhavan (1998) Coppejans and Domowitz (1996), Noronha, Sarin and Saudagaran (1996) and Smith and Sofianos (1997).

segmented. International investors are forbidden to invest in any other local foreign securities (*l*) and local investors are also precluded from investing in international securities (*d*). Additionally, they assume:

- the capital market is perfectly competitive;
- no transaction costs or differential taxation;
- homogeneous expectations as to risk and return characteristics of all assets;
- returns are joint-normally distributed with finite first and second moments;
- investors can borrow and lend at the same risk free rate (r);
- exponential utility functions (a^D and a^L are the aggregate absolute risk aversion of, respectively, international and local investors);
- no short sales in the local market; and
- a fixed exchange rate.

They develop a static two period mean-variance model where the investors in each country will choose portfolio weights so as to maximise their expected utility on period 1, subject to their budget constraints. Asset demands are aggregated and then equated to the respective supply of securities to derive the equilibrium asset-pricing relationships for international, "pure" local and for the dual-listed securities. The expected return of the dual-listed security is:

$$E(R_0) - r = a^W LCov(R_0, R_l) + a^W DCov(R_0, R_d) \qquad (5\text{-}1)$$

where a^W is the aggregate world risk aversion coefficient. D and L denote the aggregate market value of international and local foreign securities, respectively. R_i, for $i \in \{0,d,l\}$, are the return of the dual-listed security, of the international market, and of the local market portfolios.

They derive an equilibrium asset-pricing relationship for the dual-listed security that states that its expected return depends on the covariances of its return with the returns on both the local and the international market portfolios. This reflects the fact that both local and international investors hold the dual-listed security. Comparing this pricing with the one that would prevail if the security was not dual-listed (R_0^b), i.e.,

$$E(R_0^b) - r = a^L LCov(R_0, R_l) \qquad (5\text{-}2)$$

we get the required return change:

$$E(R_0^b) - E(R_0) = -a^W DCov(R_0, R_d) + \left(a^L - a^W\right) LCov(R_0, R_l) \qquad (5\text{-}3)$$

The change in the expected return depends on (i) the relative value of the aggregate risk aversion coefficients; (ii) the relative market capitalisation values; and (iii) the covariance of the dual-listed security with the local and international market portfolios. If the relative risk aversions are the same across markets, the required return after listing will be lower as long as the dual-listing security is less positively correlated with the international market than with the local market. The implication of this is that dual-listed securities that match the idiosyncrasies of the local market, and that are not spanned by international free assets, should register stronger declines in expected returns. If the price of international risk is lower than the price of local risk, the firm's required return should decline even further.

The market for "pure" local securities becomes indirectly integrated via the dual-listing. The impact on each individual security depends on its correlation with the dual-listed security. The more correlated those securities are with the dual-listed security, the higher the impact. As dual-listing partially dismantles segmentation, further cross-listings, *ceteris paribus*, will register lower changes in required returns.

This model yields the following testable hypotheses:

Segmentation I: Ceteris paribus, the decline in expected returns from an international dual-listing of a security originating from a segmented market varies directly with the degree of segmentation in that market.

Segmentation II: Ceteris paribus, the decline in expected returns from an international dual-listing of a security originating from a segmented market varies directly with the ratio of local and international risk premia.

Segmentation III: Ceteris paribus, the decline in expected returns from an international dual-listing of a security originating from a segmented market varies directly (inversely) with the covariance of the dual-listed security and the local (international) market portfolio.

Segmentation IV: Ceteris paribus, for firms originating from the same market, the first dual-listing should observe the largest impact on its expected return.

These hypotheses are the focus of my analysis and relate to the international capital market segmentation-based explanation. In addition, I investigate whether the listing impact is affected by the exchange where the firm dual-lists. The univariate analysis breaks down the results by market and exchange type allowing us to indirectly draw some implications regarding international capital market segmentation and on the other theoretical explanations discussed in the previous section. While the segmentation theory anticipates that listing effects should be significantly different across markets, the other explanations suggest that these effects should be stronger for listings on exchanges with better risk sharing, superior liquidity services and stricter initial listing requirements and regulatory regimes.[124,125]

5.5 METHODOLOGY

5.5.1 ABNORMAL RETURNS

The methodology employed to measure the magnitude of stock returns' reaction to a dual-listing is the standard abnormal returns technique, based upon the several benchmarks described below. I am interested in examining the impact of the dual-listing decision on returns on the announcement of listing but also in the post-listing period. Most of the time, it is not possible to pinpoint exactly when the listing decision was made public so, I have defined the event as the week of listing.[126] Since the process from application to actual listing takes between 8 to 14 weeks, I computed weekly abnormal returns for each firm starting from week -14 before the listing date, through week +5. The event period goes on until week +5 to account for any delayed effects that may occur due to thin trading. Post-listing returns are calculated from week +6 to week +36 in event time.

Ex-post abnormal returns are obtained as the difference between observed returns of the firm *i* at event week *t*, R_{it} , defined as

$$R_{it} = \log\frac{P_t + D_t}{P_{t-1}} \tag{5-4}$$

and the expected return generated by a chosen benchmark $\mathrm{E}(R_{it})$:

$$AR_{it} = R_{it} - \mathrm{E}(R_{it}). \tag{5-5}$$

Averaging these residuals across firms in common event time, we obtain the average residuals

124 The univariate analysis compares the behaviour of emerging markets with mature markets. Among the two groups the degree of integration is dramatically market-varying but it is defensible that, as a group, emerging markets are expected to be more segmented than mature markets. The cross-sectional regressions introduce explicitly the degree of segmentation of each market.

125 There are important differences other than the degree of segmentation between the two groups of markets (emerging and mature). Specifically, and again as a group, the stock exchanges of emerging markets are less liquid and have less severe disclosure requirements than those of mature markets. It can thus be misleading to say that any differences between the two groups can be attributed solely to segmentation. The same goes for the stock exchange effect: NYSE listings involve, because of the exchange requirements, larger and better performing firms.

126 Due to data constraints, I could not use daily data·

$$\overline{AR}_t = (1/N)\sum_{i=1}^{N} AR_{it} \tag{5-6}$$

where N is the number of firms in the sample and t refers to weeks in event time. By cumulating the average residuals over a particular time interval (L weeks around the dual-listing date), we obtain the cumulative average residuals ($\overline{CAR}$):

$$\overline{CAR} = \sum_{L} \overline{AR}_t \,. \tag{5-7}$$

Bias in Measuring Abnormal Returns

By using continuously compounded returns, compounding returns over time is achieved by simply summing the log returns.[127] If we assume that discrete returns are distributed as iid log normal variables, the cumulative log return is normal distributed. On the other hand, the use of log returns attenuates the re-balancing bid-ask spread bias.[128,129] Buy and Hold discrete returns would be an alternative but they also entail difficulties. First, it is necessary to assume normality for a particular return-horizon. Second, because of short time-series, it is necessary to estimate standard deviations with the cross-section of the sample holding period returns.

Benchmark Models

One central question in measuring abnormal returns is the choice of the right benchmark. Dimson and Marsh (1986) and for example, Dharan and Ikenberry (1995), have shown that failure to adjust for size and book-to-market risk factors results in a downward bias of abnormal performance. Due to lack of information about the firms in my sample, I do not account for those risk factors here.

127 Portfolio log returns have two main drawbacks. First, portfolio abnormal returns are computed as a geometric average across securities. Geometric averages negatively proxy arithmetic and true averages. Second, bias arises from comparing a buy and hold return for the portfolio of event firms with a benchmark that is a re-balancing portfolio (i.e., comparing a mean of logs with the log of a mean).

128 See, for example, Conrad and Kaul (1993).

129 Two other procedures can induce bias in the results: the use of value-weighted benchmarks and not accounting for non-synchronous trading. The available aggregate market data on emerging markets is value-weighted. The equilibrium model provides justification for the use of a value-weighted index even if that may result in too few rejections. Relative to the second problem, previous literature has suggested the downward bias in the risk parameters is compensated by the upward bias in the intercept (Market Model). Moreover, this bias is expected to be small compared to the residual variation. I have repeated the analysis using the correction proposed by Dimson

Bekaert and Harvey (1995) argue that the presence of country funds and/or cross-listed securities might serve to effectively integrate markets with the world capital market despite the existence of other formal and informal barriers to foreign investment. The presence of unequal integration of individual shares makes it difficult to find a good model for the pricing of these securities. If markets are not completely integrated, the shares in the restricted market are priced for their exposures to local and world risk factors. I use unconditional and conditional versions of the Capital Asset Pricing Model, with two and three factors, and unconditional and conditional versions of the least squares market model with two and three factors. Abnormal returns are computed based on the following models:

(I.1) Unconditional CAPM Two Factors (see, for example, Solnik 1974)

$$R_{it} = r_t + \beta_{i1}(R_{l,t} - r_t) + \beta_{i2}(R_{d,t} - r_t) + e_{it} \qquad (5\text{-}8)$$

(I.2) Unconditional Market Model Two Factors

$$R_{it} = \alpha_i + \beta_{i1}R_{l,t} + \beta_{i2}R_{d,t} + u_{it} \qquad (5\text{-}9)$$

where R_i is the total realised return of the firm *i*. $R_{l,t}$ and $R_{d,t}$ are, respectively, the returns on the local market and mature market (world, US or UK) portfolios.[130] r_t is the one-month Treasury Bills' rate. The $\beta_i s$ are the unconditional risk exposures of the returns of firm *i*. I include one additional risk factor to capture the sensitivity of returns to currency risks (see, for example, Dumas and Solnik, 1995). Finally, the conditional version incorporates time-varying risk exposures (see, for example, Ferson and Schadt, 1996).[131]

5.5.2 ASSESSING STATISTICAL SIGNIFICANCE

I use both parametric and non-parametric tests to assess the statistical significance of average abnormal returns. The parametric test statistics examined are Brown and Warner

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(1979) with a specification that includes one lagged, one matching and one leaded market returns, and used the aggregated coefficients from this multiple regression to compute abnormal returns.

130 The choice of the world index or the US or UK indices depends on what we assume in terms of segmentation among mature markets.

131 In the conditional *K*-factor model, for example, the regression equation has *(L+1)K+1* regressors. The regressors are a constant, the *K*-factors and the products of the *L* information variables with the *K* factors. I use a collection of public information variables that previous studies have shown important in predicting risks over time. The information variables are: (1) the lagged local and world market returns; (2) the lagged local dividend yield; (3) other macroeconomic variables: local interest rates; the consumer price index; the industrial production index and changes in the value of US $ denominated exports.

(1980, 1985) with and without crude dependence adjustment, Patell (1976) standardised residual test and Boehmer, Musumeci and Poulson (1991) standardised cross-sectional test. The non-parametric statistics are the generalised sign test (Sanger and McConnell, 1986 and Cowen and Sergeant, 1996), the Wilcoxon signed rank test and Corrado's (1989) rank test. Finally, I use a bootstrapping procedure. These non-parametric tests give an idea of the robustness of results to violations of the normality assumption for returns.

To test for variance changes around and after listing, I use two parametric tests: an F test for the equality of two population variances and Beavers's U test. I also look at two non-parametric rank tests: the squared rank test (Conover, 1994) and a test proposed by Rohrbach and Chandra (1989). The description of these tests is available upon request. The tables in this chapter concentrate on some selected statistics. Results for the other test statistics are available upon request.

5.5.3 STRUCTURAL CHANGES IN THE RETURN GENERATING PROCESS

The covariance of an asset's return with the returns on the stock index is due to future cash flows and discount rates. The covariance of the return to an individual equity with a foreign stock index will depend on the extent to which cash flows, real interest rates and expected excess returns are correlated between countries. Segmentation in capital markets results in that expected return factors are local and discount rates do not move in tandem. One reason that the factor loadings may change as a result of dual listing is that, if international equity markets are segmented, the dual listing will result in a shift in investor clienteles. Therefore, if listing effectively eliminates constraints on foreign ownership, the dual-listed stocks are expected to move more closely with the returns of the dual-listing international market. The result of the dual-listing will be that the beta with respect to the market where the firm dual-lists will increase and the beta with respect to the local foreign market will fall because part of the trading of the dual-listed firm will be now in the international stock market.

My null hypothesis is that the factor loadings of the dual listed firm on the market indexes are unaffected by the dual-listing. The alternative hypothesis, that is consistent with segmented capital markets, is that the loading on the international market index increases and the loading on the local market index decreases.

For the particular case of the model with two factors, the structural changes can be modelled as follows:[132]

$$R_{it} = \alpha^b + \alpha^d E_{it} + \alpha^a D_{it} + \beta_{i1}^b R_{lt} + \beta_{i1}^a D_{it} R_{lt} + \beta_{i2}^b R_{d,t} + \beta_{i2}^a D_{it} R_{d,t} + e_{it} \qquad (5\text{-}10)$$

where the variables are defined as above and the superscripts b, d and a label the parameters before, around and after the listing date. E_{it} is a dummy variable that equals one for the weeks around the dual-listing date and D_{it} is a dummy variable that equals one for the post-listing weeks.

If there are changes in the risk parameters after the listing date, then the estimates of β_{i1}^a and β_{i2}^a should be significantly different from zero. Otherwise the listing effects should be concentrated in the coefficients α^d and α^a. The estimates of these parameters give, respectively, the mean CAR for each firm, in the event period around the listing date, and in the post-listing period. For each firm, I use a Wald test to assess if the difference between the pre and post-listing parameters is significantly different from zero. To assess the significance of the differences in the estimates across firms, I have used a pairwise difference Student *t*-test and a naïf sign test.

5.5.4 Cross-Sectional Analysis

To investigate how the determinants suggested by the international asset pricing theory are related to the observed abnormal returns, I run univariate and multivariate cross-sectional regressions.

Hypothesis *Segmentation I* states that the higher the degree of segmentation, the higher the increase in price (and the negative impact on required returns). To proxy the degree of segmentation, I have chosen the following variables:

- the premium on country funds targeting the emerging market from where the firm originates (*CF*). Chapter 4 has discussed the relation between country fund premia and the degree of segmentation.

- the IFC investability indices (*II*).[133]

- the Institutional Investor's country credit ratings (*RATING*).

Hypothesis *Segmentation II* states that the effect of a dual-listing should be more pronounced, the higher the ratio of local and international risk premia. To capture the

[132] I could use a Chow test of differential regressions instead. The structural test used here, however, gives me more information on which subset of variables is driving the overall significance of the test.

[133] Please refer to footnote 72 in chapter 4.

effect of differential market risk premia, I use the historical difference between the local and world market's returns for the year before the event (*DRP*). This proxy is far from adequate given the small period for which it is used to compute the risk premia. I also include the size of the originating market relative to the world (log) market value (*LMSIZE*) to account for wealth effects that could influence the relative price of risk.

Hypothesis *Segmentation III* says that the higher the correlation between the dual-listed stock and the local (world) market, the higher (lower) the impact on price. To proxy for the idiosyncratic features of the dual-listed stock, I use the correlation coefficients between the stock's local return and the local and world market returns computed over the period prior to the beginning of the event window (*CORL* and *CORW*).

Hypothesis *Segmentation IV* asserts that firms that dual-list first, should observe a higher impact on prices. Urias (1995) suggests that the dual-listing effects should decline as the number of dual-listed securities increases. I have included the number (*RANK*) and the (log) capitalisation of the emerging markets' securities that had previously dual-listed within a particular market (*TMV*).

Finally, I include the (log) capitalisation of the dual-listed security (*SIZE*)[134]. This last variable may capture different things. First, large firms are the ones that are more targeted by international investors that invest directly in foreign markets. Second these firms usually receive a broader coverage than smaller firms and have higher liquidity before the listing. Third, these are the firms that will have less problems in complying with the requirements of the international exchanges and are the more likely to dual list. Finally, this variable could be associated with NYSE listings, given the exchange requirements in terms of size. I expect thus that the coefficient for this variable is negative.

The multiple regression is as follows:

$$\begin{aligned} CAR_i = {} & c_0 + c_1 CORL + c_2 CORW + c_3 DRP + c_4 LMSIZE + c_5 CF + c_6 II + c_7 RATING \\ & + c_8 RANK + c_9 TMV + c_{10} SIZE + e_i \end{aligned} \tag{5-11}$$

where CAR_i is the cumulative abnormal return for each firm over the period before listing and measures the price reaction to the announcement of the dual-listing.[135]

[134] This variable may create endogeneity problems if the listing decision is indeed endogenous.

[135] I have also run cross-sectional regressions for the cumulative abnormal returns over the period after listing. These results are less precise so I focus here on the price effect.

5.6 DATA

5.6.1 SOURCES

I have collected information for all the emerging markets' firms listed either on a US public exchange (NYSE, AMEX or NASDAQ) or trading on London SEAQ-I as of June 1996, in a total of 133 firms.[136] The sample and listing dates were obtained directly from the exchanges. I cross-checked the listing dates and the identification of the underlying stocks using Bloomberg (Equity New Issues Calendar).

My analysis will only be concerned with measuring the impact of a *listing*. The sample does not include either Rule 144A ADRs (RADRs) or level-one ADRs. Moreover, I do not have information on whether a particular listing is a direct entry in the US market or an upgrade from a level-one ADR or a private RADR. Additionally, many of the issues that quote on SEAQ-I, are very likely to be privately or publicly-traded on the over-the-counter market in the US. The impact of SEAQ-I listings on local stocks' returns must, therefore, be carefully interpreted, in the sense that, it can also result from the initiation of a level-one ADR or from the launch of a private offer.[137]

The primary source for return data was Datastream. I have excluded all the issues for which weekly local returns, exchange rates (middle rates) and stock market index returns were not available for 52 weeks before and 36 weeks after the listing date.[138] I kept only one class of shares for each firm. Given that my analysis focuses on the effect of dual-listings on the local expected returns, I have chosen to include the series A shares that usually can only be held by local foreign investors. Finally, I did not exclude equity offerings because they represent a large part of my sample.

I include a control sample of European mature markets' firms that have dual-listed in the US and on SEAQ-I over the same period.

I use IFC (in US $ and local currency) and FT/S&P - Actuaries' World (local currency) value-weighted indices, respectively, for emerging and mature (including the

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[136] Some firms have more than one security dual-listed. This is true in the cases of Brazil, India, Mexico, the Philippines, South Korea, Turkey and Zimbabwe.

[137] When we look at SEAQ-I listings, these occur, in time, after the international offer (and this offer may have been made public well in advance, at least when the road-show started); and, for side-by-side programs or level-one ADRs, probably after these receipts having been admitted to trade on the OTC in the US.

[138] For 27 emerging markets' firms in the initial sample, the data is only available after the dual-listing date. One of the reasons for this lies in the fact that some of these firms dual-listed as soon as they got privatised (by an IPO) and thus got their primary listing at that same time.

world) markets. Return data for these series are only available on a weekly basis. Dividend yields refer to local indices' information. To compute excess returns I use the one-month T-bill rates.[139]

Interest rates (commercial lending prime rate), the consumer price index, the industrial production index and changes in exports for each of the home markets are IMF series (International Financial Statistics database). These series are available on a monthly basis and were obtained from Datastream.[140]

Country fund premia were obtained in Bloomberg and cross-checked in Datastream for UK funds. For each emerging market, I used the simple average of all available information on funds targeting that particular market, listed in the US and UK and that had at least 36 monthly observations. The Investable Indices were obtained by computing the ratio of the market values of the IFC Global index over the IFC Investable index for each country. Market capitalizations were also downloaded from Datastream. The country credit ratings were collected from several issues of the Institutional Investor.

5.6.2 ANNOUNCEMENT DATES

As described briefly above, the listing process of a foreign security is not an instantaneous process.[141] For NYSE listing there are three dates of interest: the formal application (or filing) date, the approval date that occurs within four weeks after the application and the indication of the admission date (usually announced one week before the actual listing). All these dates are made public via an Official Public Announcement on the NYSE Weekly Bulletin, published every Friday. This bulletin is freely available but exists only on hard copy (SEC library). For stocks listing on SEAQ-I, the only official publication of this kind is the Weekly Official Intelligence which contains the new issues admitted to list on the previous week.

I collected the announcement dates from the Dow Jones Service and from the FT Financial Extel databases. The search was done using the firm name, for one year before the listing date. The earliest press release is taken as the announcement date. In addition,

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[139] To compute risk free rates in local currency, I have used the T-bill rates and assumed ex-ante parity (based on ex-post exchange rates) and rational expectations.

[140] Conversion to weekly data assumed a step function for interest rates and spline approximations to generate the other three series. For a particular week, I use the figures at the beginning of that month and assume those would be readily available, public information by then. This is a strong assumption that can be overcome if we believe that the forecasts produced for these variables were reasonably accurate.

[141] For more details see Sanger and McConnell (1986).

and for US listings, I include the filing date, obtained from Bloomberg, when it was previous to the announcement date or when no announcement appeared in the press.

The most common sources were Dow Jones News Services (23) and the Wall Street Journal (20). Of a total of 51 announcements, 35 of these were announcements regarding emerging markets' firms. I could only trace seven announcements regarding new quotes on SEAQ-I. For my sample of announcements, the average (median) time between the first announcement and the listing was approximately eight (five) weeks.

5.6.3 SAMPLE DESCRIPTION

The final sample consists of 135 listings, 70 from emerging stock markets and 65 from European mature markets. Listing dates go from January 1991 to November 1995.

The sample covers 10 emerging markets. India has the largest number of firms (20) followed by Chile and Mexico (18 and 14, respectively). Only seven emerging markets' firms dual-listed on both US and UK exchanges. The rest of the firms are divided between NYSE+NASDAQ (29+2) and SEAQ-I (32). Chilean firms have chosen US exchanges 17 out of 18 times while Indian or Taiwanese firms only listed in London. The boom year for emerging markets' foreign listings was 1994. Until the end of 1991 (inclusive), only two firms, in the final sample, had dual-listed. The control sample for mature markets includes five European countries and is evenly distributed across exchanges.

In appendix, I provide some descriptive statistics concerning the partition of the sample by country, listing exchange and listing year.

5.7 EMPIRICAL RESULTS

I first measure the valuation impact of dual listing. The univariate analyses that compare the behaviour of dual listings for emerging and mature markets, on NYSE and SEAQ-I , and in four emerging markets with different investment barriers are tests of my hypothesis Segmentation I. Section 5.7.3 investigates whether the dual listing effect has indeed any impact on risk exposures as predicted by an International Asset Pricing-based explanation. Finally, section 5.7.4 tests explicitly my four hypotheses that relate to the international segmentation-based explanation.

5.7.1 HISTORICAL RETURNS

Table 5.2 shows that the distribution of raw returns for the emerging markets' dual-listed stocks is significantly leptokurtic and positively skewed. For the mature markets' firms, there is no such evidence.

There are very large variations in the time series. For example, average weekly returns on the combined time series of one year before and one year after the listing can be as low as -1% (Edwards, Chile, NYSE) and is common to observe positive values of around 0.8%. Standard deviations can be as high as 25% per week (again Edwards). Standard deviations are in general around 5% a week and never below 3%. The more extreme values occur on different exchanges and for different emerging markets. Except for the case of very small sub-samples (for example, when we analyse the firms that listed on both UK and US exchanges), their influence does not drive the results. In any case, the use of standardised residuals and some non-parametric tests partially overcomes that potential bias.

Table 5.2 - Distributional Properties of Dual-Listed Firms' Weekly Returns over the Period of 1991-1995

Statistics are averages based on weekly local currency denominated returns one year before and one year after the listing date. Only firms with at least one year of weekly observations before the listing and 36 weeks after the listing date were included. The sample data was obtained from Datastream.

	All Listings	Emerging Markets	Mature Markets
Number of Firms	135	70	65
Mean	0.0023	0.0037	0.0009
Std. Deviation	0.0543	0.0619	0.0466
Skewness	0.1759	0.3650	-0.0644
Kurtosis	3.5691	4.5060	2.6178

Memo: Fractiles of Random Samples of Size 100 Drawn from a Normal Distribution

Skewness		Kurtosis	
0.95	0.99	0.95	0.99
+/-0.389	+/-0.567	3.77	4.39

Table 5.3 shows that, on average, for the emerging markets' sub-sample, the weekly return in local currency during the event window is 0.32% against 0.74% in the pre-listing period and -0.04% in the post-listing period. Paired difference tests show these differences are very significant. Differently, firms originating from mature markets observe, on average, a slight increase in returns around the listing date: 0.5% from 0.02% in the pre-listing period.

Table 5.3 - Change in Average Returns

This table reports the results of paired difference tests between the pre-listing and post-listing means based on weekly local currency denominated returns. The sample data was obtained from Datastream. Statistics are averages across firms that dual-listed from 1991 to 1995. Only firms with at least one year of weekly observations before the listing and 36 weeks after the listing date were included. *t* refers to the *t*-test and the *p*-values reflect Wilcoxon Signed Rank two-tailed tests.

	All Listings (N=135)	Emerging Markets (N=70)	Mature Markets (N=65)
Pre-Listing (-118 to -15)	0.0038	0.0074	0.0002
Event Window (-14 to +5)	0.0040	0.0032	0.0049
Post-Listing (+6 to +109)	0.0000	-0.0004	0.0004
Mean Difference (Post vs.Pre)	-0.0038	-0.0078	0.0002
t-statistic	(-4.75)	(-6.69)	(0.22)
p(W)	(0.0001)	(0.0001)	(0.6815)

5.7.2 ABNORMAL RETURNS

In this section, I present the results of the analysis of abnormal returns generated by an unconditional two-factor CAPM specification. As stated earlier, the core analysis is based on an event window from week -14 to week +5 and considering an estimation periods that goes from week -52 to week -15 (weeks relative to the listing date). The results discussed in this section refer to local returns.

Previous literature has warned about the dangers of using pre-listing parameters from a market model, because positive abnormal returns could be present in the pre-listing period and, by using those parameters, the abnormal returns during the event and post-listing periods would be biased downwards. CAPM will avoid this bias if it is the correct asset pricing model to use in the pre-listing period. However, if the equilibrium model holds only *after* the dual-listing then the true intercept in the pre-listing period will be positive and we will be violating the OLS regression (the expected residuals will be different from zero). Thus, when using data from the pre-listing period, we may create a bias then for two reasons: on one hand, positive abnormal returns may exist because of timing behaviour; on the other hand, the true intercept may be positive due to a super risk premium. To overcome that, I re-estimate the parameters using data from the post-listing period. I expect to observe positive abnormal returns in the period before listing because of segmentation and timing, and positive performance during the event period due to anticipation of lower future expected returns.[142]

Estimation parameters were obtained by regressing local returns on local and world market indices. I have tried different estimation periods and performed the correction for trading infrequency (Dimson, 1979) and I obtained very similar parameters. I find that, on average, only the local factor is significant. For each firm separately, the world factor turns out to be significant in many cases. Plots of the returns of emerging markets firms against local and world indices are very informing: firms' returns usually go together with the local index and this is more notorious before the dual-listing. After listing, however, we do not observe a closer co-movement with the world index or the index of the international exchange where the firm has listed. I kept a two-factor model, anyway, and that choice was dictated by theoretical reasons.

Average Abnormal Returns

Table 5.4 shows the cross-sectional average abnormal returns generated by the two-factor unconditional CAPM specification for the 20 weeks surrounding the listing date. We observe positive abnormal returns before the listing date. After listing, abnormal returns are always negative and significant in the first week after the listing. Using standardised abnormal returns, the tests are stronger both for positive and negative abnormal performance. Using cross-sectional standard deviations can work in both directions.[143] Overall, the conclusions are valid whatever the parametric test used. Non-parametric tests confirm the results of the parametric tests.

Table 5.5 shows the average abnormal returns after week +6. The long run post-listing abnormal performance is not so clear. The CAPM model generates a negative pattern in abnormal returns but both parametric and non parametric tests are inconclusive.

142 To disentangle the segmentation and timing effect, one would need to investigate further whether these firms have effectively observed positive operating performance before the application to listing. Due to availability of data, my analysis was limited to stock market data.

143 I looked for changes in variance of abnormal returns during the period of study. I performed Beaver's U test and a non-parametric test. Relative to the event period it is not possible to reject the null hypothesis of a constant variance. In the post-listing period, many weeks have variances that differ from the ones obtained in the estimation period. Given this result, I have compared the Brown and Warner parametric tests with the results obtained by using cross-sectional variances. Overall, the results are similar. These results are available upon request.

Table 5.4 - Average Abnormal Returns Around the Week of Dual-Listing Emerging Markets' Listings

This table reports average abnormal returns (AR) and cumulative average abnormal returns (CAR) around the listing date for 70 emerging markets' firms that dual-listed their stocks on the NYSE, NASDAQ and SEAQ-I during the period of 1991 to 1995. Abnormal returns are prediction errors using CAPM parameters estimated by regressing local returns on the local and the world market indices over the weeks -52 to -15 in event time. *t*-statistics refer to tests on average returns using the Crude Dependence Adjustment (Brown and Warner, 1980). The *z*-values reflect significance tests using average standardised residuals. *p*-G and *p*-C reflect, respectively, the Generalised Sign and the Corrado Rank one-tailed tests.

Week	AR	*t*	*z*	%non negative	*p*-G	*p*-C	CAR	*z*
-14	0.0129	(1.27)	(2.38)	0.6061	(0.0292)	(0.0160)	0.0129	(0.0086)
-13	0.0084	(0.82)	(1.53)	0.6212	(0.0162)	(0.0673)	0.0213	(0.0028)
-12	0.0060	(0.59)	(1.27)	0.5455	(0.1819)	(0.2043)	0.0272	(0.0014)
-11	0.0007	(0.07)	(-0.44)	0.4849	(0.4695)	(0.2150)	0.0279	(0.0090)
-10	0.0001	(0.01)	(0.05)	0.4849	(0.4695)	(0.4408)	0.0279	(0.0162)
-9	0.0021	(0.20)	(0.37)	0.5000	(0.4327)	(0.4911)	0.0300	(0.0176)
-8	0.0156	(1.53)	(2.34)	0.5606	(0.1241)	(0.0573)	0.0456	(0.0023)
-7	0.0043	(0.42)	(1.25)	0.5606	(0.1241)	(0.0765)	0.0499	(0.0010)
-6	0.0017	(0.17)	(0.98)	0.4697	(0.3734)	(0.4350)	0.0516	(0.0006)
-5	-0.0045	(-0.44)	(-0.62)	0.3939	(0.0601)	(0.0866)	0.0471	(0.0020)
-4	0.0106	(1.04)	(2.24)	0.6061	(0.0292)	(0.0226)	0.0577	(0.0003)
-3	-0.0028	(-0.28)	(0.01)	0.5303	(0.2540)	(0.4941)	0.0549	(0.0005)
-2	0.0167	(1.64)	(2.55)	0.6364	(0.0085)	(0.0154)	0.0716	(0.0001)
-1	-0.0068	(-0.67)	(-0.56)	0.4394	(0.2075)	(0.1111)	0.0647	(0.0002)
0	0.0023	(0.22)	(1.14)	0.5000	(0.4327)	(0.3384)	0.0670	(0.0001)
1	-0.0172	(-1.69)	(-2.26)	0.3333	(0.0056)	(0.0025)	0.0498	(0.0011)
2	-0.0121	(-1.19)	(-1.56)	0.4546	(0.2847)	(0.0347)	0.0377	(0.0048)
3	-0.0162	(-1.59)	(-3.09)	0.3182	(0.0027)	(0.0006)	0.0215	(0.0370)
4	-0.0080	(-0.79)	(-1.32)	0.3939	(0.0601)	(0.0463)	0.0135	(0.0756)
5	-0.0030	(-0.29)	(-0.75)	0.4546	(0.2847)	(0.1879)	0.0105	(0.1089)

Cumulative Average Abnormal Returns

The last two columns in tables 5.4 and 5.5 refer to cumulative abnormal returns. Table 5.6 summarises these results. The CAPM specification generates 6.7% positive cumulative abnormal returns that are significant until the week of the listing date even if we use standardised abnormal returns or infer with non-parametric tests. When we look at the first five weeks after listing, we observe a cumulative decline of -5.7% and this decline is significant whatever the tests (parametric and non-parametric) we use.

In the post-listing period, starting at week six, we observe a negative cumulative return of -4.8% that is statistically significant at a 10% level. One-half year after listing, there is a negative CAR of 11%.

Table 5.5 - Post-Listing Average Abnormal Returns
Emerging Markets' Listings

This table reports post-listing average abnormal returns (AR) and cumulative average abnormal returns (CAR) for 70 emerging markets' firms that dual-listed their stocks on the NYSE, NASDAQ and SEAQ-I during the period of 1991 to 1995. Abnormal returns are prediction errors using CAPM parameters estimated by regressing local returns on the local and the world market indices over the weeks -52 to -15 in event time. *t*-statistics refer to tests on average returns using the Crude Dependence Adjustment (Brown and Warner, 1980). The *z*-values reflect significance tests using average standardised residuals. *p*-G and *p*-C reflect, respectively, the Generalised Sign and the Corrado Rank one-tailed tests.

Week	AR	*t*	*z*	%non negative	*p*-G	*p*-C	CAR	*p*-*z*
6	0.0021	(0.21)	(0.24)	0.4697	(0.3734)	(0.3424)	0.0021	(0.4065)
7	-0.0089	(-0.87)	(-1.22)	0.4242	(0.1442)	(0.0917)	-0.0067	(0.2438)
8	-0.0071	(-0.70)	(-1.25)	0.4394	(0.2075)	(0.0782)	-0.0138	(0.0985)
9	0.0048	(0.47)	(0.51)	0.5303	(0.2540)	(0.2662)	-0.0091	(0.1939)
10	-0.0038	(-0.37)	(-0.55)	0.5303	(0.2540)	(0.3539)	-0.0129	(0.1548)
11	-0.0041	(-0.40)	(-0.30)	0.3788	(0.0359)	(0.1266)	-0.0170	(0.1465)
12	0.0067	(0.66)	(1.33)	0.5606	(0.1241)	(0.1305)	-0.0102	(0.3194)
13	-0.0025	(-0.25)	(-0.72)	0.4546	(0.2847)	(0.1665)	-0.0128	(0.2435)
14	0.0001	(0.01)	(0.41)	0.4697	(0.3734)	(0.4677)	-0.0127	(0.3017)
15	-0.0033	(-0.32)	(-0.00)	0.5758	(0.0806)	(0.4950)	-0.0160	(0.3106)
16	-0.0068	(-0.67)	(-0.85)	0.4546	(0.2847)	(0.1810)	-0.0228	(0.2337)
17	0.0015	(0.15)	(0.37)	0.4546	(0.2847)	(0.3870)	-0.0212	(0.2780)
18	0.0057	(0.56)	(0.78)	0.5152	(0.3388)	(0.2175)	-0.0155	(0.3631)
19	-0.0148	(-1.45)	(-2.25)	0.4091	(0.0955)	(0.0050)	-0.0303	(0.1740)
20	0.0084	(0.82)	(1.57)	0.6061	(0.0292)	(0.0435)	-0.0219	(0.3081)
21	0.0003	(0.03)	(0.58)	0.5758	(0.0806)	(0.1843)	-0.0215	(0.3667)
22	0.0082	(0.81)	(1.21)	0.5303	(0.2540)	(0.1442)	-0.0133	(0.4858)
23	0.0018	(0.18)	(0.15)	0.4849	(0.4695)	(0.4208)	-0.0115	(0.4996)
24	-0.0053	(-0.52)	(-1.23)	0.4091	(0.0955)	(0.0772)	-0.0167	(0.3892)
25	-0.0069	(-0.67)	(-0.75)	0.4394	(0.2075)	(0.1292)	-0.0236	(0.3290)
26	-0.0140	(-1.38)	(-2.29)	0.3939	(0.0601)	(0.0103)	-0.0376	(0.1756)
27	0.0126	(1.24)	(2.36)	0.5152	(0.3388)	(0.0662)	-0.0250	(0.3417)
28	-0.0133	(-1.31)	(-2.44)	0.4091	(0.0955)	(0.0578)	-0.0383	(0.1822)
29	-0.0018	(-0.18)	(-0.49)	0.5000	(0.4327)	(0.4900)	-0.0401	(0.1615)
30	0.0098	(0.96)	(1.50)	0.5606	(0.1241)	(0.1544)	-0.0304	(0.2518)
31	0.0060	(0.59)	(0.84)	0.6061	(0.0292)	(0.1305)	-0.0243	(0.3117)
32	-0.0011	(-0.10)	(-0.65)	0.6061	(0.0292)	(0.2441)	-0.0254	(0.2722)
33	-0.0030	(-0.30)	(0.29)	0.5909	(0.0498)	(0.1165)	-0.0284	(0.2946)
34	-0.0031	(-0.31)	(-1.56)	0.4091	(0.0955)	(0.1177)	-0.0315	(0.2062)
35	-0.0191	(-1.87)	(-3.18)	0.3182	(0.0027)	(0.0003)	-0.0506	(0.0827)
36	0.0031	(0.30)	(0.40)	0.5152	(0.3388)	(0.3941)	-0.0475	(0.0979)

Notice that if these markets are becoming gradually more integrated one should observe a trend of decline in expected returns. Along with liberalisation measures, many of these markets have been modernising their trading mechanisms, settlement and clearing systems and that should also result in a decline in expected returns. In principle, these trends are picked up by the local market factor but it is possible that these trends do not similarly affect the market and the stocks in my sample.

Table 5.6 also shows the results for the market model two-factor specification for the purpose of comparison[144].

Table 5.6 - Cumulative Average Abnormal Returns Around and After the Week of Dual-Listing, Significance Tests for Sub-Periods
Emerging Markets' Listings

This table reports cumulative average abnormal returns (CAR) around and after the listing date for 70 emerging markets' firms that dual-listed their stocks on the NYSE, NASDAQ and SEAQ-I during the period of 1991 to 1995. Abnormal returns are prediction errors using CAPM (or Market Model) parameters estimated regressing local returns on local and world market indices over the weeks -52 to -15 in event time. Statistical significance is calculated using average standardised residuals. The *p*-values reflect two-tailed tests for the event period and a one-tailed test for the post-listing period. Significance for one tailed-test at the 90%, 95% and 99% level is indicated by '*', '**' and '***'.

	CAPM		Market Model	
Period	CAR	*p*	CAR	*p*
Event				
-14 to -2	0.0716	(0.0002)	0.0243	(0.0278)
-1 to 0	-0.0046	(0.6789)	-0.0079	(0.9173)
+1 to +5	-0.0565	(0.0000)	-0.0689	(0.0000)
Post-listing				
+6 to +36	-0.0475	(0.0979)	-0.1502	(0.0002)

	CAPM		Market Model	
Weeks	5 weeks CAR	CAR	5 weeks CAR	CAR
6-10	-0.0129	-0.0129	-0.0302**	-0.0302**
11-15	-0.0031	-0.0160	-0.0193	-0.0494**
16-20	-0.0059	-0.0219	-0.0279*	-0.0773**
21-25	-0.0017	-0.0236	-0.0165	-0.0938***
26-30	-0.0068	-0.0304	-0.0225**	-0.1163***
31-35	-0.0202**	-0.0506*	-0.0355***	-0.1518***

As expected, we observe a downward bias in abnormal returns that is reflected in lower positive abnormal performance before listing (around 2%, but still statistically significant) and much more negative abnormal returns thereafter. The loss after 36 weeks is 22% and very significant. As discussed at the beginning of this section, I elected the

144 I have also looked at mean adjusted returns to bypass the problem of identifying the appropriate benchmark. Results are even more dramatic than those observed using the market model.

CAPM specification: that specification may overcome the bias in abnormal returns caused by any run-up in prices in the pre-listing period.

Robustness of the Results[145]

Measuring Abnormal Returns

Log returns can produce a negative bias in abnormal returns. To ensure that the findings described here were not driven by that, I compare the results with those obtained using Buy and Hold discrete returns. The results confirm my findings: (stronger) positive abnormal performance before the listing; post-listing short-run performance is negative as before (and very significant). Yet I am not able to reject the null of no abnormal performance in the long-run.

Estimation Period

When I include a longer estimation period, the positive abnormal performance in the pre-listing period becomes more evident. There seems thus to be evidence that firms list after a period of good performance.

When I compute abnormal returns with parameters estimated in the *post-listing* period, I get, as expected, positive abnormal returns in the pre-event period that are significant at a 1% level. For the period of interest, around the listing date, the CAPM specification generates similar results: the positive cumulative abnormal performance just before the listing date is slightly lower (4.0% against the 7.2% observed before) but still statistically significant; in the first five weeks after the listing, cumulative abnormal returns are -5.7% as before. After the event, and if the equilibrium model used here is well specified, the expected residuals should be zero. The negative performance observed after the listing is thus puzzling and difficult to interpret within the segmentation, awareness or liquidity arguments. Apparently, this pattern could only be justified by the timing argument.

US $ Denominated Returns

The balance of the results was similar to the ones reported above.

Model Specification

- Unconditional CAPM Three Factors

[145] The results below are available upon request.

This specification includes a currency risk factor. I have used an F-test to evaluate the marginal significance of this risk factor. The hypothesis of a zero coefficient on the currency factor was only rejected in 6 out of the 70 cases.

In spite of all the noise that this model seems to be adding, it is still possible to observe significant positive cumulative abnormal performance until the listing date (+4.2%) and confirm the decline in the weeks that follow the listing (-3.1%). Both movements are statistically significant whatever the statistics used to infer. The cumulative abnormal returns in the post-listing period amount to -4% and are statistically significant at a 5% level.

- Conditional Model Two-Factors

I use Wald tests to test for the joint significance of the information variables. It is never possible to reject the hypothesis that the marginal contribution of the cross-product variables is zero.

This model generates very high t-statistics when we use the inference with the variances obtained in the estimation period, with or without cross-sectional dependence adjustment. However, when we account for potential changes in variance, by using the cross-sectional estimates of the variance of the average residuals, or use standardised residuals, the statistics assume more reasonable values. The pattern is similar to that observed for the unconditional specification.

Announcement Dates

I have repeated the analysis using the announcement date when available, i.e., for the sub-sample of 35 emerging markets' firms. CAPM generates significant (at a 10% level) positive cumulative abnormal returns of about 5.4% by the week of the announcement. Cumulative abnormal returns after the announcement date are close to zero.

By Market Type

Figures 5.2 and 5.3 plot the abnormal performance for each of the sub-samples of emerging and mature markets. Table 5.7 shows these results. Mature markets, unlike emerging markets, do not seem to register positive or negative performance, respectively before and after the listing date in event time. There are positive significant abnormal returns but they concentrate on the week just before listing and the listing week. For the post-listing period, the cumulative abnormal performance is negative of minus 3% against the minus 5% we observe for the emerging markets group.

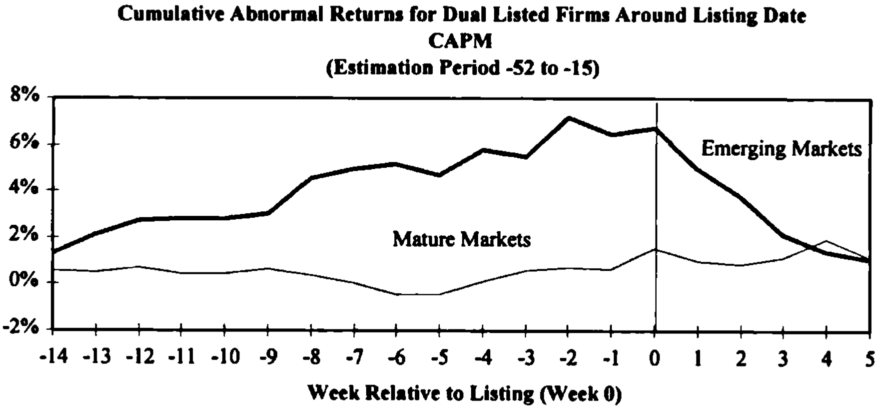

Figure 5.2 - Cumulative Abnormal Returns Around Listing Date: 1991 to 1995
- Emerging vs. Mature Markets -

This figure plots cumulative average abnormal returns around the week of listing, for respectively 70 and 65 emerging and mature markets' firms that dual-listed on the NYSE, NASDAQ and SEAQ-I during the period 1991 to 1995. Abnormal returns are measured starting on the -14th week before listing, using an unconditional model that regresses local returns on the world and the local risk factors. The sample data was obtained from Datastream.

When we compare the performance of the two groups with a difference *t*-test, we see that abnormal performance is statistically different for the two groups in both the pre-listing period and in the five weeks following the listing.

<u>By Exchange Type</u>

To investigate further this differential behaviour, panels II and III in table 5.7 report the differences between the two groups across two stock exchanges: NYSE and SEAQ-I.

For SEAQ-I listings, the results are similar: during the event period, the effects are only significant for the emerging markets sub-sample; in the post-listing period the difference in the abnormal performance between the two groups is not statistically significant.

For NYSE listings, however, the general pattern vanishes: both emerging and mature markets' firms register the overall pattern of positive and negative abnormal returns respectively before and after the listing date (the lack of significance seems to result from the small number of observations in each group). Strangely, in the post listing period there are no signs of negative abnormal performance for the emerging markets' listings.

Thus the difference we observed above, between emerging and mature markets, for the overall sample, seems to be driven by differences in SEAQ-I listings.

Table 5.7 - Cumulative Average Abnormal Returns Around and After the Week of Dual-Listing by Market Type - Significance Tests for Sub-Periods

This table reports cumulative average abnormal returns (CAR) around and after the listing date for, respectively 70 emerging markets' and 65 mature markets' firms that dual-listed on the NYSE, NASDAQ and SEAQ-I during the period of 1991 to 1995. Abnormal returns are prediction errors using CAPM parameters estimated by regressing local returns on the local and the world market indices over the weeks -52 to -15 in event time. Statistical significance is calculated using average standardised residuals. The p-values reflect two-tailed tests for the event period and a one-tailed test for the post-listing period. t-dif CAR refers to a t-test on the set of differences across markets.

I. All Exchanges

	Emerging Markets (N=70)		Mature Markets (N=65)		
Period	CAR	p	CAR	p	t-dif CAR
Event					
-14 to -2	0.0716	(0.0002)	0.0070	(0.5466)	(2.17)
-1 to 0	-0.0046	(0.6789)	0.0084	(0.0970)	(-0.90)
+1 to +5	-0.0565	(0.0000)	-0.0040	(0.2134)	(-2.24)
Post-listing					
+6 to +36	-0.0475	(0.0979)	-0.0290	(0.1424)	(-0.13)

II. NYSE

	Emerging Markets (N=29)		Mature Markets (N=13)		
Period	CAR	p	CAR	p	t-dif CAR
Event					
-14 to -2	0.0359	(0.2835)	0.0248	(0.3163)	(-0.19)
-1 to 0	-0.0229	(0.6533)	0.0135	(0.3980)	(-0.95)
+1 to +5	-0.0343	(0.1802)	-0.0409	(0.0160)	(1.21)
Post-Listing					
+6 to +36	0.0211	(0.4008)	-0.0450	(0.3167)	(0.50)

III. SEAQ-I

	Emerging Markets (N=32)		Mature Markets (N=46)		
Period	CAR	P	CAR	p	t-dif CAR
Event					
-14 to -2	0.0844	(0.0018)	0.0037	(0.9143)	(2.31)
-1 to 0	0.0013	(0.7113)	0.0048	(0.3290)	(-0.35)
+1 to +5	-0.0625	(0.0002)	0.0037	(0.4605)	(-2.70)
Post-Listing					
+6 to +36	-0.0655	(0.0910)	-0.0542	(0.0459)	(0.06)

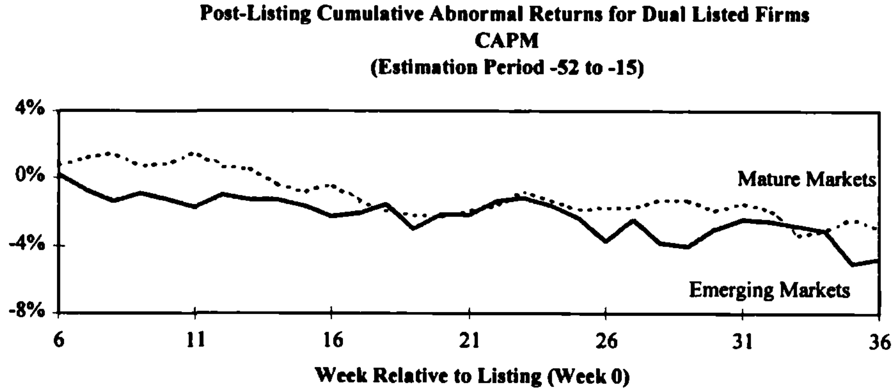

Figure 5.3 - Post-Listing Cumulative Abnormal Returns: 1991 to 1995
- Emerging vs. Mature Markets -

This figure plots cumulative average abnormal returns up to 36 weeks after listing for, respectively 70 and 65 emerging and mature markets' firms that dual-listed on the NYSE, NASDAQ and SEAQ-I during the period 1991 to 1995. Abnormal returns are measured starting on the 6th week following listing using an unconditional model that regresses local returns on the world and the local risk factors. The sample data was obtained from Datastream.

I have re-examined the results by now comparing the effects across stock exchanges for each of the two groups of markets. Table 5.8 shows the difference *t*-tests. We can see that, for emerging markets, the pattern during the event period is similar across exchanges. The difference between the two exchanges is only significant in the first five weeks following listing where firms trading on SEAQ-I register a steeper decline than their NYSE counterparts. If we consider altogether this period and weeks -1 and 0 this difference is no longer statistically significant. Thus, it seems that for emerging markets' firms, dual-listing has a significant impact on returns regardless of the listing place. For the mature markets, however, the general pattern we observed during the event period is only there for listings on the NYSE. Yet listing on any of the two exchanges, shows negative abnormal performance in the post-listing period.

This evidence could be supportive of the segmentation hypothesis. For emerging markets, any of the two trading venues is good enough to partially undo the segmentation effects and decrease the firm's cost of capital. For mature markets' firms, that originate from markets that are more financially integrated, the impact on prices is limited to the NYSE if we leave out the post-listing period,. Any of the other theories reviewed above, anticipates that effect. For example, information and liquidity arguments predict that trading on SEAQ-I will have no (or a negligible) effect on the firm's value. However, trading on the NYSE by providing access to a very large pool of investors and superior liquidity services, should impact the firm's cost of capital. For emerging markets' firms those effects could also be present given that the different explanations are not mutually exclusive.

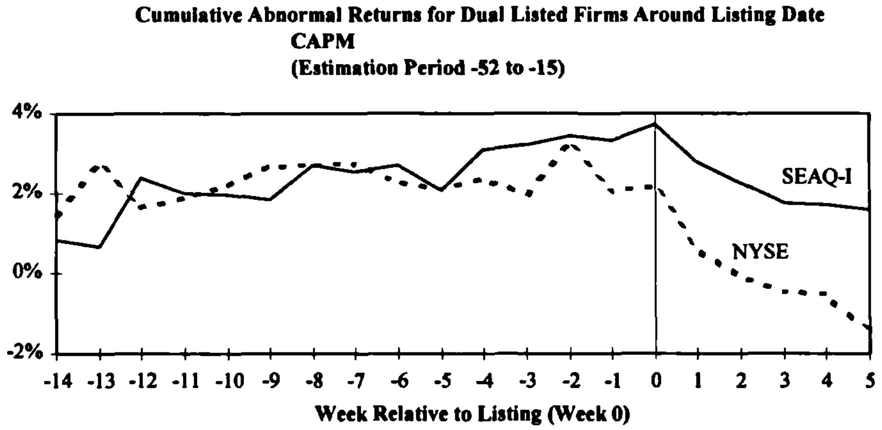

Figure 5.4 - Cumulative Abnormal Returns Around Listing Date: 1991 to 1995
- Emerging Markets, NYSE vs. SEAQ-I -

This figure plots cumulative average abnormal returns around the week of listing for, respectively 29 and 32 emerging markets' firms that dual-listed their stocks on the NYSE and on the SEAQ-I during the period 1991 to 1995. Abnormal returns are measured starting on the -14th week before listing, using an unconditional model that regresses local returns on the world and the local risk factors. The sample data was obtained from Datastream.

Table 5.8 - Cumulative Average Abnormal Returns Around and After the Week of Dual-Listing by Exchange Type - Significance Tests for Sub-Periods

This table reports the significance statistics for the difference between the cumulative average abnormal returns (CAR), around and after the listing, on the NYSE and on SEAQ-I during the period of 1991 to 1995. *t*-dif CAR refers to a *t*-test on the set of differences across exchanges. Refer to table 5.7, panel II and III, for the CARs of each sub-sample of emerging and mature markets on the NYSE and on SEAQ-I.

	t-dif CAR	
Period	Emerging Markets	Mature Markets
Event		
-14 to -2	(-1.26)	(0.83)
-1 to 0	(-0.58)	(0.28)
+1 to +5	(1.71)	(-1.84)
Post-Listing		
+6 to +36	(0.99)	(0.35)

<u>**Selected Markets**</u>

The hypothesis *Segmentation I* states that the impact of listing varies directly with the degree of segmentation. Whether a market is more or less integrated with the world market is a difficult question to answer. On one hand, as I have documented above, formal or informal barriers are too many to list. On the other hand, these barriers are not necessarily binding.

If the international segmentation theory is valid, the impact of dual listing is a measure of integration. The evidence discussed above broadly confirmed that: listings of emerging markets' firms register a greater impact than those listings originating from mature markets. I now examine, in more detail, the results for some selected emerging markets and try to link the results with the information I have on barriers for each of these markets. Table 5.9 reports the results for Chile, India, Mexico and Taiwan. The analysis is restricted to these markets given that the remaining emerging markets in the sample have only a few listings each.

<u>Chile</u>

There are 18 dual-listed Chilean firms in my sample, of which 16 listed on the NYSE, one on NASDAQ and one on SEAQ-I. By the end of 1992, there were only two international listings from Chile and most of the listings clustered in 1994.

I would expect *a priori* that Chilean dual-listings lead to a significant impact in returns. The Chilean market still has important restrictions on foreign investment. Repatriation of capital is still regulated. 100% foreign ownership of listed Chilean companies has only been allowed since 1996 and outward investment has been limited until very recently. Besides that, there is a 30% reserve requirement on any short term foreign capital.

My results for the Chilean listings do not show the pattern expected. Results are even more surprising given that Chile is a market within the same time zone as NYSE. Smith and Sofianos (1997) show that the market share of the US market in global trading is more pronounced when dual-listed securities originate from time zones where business hours overlap substantially with the NYSE, because information that is revealed locally can be used simultaneously at the NYSE. If the weight of US investors is more important, then the impact on the firm's cost of capital should be higher. We can observe that Chilean cumulative abnormal returns are always negative but never significant. The reason for this could be that this sub-sample includes listings at different moments in time. According to the hypothesis *Segmentation IV*, the most important impact should be registered for the first international listings.

Table 5.9 - Cumulative Average Abnormal Returns Around and After the Week of Dual-Listing, Significance Tests for Sub-Periods - Selected Markets

This table reports cumulative average abnormal returns (CAR) around and after the listing date for selected emerging markets' firms that dual-listed their stocks on the NYSE, NASDAQ and SEAQ-I during the period of 1991 to 1995. Abnormal returns are prediction errors using CAPM parameters estimated by regressing local returns on the local and the world market indices over the weeks -52 to -15 in event time. Statistical significance is calculated using average standardised residuals. The *p*-values reflect two-tailed tests for the event period and a one-tailed test for the post-listing period.

	Chile (N=18)		India (N=20)		Mexico (N=14)		Taiwan (N=7)	
Period	CAR	*p*	CAR	*p*	CAR	*p*	CAR	*p*
Event								
-14 to -2	-0.0127	(0.7491)	0.0978	(0.0010)	0.1214	(0.0053)	0.0063	(0.9939)
-1 to 0	-0.0145	(0.5975)	-0.0124	(0.3171)	0.0069	(0.6612)	0.0515	(0.0083)
+1 to +5	-0.0499	(0.1245)	-0.0412	(0.0271)	-0.0806	(0.0028)	-0.1010	(0.0015)
Post-listing								
+6 to +36	0.0695	(0.1140)	-0.0307	(0.3354)	-0.1827	(0.0050)	-0.1201	(0.1343)

India

There are 20 Indian GDRs in my sample, all trading on SEAQ-I. By the end of 1993, only two Indian GDRs were trading internationally.

India is a country with very severe barriers. Not only there still are many formal restrictions on foreign investment, but India's settlement and clearing risks are extremely high. Only authorised investors are allowed to invest in India and even these investors face aggregate and single ownership limits.

The results in table 5.9 confirm that the Indian stock market is segmented. Indian dual-listings follow the overall pattern we observe for the emerging markets' sub-sample. By the listing date, we observe significant cumulative abnormal returns amounting to +9% and in the five weeks following listing the cumulative abnormal returns are -4% (significant at a 5% level) .

Indian GDRs provide a distinctive case from almost the rest of emerging markets' listings in our sample. For the generality of these listings, the law of one price holds (and the differential in prices usually does not exceed 5%). Given the connection between the ADR and the underlying share market - given that an ADR can be transferred to a US buyer or can be cancelled by the depository and converted back into the underlying share - cross-border arbitrage seems to align the prices of the two securities (adjusted by the exchange rate) subject to transaction costs imposed by the conversion fee, bid-ask spreads and other transaction costs. Profitable arbitrage may occur when the price differentials depart from those bounds, possibly because of delays in observing prices and quotes in the other market, differences in responsiveness of prices to new events or price pressure caused by noise trading or illiquid markets. Yet, as it has been highlighted before, dual listing does not undo formal barriers and does not overcome some informal barriers. So it is possible that, for segmented markets, there could be differences in prices that are difficult or impossible to take advantage of. A similar reasoning can be made if most of the benefits are liquidity driven, that is dual listing decreases bid-ask spreads as a result of inter-market competition. If international and foreign investors trade in different boards, this benefit will not be transmitted to all investors. There is no reason to observe smaller spreads for the A-shares: the fact is that there is no order flow to fight for; restricted shares will still be restricted.

Indian GDRs provide a distinctive case from almost the rest of emerging markets' listings in my sample. Indian GDRs trade often at a substantial premia or discounts to the underlying stocks reflecting the foreign investor demand or sentiment for the Indian market or the GDR market relative illiquidity. Arbitrage is not possible because the Indian domestic stock market is only open to qualified foreign institutional investors and local stock markets are illiquid.

Mexico

Our sample comprises 14 Mexican listings but Mexico is the emerging market country that has dual-listed more securities in the last decade. By the end of 1991, Mexico already had 10 or more listed ADRs.

The Mexican stock market is free to foreign investment since December 1993 and the presence of foreign investors is very important.

Mexican dual-listings show very positive cumulative abnormal returns before the listing date (+12%) and negative cumulative abnormal returns of -8% after that. This result is surprising: Mexico is a market that, *a priori*, I would expect to be integrated world-wide given that there are no formal barriers to foreign investment. One of the reasons for this behaviour could be related to the substantial time-overlap of Mexico and NYSE stock markets, that facilitates the trading in the US. Liquidity effects could be thus driving the results.

Taiwan

There are seven dual-listings in our sample, all trading on SEAQ-I. The first dual-listing from Taiwan occurred in 1992, but by the end of 1996, there were still only 10 international listings.

Taiwan is the second largest emerging market but it is very regulated and foreign participation is small. Only authorised investors are allowed to invest in the stock market and there are still restrictions to income and capital repatriation and absolute ownership limits for non-Taiwanese investors.

The evidence in table 5.9 confirms the investment restrictions just described, suggesting that the Taiwan stock market is not fully integrated. By the listing date, there were positive cumulative abnormal returns of around 5.8% and during the first 36 weeks after listing cumulative abnormal returns summed to -22%.

Summary of Main Findings

1. Previous studies on the effects of foreign listings in the US have found positive significant abnormal returns before listing and negative significant abnormal returns immediately following listing. For an extensive sample of 70 emerging markets' listings, I also find positive abnormal returns before the listing date and negative short-run abnormal returns following the dual-listing. For the first month after listing, my results show a decline of around -6% against the -3% in Alexander *et al.* (1988), -3.5% in Miller (1996). Foerster and Karolyi's (1996) abnormal returns are not directly comparable to mine because they adjust for changes in risk. My results are robust to the specification model used (CAPM or market model, unconditional or conditional) and are significant whether I use parametric or non-parametric tests.
2. In the post-listing period, there seem to be negative cumulative abnormal returns but the abnormal performance is marginally significant. Further, that pattern exists only for SEAQ-I listings.

Let's assume a simplistic valuation model like the Gordon model and a required return of 20% before listing. If we take the change in prices (+7%) as the unbiased estimate of the true change in value, then that would sanction a decline of 1.4% (annualised) in required returns, if the firms' stream of cash-flows is a perpetuity; if the dividends growth rate is positive, then an even lower change in required returns would match. On the contrary, if the returns truly dropped 8% (annualised), suggested the mean abnormal returns in the first 36 weeks after listing, the price would have to have increased 40% in the case of a zero dividend growth, or more for a positive dividend growth. Within the setting of this model, it is not possible to accommodate the values I get for the average change in prices before the dual listing and the decline in returns after listing. This could be because the Gordon model assumes that future required returns and dividend growth are constant, or due to partial anticipation by investors of the decline in the firm's cost of capital, or because a large part of the benefits are reaped by fees and disclosure costs. Alternatively, our benchmark model could be misspecified.

3. Emerging markets' firms register stronger positive and stronger negative abnormal returns (respectively, in the 14 weeks before listing and the first 5 weeks after listing) than mature markets. This result is important in that it supports my first hypothesis (*Segmentation I*) that states that the effects of dual-listing are more pronounced for markets that exhibit more barriers to free investment. Miller (1996) also finds that difference significant for a sample of US dual listings. When I investigated further that differential behaviour, I found that the difference only exists for the sub-sample of SEAQ-I listings.

4. Thus for emerging markets' firms there is no support for higher rewards in the more liquid place where there is better risk sharing and stricter disclosure rules. The implication of this result in terms of choosing a place to list is that, as there are benefits in both exchanges, it may be important to consider the other costs involved in the listing process. I computed a rough estimate of the present value of fees across exchanges. For a firm with a capitalisation of around 20 million dollars, NYSE fees could represent around 1.2% of the firm's value. For NASDAQ or SEAQ-I, this cost should not exceed 0.3% of the firm's capitalisation.

Even if exchanges are value maximising, it is understandable that they not set fees extracting all the value from investors. Because they are long-lived agents, and because firms that are likely to list can learn about how an exchange implements its listing policy by studying the performance of firms which have obtained a listing in previous periods and comparing it with competing exchanges, the listing fees they choose may affect their future reputation. The exchanges' listing fees may thus emerge endogenously in equilibrium from the interaction between firms, investors and exchanges.

Even if there was no competition - in reality there is and stock exchanges like NASDAQ or London involve less costs not only in terms of fees but lower disclosure costs -, if the exchange set the fees to maximise its revenues, so that these costs will more than offset any immediate benefits to shareholders or expected benefits to the firm (future equity offerings), there would be no economic motivation for dual listing. Stock exchanges will be faced with the choice of extracting monopoly rents/fees or decreasing market share. The fact that New York Stock exchange is more and more concerned in getting into alliances with other less strict, less costly exchanges seems to denote the importance to retain and increase customer base.

There are two questions here. The first is whether it is correct to consider the NYSE as a monopolist. Is the service that the exchange offers that unique? The second question is to assess the (price) elasticity of demand. The optimal level of fees will be as usual where the marginal revenue crosses the exchange's marginal cost curve.

Finally it is important to say that NYSE is not (yet) a public profit-maximising company and therefore other considerations (social) enter its fee policy decision. It is widely known how SEC is concerned in keeping its regulatory disclosure standards high to protect US investors from risk that may come from looser accounting principles.

In the case of the European firms in my sample, dual-listing seems to create value and impact the firm's cost of capital only when it lists on the NYSE. Cantale (1996) finds similar results. This evidence could be supportive of one (or several) of the other arguments (for example, awareness or liquidity).

5. The patterns we observe are not always consistent with the expectations suggested by investment restrictions and foreign participation in the local markets and provide inconclusive evidence on my hypothesis Segmentation I. The valuation impacts are as expected in India and Taiwan, where formal barriers are high and foreign presence is small. However, for Chile and Mexico, results are puzzling.

5.7.3 STRUCTURAL CHANGES IN PARAMETERS

To address the problem of change in the risk parameters caused by the dual-listing, I run a dummy regression, for each stock, allowing for changes in the intercept during and after the listing date and in the risk parameters after the event. I have tested individually and jointly the significance of these dummy variables. Table 5.10 summarises the results. Panel I is inconclusive regarding the change in the model parameters. The intercept dummy variables are economically significant but, on average, are not statistically significant. Results in panel II are more convincing. I would expect the local market parameter to decrease and the world market parameter to increase after listing reflecting the increasing integration from dual listing. We observe an increase for both the local and world betas and this last is very significant. Jayaraman *et al.* (1993) and Miller (1996) are unable to find significant changes in risk parameters. Foerster and Karolyi (1996) report a decline in the local betas using a pooled model. Their Chow-test is very significant but it is a joint test that includes intercept changes.

After accounting for risk changes, the event dummy (mean CAR during the event period) still shows a positive value (+0.4%) and the post-listing dummy is negative (-0.5%) but, on average, these parameters are not significant. Foerster and Karolyi (1996) find a similar decrease of around -0.5% using a pooled regression.

I have also accounted for possible changes in trading frequency motivated by the listing. I performed the pair-wise tests of differences in risk parameters after accounting for thin trading following Dimson's (1979) procedure. Doing so, it is not possible to reject the null of no change in the parameters.

I have investigated briefly whether the dual-listing had any effect on variance parameters. I find a variance ratio above 1 but both parametric and non-parametric tests are inconclusive. Further investigation on volume effects could clarify the liquidity effects of foreign listings.

Table 5.10 - Dummy Variable Regressions
Emerging Markets' Listings
This table summarises the dummy variable regressions of local returns against the world and the local market risk factors using GMM. Panel I shows the average estimated parameters for 70 emerging markets' firms that dual-listed on the NYSE, NASDAQ and SEAQ-I during the period 1991 to 1995. Panel II compares the parameters before and after listing. The pre-listing period goes from week -52 (or before) to week -15. The post-listing period starts at week +6 and ends at least at week +36 (or later). *t* refers to the value of the *t*-test. *p*-S reports the Sign Test *p*-value for a two-tailed test.

I. Individual Estimates

	CAPM		Market Model	
Variable	Average Estimate	Average *t*-ratio	Average Estimate	Average *t*-ratio
Intercept	-	-	0.0032	(0.75)
Listing Dummy	0.0036	(0.39)	0.0006	(-0.45)
Post-Listing Dummy	-0.0026	(-0.61)	-0.0061	(-0.95)
Local Risk	0.8166	(7.65)	0.7966	(6.59)
Post-Listing Local Risk Dummy	0.0711	(0.31)	0.0944	(0.34)
World Risk	0.0990	(0.49)	0.1184	(0.58)
Post-Listing World Risk Dummy	0.1487	(0.38)	0.0600	(0.18)

II. Pair-wise Test of Differences in Parameters Before and After Listing

	CAPM				Market Model			
Parameter	Pre-Listing	Post-Listing	*t*	*p*-S	Pre-Listing	Post-Listing	*t*	*p*-S
Intercept					0.0034	-0.0023	(-5.93)	(0.000)
Local beta	0.8092	0.8805	(2.05)	(0.065)	0.7888	0.8790	(2.09)	(0.1160)
World beta	0.1044	0.4984	(5.34)	(0.000)	0.1298	0.2690	(1.71)	(0.0794)

5.7.4 CROSS-SECTIONAL RESULTS

The results in the previous two sections suggest that the super risk premium required for stocks originating from markets where there are barriers to investment is partially undone by the dual-listing.

In this section, I provide more evidence on the determinants of the listing impact by conducting a cross-sectional regression of cumulative abnormal returns over the period before listing, on proxies for the factors motivated by the theoretical framework described in section 5.4.

Table 5.11 shows the results. The univariate regressions show that the more powerful variables are the IFC investability index (*II*), the country credit rating (*RATING*) and the premium on country funds (*CF*)[146]. The last two variables are economically and statistically significant. These results give support to hypothesis *Segmentation I*. Firms that originate from markets where barriers are more severe observe a larger impact on prices. The evidence is inconclusive for the other hypotheses: I cannot establish that first listings (hypothesis Segmentation IV) or that firms that provide more diversification benefits (hypothesis Segmentation II) register a stronger valuation impact. The evidence is also inconclusive regarding the impact of different market risk premium on the magnitude of abnormal returns (hypothesis Segmentation II).

For the multivariate regression, we only present here some selected specifications given that some of the explanatory variables are highly correlated. The regressions explain only a small part of the cross-sectional variation in abnormal returns. Further, the intercept term is, in almost all specifications, statistically different from zero.

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146 In some specifications, I include variables that are country-invariant. This is the case for the country rating, the country fund premium in a particular market, or the capitalisation of the market where the stock belongs. This may result in inadequate or insufficient variability of the regressors in the data set: the estimates will be unbiased, and so will be the R^2 but the standard errors of the estimates will be quite large and therefore hypothesis testing is not powerful. Furthermore in the case of multicollinearity, a specification problem may arise given that diverse hypotheses about the parameter values cannot be rejected.

Table 5.11 - GMM Regressions of Cumulative Abnormal Returns on Proxies for the International Asset Pricing Determinants
Emerging Markets' Listings

This table shows the coefficients for the cross-sectional regressions of abnormal returns on proxies for the International Asset Pricing model determinants. *CAR* is the cumulative abnormal returns for each firm over the period before listing (week -14 to -2) using the CAPM specification. *CORL* and *CORW* are the correlation coefficients between the stock's local return and the local and world market returns, computed over the period prior to the beginning of the event. *DRP* is the historical difference between the local and the world market's returns prior to the listing date. *LMSIZE* is the log size of the originating market relative to the world market value. *II* is the IFC investability index and *RATING* is the Institutional Investor's country credit rating. *CF* is the premium on country funds targeting the emerging market from where the firm originates. *RANK* and *TMV* are, respectively, the ranking and the total log market value (up to that listing) of the dual-listed securities (all classes) originating from that particular country. *SIZE* is the log market value of the stock. *t*-statistics are reported in parentheses below the coefficient.

Dependent Variable: *CAR* over the 13 Weeks before Listing

Number of Firms: 70

Intercept	0.0427	0.0803	0.0679	0.0525	0.0118	0.1992	0.0078	0.0570	0.0660	0.0739	0.2710	0.2547	0.3096
	(0.45)	(3.00)	(3.16)	(0.93)	(0.36)	(2.42)	(3.48)	(1.32)	(1.93)	(2.78)	(2.01)	(1.95)	(1.76)
CORL	0.0593										-0.0163	-0.0296	-0.0249
	(0.33)										(-0.09)	(-0.16)	(-0.13)
CORW		-0.1337									-0.0984	-0.166	-0.0933
		(-0.85)									(-0.62)	(-0.69)	(-0.56)
DRP			1.3329									2.3974	2.2577
			(0.37)									(0.56)	(0.53)
LMSIZE				2.8000								5.8050	4.938
				(0.46)								(0.66)	(0.52)
II					0.1608								
					(1.89)								
RATING						-0.0959					-0.1330	-0.1612	-0.1881
						(-1.80)					(-2.25)	(-2.20)	(-2.08)
CF							0.5172				0.7202	0.7895	0.8778
							(2.11)				(2.63)	(2.41)	(2.34)
TMV								0.4126					-0.0924
								(0.44)					(-0.76)
RANK									0.0005				0.0012
									(0.24)				(0.57)
SIZE										-0.0814		0.5532	0.6442
										(0.22)		(1.39)	(1.59)
R^2	0.00	0.02	0.00	0.00	0.07	0.03	0.05	0.00	0.01	0.00	0.13	0.16	0.16
Adjusted R^2	-0.00	0.01	-0.01	-0.01	0.06	0.02	0.03	-0.01	-0.02	-0.02	0.07	0.05	0.03

5.8 CONCLUSIONS

This study re-examines the effects of international dual-listings on local stock returns with a sample of emerging markets' firms. My results confirm the previous findings: firms experience significant positive abnormal returns before the listing date and a significant decline in returns over the first five weeks following listing. The decline seems to be persistent for a longer horizon but that evidence is not conclusive. These results are robust to different specifications for modelling returns and the inference conclusions are robust to a battery of parametric and non-parametric tests.

The prospectus for foreign listing in London states the following: "London provides access to the largest pool of institutional equity capital in the world"; "a wide and sophisticated shareholder base"; "increased investor interest and confidence"; "A listing in London can mean a company's visibility and status is dramatically enhanced".

My results for emerging markets' listings support these statements: listing on an international exchange results in a decline of a firm's expected returns, reflecting a better risk sharing. For emerging markets, any of the two main international exchanges seems to be good enough to reap these benefits. Yet for mature markets' firms, the impact on prices is limited to NYSE listings.

The evidence presented here could be supportive of the segmentation hypothesis. Firms that originate from markets where barriers are more severe observe a larger impact on prices. Furthermore, while NYSE provides access to a wider range of investors, better liquidity and transparency, listing on SEAQ-I seems to allow firms to partially undo the segmentation effects and decrease their cost of capital. For firms that originate from markets that are more financially integrated, the dual-listing benefits of an enlarged shareholder base and/or superior liquidity can only be realised by listing on the NYSE.

My results are robust to the specification model used (CAPM or market model, unconditional or conditional); are valid for different estimation periods; to using continuous or discrete returns and local or US returns; and are significant for a battery of parametric and non-parametric tests.

This paper has important limitations. Besides the traditional problems associated with the event study methodology - in particular, the identification of the appropriate benchmark, the difficulty of pinpointing the exact date when the listing was made public and the weakness of the technique for inferring about long term abnormal returns -, it seems that further work should concentrate on separating the different proposed theories. This necessarily involves using other data, for example, changes on the shareholdings' base, bid-ask spreads and volume, firms' operating performance and alternative proxies for the degree of segmentation.

APPENDIX D - FOREIGN LISTINGS: ADRS AND SEAQ-I

This appendix provides detailed information on depository receipts. I describe the different types of depositary receipts and I give an approximate idea of the requirements and length of time for establishing such programs in the US and in London. I also document the criteria demanded by the exchanges and the level of fees they charge. The main sources of information were Coyle (1995), Citibank (1995), London Stock Exchange and New York Stock Exchange.

Depositary Receipts

Depositary Receipts (DRs) are negotiable claims issued by a depositary institution to an underlying foreign security.[147] To avoid unusual share prices, depositary receipts may represent a combination of several foreign shares. New DRs are created once the underlying shares (depositary shares) are deposited with the depositary's foreign custodian in the issuer's home market. The depositary then issues the depositary receipts which represent those shares to the investor. New DRs can be created by purchasing the issuer's shares in the home market.[148] Depositary receipts can be converted into the underlying stock at any time although conversion usually involves a fee.[149]

DR facilities can be sponsored or unsponsored. While the first ones are created by the depositary together with the underlying foreign security issuer, the last ones are initiated solely by a broker. Once one depositary has created the facility, all other depositaries are free to create duplicate facilities. Differently, a sponsored DR facility is exclusive to one depositary.

DRs can be publicly offered or privately placed.

In the US, foreign publicly-traded securities are usually traded as American Depositary Receipts (ADRs). There are three levels of ADRs which have different US

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147 ADRs have been around since 1927 when JP Morgan established a depositary for shares of Selfridges. A primary purpose for the depositary receipt was to eliminate the lengthy and cumbersome process of shipping stock certificates back and forth across the Atlantic Ocean by steamer, at a time when the paper had to be physically presented to receive a dividend payment.

148 The basic structure of the ADR is the following: when a US investor wants to buy a foreign firm's stock, the shares are purchased on the home country exchange by a broker and deposited with a custodian in that country. The depositary issues a receipt, much like a claim check, to the American buyer, confirming ownership of the shares. When the holder decides to sell the shares, he can either trade the receipt to another American investor or return to the depositary for cash, in which case the foreign shares are offered for sale in the home country's exchange.

149 These fees are charged by the depositary banks both for issuance when buying and cancellation when selling ADRs. The charges vary according to the ADR price and range from 1% to substantially less than 0.5% for large ADR prices (from 3 to 5 cents).

reporting requirements and Generally Accepted Accounting Principles (GAAP) compliance.[150]

Level-One DRs

Level-one DRs can only trade in the OTC market and quote on Bulletin Board and Pink Sheets. This program must obtain an exemption for the foreign securities from periodic reporting requirements if it meets a certain number of conditions, such as whether the potential investors have access to the kind of information that would be available in a registered public offering (Securities Exchange Act of 1934, Rule 12G3-2(b)).[151,152] The DRs themselves must obtain SEC registration under the Securities Act of 1933 (Registration Statement on Form F-6).[153,154]

A Level-one ADR program trades in the US on the over-the-counter market. Brokers wishing to trade in these securities access the information through the National Quotation Bureau's Pink Sheets and/or the National Association of Security Dealers (NASD)'s OTC Bulletin Board and contact the brokers listed as market makers in a particular security. Pink Sheets information (indicative prices, market makers names and telephones, ...) is available in either printed or electronic format and it is supplied only to registered brokers, dealers and financial institutions. NASD's Bulletin Board information (real time non-firm quotes) is distributed by vendors such as Bloomberg and Reuters. Pink Sheets' stocks have no quotation in the newspapers.
Unsponsored ADRs also do not qualify for a listing on a public exchange and trade on the OTC market via the Pink Sheets. OTC trading is the least costly way for a firm to cross "list" its shares in the US.
The several steps to establish the level-one ADR program take 8 to 9 weeks. When trading begins, the Depositary faxes and mails the announcement to brokers and investors.

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150 Registration is necessary for all ADRs on Form F-6. This form requires minimal information about the ADR facility.

151 The issuer initially furnishes the last fiscal years' documents to SEC and the SEC will respond with a formal letter, usually 4 to 6 weeks later, confirming such exemption. The foreign issuer must furnish shareholder or investment information that the issuer makes public, or that is required by its domestic law or regulations or the rules of any stock exchange on which the stock is listed. The information must be in English or an English version or summary must be prepared.

152 The Exchange Act regulates trading on the exchanges. Two events require a foreign issuer to register under the Exchange Act: listing on an exchange and a public offering in the US.

153 Any issuer must register securities being offered in the US public market with the SEC.

154 Paragraph (a) of Rule 12 G3-2 states that foreign private issuers can obtain an exemption as long as the class of securities issued has less than 300 holders resident in the United States.

Level-Two DRs

Level-two DRs must obtain SEC registration (Securities Act of 1933, Form F-6) and comply partially with US reporting requirements (Securities Exchange Act of 1934 Form, 20-F annually). These depositary receipts are listed on a recognised US exchange.

To have ADRs listed on an exchange, the issuer must comply with the exchange's requirements and the Exchange Act registration procedures. Moreover, foreign issuers must partially reconcile all financial statements to US GAAP - while for Level-one ADRs, they only had to translate them. Listing fees vary by exchange (see below).
Both the NYSE and AMEX are auction-based systems with specialists. The NASDAQ system is an electronic system that collects and disseminates quotations from competing dealers. The NASDAQ offers real time trade reporting and is organised around a system of multiple market makers linked via computers. All issuers must have at least two market makers, quoting their stock.
The several steps to establish the program take 14 to 15 weeks. In addition to SEC approval (reporting requirements and registration), the issuer (through its lawyers and supported by the depositary) must file to list on an US exchange. When trading begins, the Depositary faxes and mails the announcement to brokers and investors.

Level-Three DRs

Level-three DRs also require SEC registration (Securities Act of 1933, Forms F-1/2/3, F-6) but full compliance with the disclosure requirements of SEC (Securities Exchange Act of 1934, Forms 20-F annually). This program applies to foreign firms issuing new shares through a public offering.

In a Level-three program, the issuer uses a listed ADR program to offer new shares to US investors. The requirements for establishing a Level-three program are essentially the same as those for establishing a listed program. There are, however, two additional requirements: the issuer must submit a different form to register the security and must fully reconcile their financial statements to US GAAP. After the offering has been completed, the program is maintained as a listed (Level-two) program.
The several steps to establish the program take 14 to 15 weeks. In addition to SEC approval (reporting requirements and registration), the issuer (through its lawyers and supported by the depositary) must file to list on a US exchange. When trading begins (on pricing day), the Depositary faxes and mails the announcement to brokers and investors.

The majority of ADRs trade on the OTC market and quote on the Pink-Sheets. At the end of 1996, only 22% of 1733 DR facilities traded in the US were exchange listed.

RADRs

In the US, Rule 144A allows the placement of privately placed foreign securities (RADRs) to Qualified Institutional Buyers (QIBs).[155] Trading is done via PORTAL (Private Offerings, Resales and Trading through Automatic Linkage), the NASD's quote system for Rule 144A securities.[156] A private placement may qualify for an exemption from SEC reporting requirements.

The time required to complete a US equity private placement is reduced to about 6 to 7 weeks. However, it usually takes at least 40 days more (silent period) after the offer closing day if a "Side-by-Side" facility is established, i.e., if the issuer has also signed for a Level-one or listed ADR. A side-by-side facility makes the issuer's shares available to all investors, including individual and non-QIB institutional investors.[157]

GDRs

Issuers wishing to raise money in global markets, i.e., simultaneously in two or more markets, can issue Global Depositary Receipts (GDRs). These depositary receipts can be placed privately or publicly and may list on organised exchanges. Most GDRs include a US tranche, which can be privately placed under Rule 144A, or publicly offered and an international tranche placed pursuant to Regulation S (Reg S) outside the US, typically in Euromarkets. GDRs placed in Europe are generally listed on Luxembourg or London exchanges (changes to London's listing rules in 1994 also permitted the listing of depositary receipts) or are quoted on SEAQ International. SEC registration and US reporting requirements vary depending on the structure of the US offering. Clearing and settlement is usually done by DTC in the US and EUROCLEAR and CEDEL in Europe.[158]

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155 QIBs include institutions that own or invest at least US \$ 100 million in securities and registered brokers that own or invest on a discretionary basis US \$ 10 million in securities of non-affiliates (please see Citibank, 1995).

156 There are no holding requirements or other formalities for the secondary trading of these securities. Prior to the adoption of Rule 144A, privately placed securities could only be resold under the provisions of opinions and certifications that limited liquidity.

157 Sometimes, the issuers complete this process by steps. Take, for example, Alcatel. In July 1990 they launched a Rule 144A ADR program; in March 1991 they established their Level-one ADR program; later, in May 1992 they upgraded their Level-one ADR to a full NYSE listing.

158 Depositary Trust Company (DTC) is the world's largest securities depositary. DTC holds securities on a fungible basis and makes computerised book-keeping entries of securities movements between its users accounts.

SEAQ-I

In the summer of 1985, the London Stock Exchange created Stock Exchange Automated Quotation International (SEAQ-I) real-time price quotation system devoted to trading in the shares of non-UK or Ireland firms listed on overseas exchanges which have listing requirements and firm news dissemination arrangements similar to those utilised by the Exchange. Prices are disseminated world-wide through various commercial quote vendor networks.

The several steps to list a GDR on SEAQ-I take 8 to 12 weeks. The Exchange is responsible both for the approval of the prospectus and for admitting firms to trade on the Exchange. The issuer together with the listing agent must submit initially a draft document to the exchange and, later on, formally submit and agree all documents and derogations with the Exchange. The formal application for listing takes place around one week before admission. The listing requirements for depositary receipts are less demanding than those for shares because this market is dominated by sophisticated institutional investors. While the prospectus is central to the process of listing, financial statements do not have to be prepared in accordance with international accounting standards and need not be consolidated.

The SEAQ-I Developing Markets

The SEAQ-I Developing Markets sector was created in September 1992. In the context of SEAQ International, a developing market is an exchange or market which may not satisfy the normal criteria for access to SEAQ International.

A security is eligible for quotation in the Developing Markets Sector on SEAQ International provided that:

- the security is listed on an exchange member (or corresponding member) of the Federation Internationale des Bourses de Valeurs (FIBV);[159]

- a member firm or authorised person under the Financial Services Act 1986 (the "proponent") must agree to act as point of contact for the Exchange in respect of the security to be quoted and supply a certain amount of information regarding the issuing firm;

- the proponent assures that the issuing firm has effective arrangements in place to allow for timely disclosure of firm announcements simultaneously to all exchanges;

- a minimum of 2 market makers must register in each developing market security for a minimum period of three calendar months.

[159] 18 emerging markets covered by IFC indices are members of FIBV.

Stock Exchanges' Requirements and Fees

Table D.1 - Stock Exchanges' Requirements and Fees
This table summarises exchanges requirements and fees across three US main exchanges and SEAQ-I.

Panel I. Listing Criteria

US $ million

	NYSE	AMEX	NASDAQ	NASDAQ Small CAPS	SEAQ-I
Number of Shareholders	2000	800	800	300	no
Publicly Held Shares	1.1	0.5	0.5	no	25%
Market Value of Publicly Held Shares (in the US)	18	3	3	1	1.1
Pre-Tax Income (min of last 3 years)	25	0.75	0.75	no	no

Panel II. Fees*

US $

	NYSE	AMEX	NASDAQ	NASDAQ Small CAPS	SEAQ-I
Initial					
Minimum	100000	5000	5000	6000	6000
Maximum	125000	30000	50000	10000	6000
Annual					
Minimum	16000	6500	2500	500	3000
Maximum	30000	14500	8000	6000	3000

* These fees usually include a fixed charge plus a variable fee that is a decreasing function of the number of shares listed.

APPENDIX E - ADDITIONAL TABLES FOR CHAPTER 5

Table E.1 - Dual Listings: Sample Description

This table lists the companies in the sample used in my dual-listings study. The listing dates were obtained with NYSE, NASDAQ and LSE. The sample data was obtained from Datastream. Firms had to have local data for returns, local market indices and exchange rates for at least 52 weeks before and 36 weeks after the listing date.

Company	Country	Exchange	Listing
BNC.FRANCES	Argentina	NYSE	24/11/93
BUE.ARS.EMBOTT.	Argentina	NYSE	05/05/93
IRSA	Argentina	NYSE	20/12/94
BAGLEY	Argentina	NASDAQ	11/06/93
ANDINA	Chile	NYSE	06/07/94
CHILGENER	Chile	NYSE	19/07/94
CONCHATORO	Chile	NYSE	14/10/94
CRISTALES	Chile	NYSE	25/01/94
EDWARDS	Chile	NYSE	03/11/95
ELECDA	Chile	NYSE	27/07/94
ENERSIS	Chile	NYSE	20/10/93
LABCHILE	Chile	NYSE	29/06/94
MADECO	Chile	NYSE	28/05/93
MASISA	Chile	NYSE	17/06/93
O'HIGGINS	Chile	NYSE	18/05/94
PROVIDA	Chile	NYSE	16/11/94
QUEMCHI	Chile	NYSE	21/09/93
SANTA ISABEL	Chile	NYSE	27/07/95
SANTANDER	Chile	NYSE	04/11/94
TELEXCHILE	Chile	NYSE	14/10/94
CERVEZAS	Chile	NASDAQ	24/09/92
CHILQUINTA	Chile	SEAQ-I	08/07/94
ARVIND MILLS	India	SEAQ-I	15/02/95
BOMBAY DYEING	India	SEAQ-I	12/09/94
CENTURY TEXTILE	India	SEAQ-I	09/10/95
FINOLEX CABLES	India	SEAQ-I	15/02/95
GRASIM INDS.	India	SEAQ-I	12/09/94
GR. EASTERN SHIPP	India	SEAQ-I	12/09/94
HINDALCO INDS.	India	SEAQ-I	12/09/94
INDIAN ALUMINIUM	India	SEAQ-I	12/09/94
INDIAN HOTELS	India	SEAQ-I	28/04/95
INDIAN PETROCH.	India	SEAQ-I	04/05/95
INDIAN RAYON	India	SEAQ-I	12/09/94
INDO GULF CHEM.	India	SEAQ-I	12/09/94
ITC	India	SEAQ-I	12/09/94
LARSEN & TOUBRO	India	SEAQ-I	18/11/94
MAHINDRA & MAHIND	India	SEAQ-I	12/09/94
RANBAXY LABS.	India	SEAQ-I	15/02/95
RELIANCE INDS.	India	SEAQ-I	27/05/92
SOUTHERN PETROCH.	India	SEAQ-I	12/09/94
TATA ENGR.& LOCO.	India	SEAQ-I	24/10/94
VIDEOCON INTL.	India	SEAQ-I	15/02/95
CERAMIC	Mexico	NYSE	08/12/94
DESC	Mexico	NYSE	14/07/94
ELEKTRA	Mexico	NYSE	05/12/94
GGEMEX	Mexico	NYSE	29/03/94
TMM	Mexico	NYSE	10/06/92
VITRO	Mexico	NYSE	19/11/91
CEMEX	Mexico	SEAQ-I	01/04/92
CIFRA	Mexico	SEAQ-I	30/11/94
GCARSO	Mexico	SEAQ-I	25/09/91
FEMSA	Mexico	NYSE+SEAQ-I	14/09/93
GSERFIN	Mexico	NYSE+SEAQ-I	01/12/93
MODERNA	Mexico	NYSE+SEAQ-I	01/02/94
SIDEK	Mexico	NYSE+SEAQ-I	12/07/94
TELMEX	Mexico	NYSE+SEAQ-I	13/05/91
WIESE CAP	Peru	NYSE+SEAQ-I	22/09/94
PHILP.LONG DSN.TEL.	Philippines	NYSE	22/11/94
BCP	Portugal	NYSE	12/06/92
KOREA ELEC. POWER	South Korea	NYSE	27/10/94
POHANG IRON & STL.	South Korea	NYSE	14/10/94
KOREA MOB.TELECOM	South Korea	NYSE+SEAQ-I	24/03/95
ADI	Taiwan	SEAQ-I	21/09/95
ASE	Taiwan	SEAQ-I	07/07/95
ASIA CEMENT	Taiwan	SEAQ-I	16/06/92
CHIA HSIN CEMENT	Taiwan	SEAQ-I	26/05/93
CHINA STEEL	Taiwan	SEAQ-I	20/05/92
TUNTEX DISTINCT	Taiwan	SEAQ-I	26/04/94
WALSIN LIHWA WIRE	Taiwan	SEAQ-I	26/09/95
ERCIYAS BIRACILIK	Turkey	SEAQ-I	27/07/95
AGF-ASR.GL.DE FRN.	France	SEAQ-I	06/12/93
ALBATROS INVESTI.	France	SEAQ-I	04/11/92
CR.FONC.FRANCE B	France	SEAQ-I	21/01/91
CREDIT LYONN.CI	France	SEAQ-I	02/01/91
ELF AQUITAINE	France	NYSE	14/06/91
LAGARDERE GROUPE	France	SEAQ-I	25/04/94
LEGRAND	France	SEAQ-I	21/01/91
LEGRIS INDUSTRIES	France	SEAQ-I	28/12/94
MOULINEX	France	SEAQ-I	13/05/91
PINAULT PRINTEMPS	France	SEAQ-I	25/07/93
PROMODES	France	SEAQ-I	29/11/93
RHONE POULENC	France	NYSE	26/01/93
SANOFI	France	SEAQ-I	21/01/91
TOTAL	France	NYSE	25/10/95
VALEO	France	SEAQ-I	16/12/92
DAIMLER-BENZ	Germany	NYSE	05/10/93
DEGUSSA	Germany	SEAQ-I	21/01/91
DOUGLAS HOLDING	Germany	SEAQ-I	21/03/94
DT.BABCOCK	Germany	SEAQ-I	21/01/91
KARSTADT	Germany	SEAQ-I	21/01/91
LINDE	Germany	SEAQ-I	21/01/91
LUFTHANSA	Germany	SEAQ-I	21/01/91
METALLGESELLSCH.	Germany	SEAQ-I	21/01/91
PREUSSAG	Germany	SEAQ-I	21/01/91
VIAG	Germany	SEAQ-I	21/01/91
ALLEANZA	Italy	SEAQ-I	03/02/92
BANCA DI ROMA	Italy	SEAQ-I	07/05/91
CIR	Italy	SEAQ-I	29/11/94
EDISON	Italy	SEAQ-I	03/03/93
GEMINA	Italy	SEAQ-I	04/02/91
IFIL	Italy	SEAQ-I	29/11/94
ITALCEMENTI	Italy	SEAQ-I	29/11/94
ITALGAS	Italy	SEAQ-I	04/02/91
PARMALAT	Italy	SEAQ-I	14/04/93
RAS	Italy	SEAQ-I	02/12/91
RINASCENTE	Italy	SEAQ-I	29/11/94
SAI	Italy	SEAQ-I	29/11/94
SIRTI	Italy	SEAQ-I	29/11/94
ASLAND CATALUNA	Spain	SEAQ-I	03/04/92
BNC.POPULAR R	Spain	SEAQ-I	03/04/92
DRAGADOS	Spain	SEAQ-I	03/04/92
ENERGIA ARAGON.	Spain	SEAQ-I	20/02/95
ERCROS	Spain	SEAQ-I	06/04/92
FOM.CONSTRC.CNTR.	Spain	SEAQ-I	29/03/94
SARRIO	Spain	SEAQ-I	06/04/92
SEVILLANA	Spain	SEAQ-I	06/04/92
TABACALERA R	Spain	SEAQ-I	03/04/92
UNION FENOSA	Spain	SEAQ-I	04/02/92
URALITA	Spain	SEAQ-I	06/04/92
VALLEHERMOSO	Spain	SEAQ-I	03/04/92
CARLTON COMMS.	UK	NYSE	19/10/93
CTL.TRAN.RENTAL	UK	NYSE	01/10/91
DANKA BUS.SYS.	UK	NASDAQ	17/12/92
ELECTROCOMP.	UK	NASDAQ	22/02/91
ENG.CHINA CLAYS	UK	NYSE	30/04/92
ENTERPRISE OIL	UK	NYSE	16/10/92
GRAND MET.	UK	NYSE	13/03/91
LASMO	UK	NYSE	08/06/93
MAID	UK	NASDAQ	22/11/95
MICRO FOCUS GP.	UK	NASDAQ	26/05/92
NATIONAL POWER	UK	NYSE	06/03/95
POWERGEN	UK	NYSE	06/03/95
REED INTL.	UK	NYSE	06/10/94
REXAM	UK	NASDAQ	07/06/95
TOMKINS	UK	NYSE	21/02/95

Table E.2 - Sample Descriptive Statistics

This table describes the sample of dual-listings used in this essay. The listing dates were obtained with NYSE, NASDAQ and LSE. The sample data was obtained from Datastream. Firms had to have local data for returns, local market indices and exchange rates for at least 52 weeks before and 36 weeks after the listing date.

I. Exchange Listings by Type of Exchange

Origin	All Listings	(%)	NYSE	NASDAQ	SEAQ-I	NYSE+SEAQ-I
Emerging Markets						
1991	3	4%	1	-	1	1
1992	7	10%	2	1	4	-
1993	10	14%	6	1	1	2
1994	36	51%	18	-	15	3
1995	14	20%	2	-	11	1
All Years	70	100%	29	2	32	7
Mature Markets						
1991	22	34%	4	1	17	-
1992	17	26%	2	2	13	-
1993	9	14%	3	-	5	1
1994	11	17%	1	-	10	-
1995	6	9%	3	2	1	-
All Years	65	100%	13	5	46	1

II. Exchange Listings by Region

	All Listings	(%)	NYSE	NASDAQ	SEAQ-I	NYSE+SEAQ-I
Emerging Markets						
Argentina	4	6%	3	1	-	-
Chile	18	26%	16	1	1	-
India	20	29%			20	-
South Korea	3	4%	2	-		1
Mexico	14	20%	6	-	3	5
Peru	1	1%	-	-	-	1
Philippines	1	1%	1	-	-	-
Portugal	1	1%	1	-	-	-
Taiwan	7	10%	-	-	7	-
Turkey	1	1%	-	-	1	-
All EM	70	100%	29	2	32	7
Mature Markets						
France	15	23%	2	-	12	1
Germany	10	15%	1	-	9	-
Italy	13	20%	-	-	13	-
Spain	12	18%	-	-	12	-
UK	15	23%	10	5	-	-
All MM	65	100%	13	5	46	1

CHAPTER 6.

FACTORS IN RETURNS: EVIDENCE FROM EMERGING MARKETS' STOCKS

Chapter 2 has documented the low correlation of returns within emerging markets and with mature markets. In this essay, I try to identify the important factors in the cross-section of stock returns that are behind those correlations. By comparing the results with the previous findings for mature markets, I am able to state not only whether the emerging markets as a group elect the same risk factors, but also whether emerging and mature markets share a similar set of pricing factors.

This study is within those empirical studies that measure integration of capital markets by looking at the commonality of important factors in explaining the cross-section of stock returns. As has been highlighted, high correlation or commonality of factors may reflect only a close cash flow structure of the firms in these stock markets. Further, this perspective of study completely ignores any formal or informal barriers that may segment the markets. Even if markets have similar pricing rules, risk premia may be different, reflecting different evaluations of risk or simply that these markets' business cycles do not move in tandem. The results that emerge from this study shed some light on the degree of integration of these markets.

This study is important because it provides new evidence based on extensive emerging markets' data and because it has important implications for the benefits of international diversification. If pricing factors are different, this guarantees that the benefits of international diversification are likely to prevail and this is independent of whether that results from differential cash flow structures or from segmented capital markets.

The outline of the essay is as follows. Section 1 discusses further the issues here researched. Section 2 discusses the alternative explanations that have been suggested to account for the low correlation of returns. Section 3 describes the data. The empirical analysis is divided into two parts. First, in section 4, I investigate the role of country and industry factors. In section 5, and building from the results in the previous section, I test the role of a set of factors in the cross-section of stock returns. In both sections, I define the empirical methodology, present the main findings and discuss the implications of the results. Section 6 provides a summary of the findings and section 7 concludes.

6.1 INTRODUCTION

Cross-country correlations of aggregate returns are low. Several interesting related questions arise:

- Is there a common variation in returns across emerging markets? Or is it limited to between-region variation?

- Why is the correlation of aggregate returns between emerging markets and mature markets so low?

- During the last decade, we have observed an increasing globalisation of the economies of these countries and liberalisation of their capital markets. Was this reflected in increasing co-variation in returns?

Evidence shows that emerging markets' returns tend to be relatively uncorrelated with each other and that a strong national market force seems to dominate industry and other stock-specific influences. Furthermore, there is only weak evidence supporting increasing cross-market correlation of returns in the last fifteen years.

Previous literature has looked at why cross-country correlations of returns are low. The discussion of this issue is not settled. Some studies claim that the low correlations between countries result from the diverse industrial structures in each country that are mirrored by different industrial composition of their stock market indices. As industries are imperfectly correlated, equity markets with different industry composition will also be imperfectly correlated. Roll (1992) claims that industrial factors play a determinant role but Heston and Rouwenhorst (1994) show that the influence of pure industry factors is very small. They provide evidence supporting the importance of country specific components of return variation that could be associated to local monetary and fiscal policies, differences in institutional and legal regimes and regional economic shocks and find that industry specific factors only explain a very small part of the variance of a country return index.

The studies reviewed in chapter 3 established that there is commonality in important factors across the major developed markets. Researchers have found an international size effect, an exchange risk factor and significance for APT factors identified by factor analysis. While some early studies had found some significance for macroeconomic factors, the more recent evidence is ambiguous about the power of these factors to explain levels or changes in cross-country covariances. Global factors are important but there is a lot of debate about their relative importance vis-à-vis local factors. Results are also mixed regarding the equality of risk premia across markets. Finally, the previous literature highlights the importance of factors that impact cash flows as well as those that influence the market risk premium.

Contrary to what happens with the mature markets, little is known about the main factors that drive the structure of returns for emerging markets.[160] As documented in chapter 3, a lot of studies show that the correlation of returns between emerging markets and mature markets is low, and that portfolio diversification into emerging markets would have provided increased returns and lower risks. Yet the literature has not examined whether those results are driven by different industrial compositions of the market indices, or by differential economic and technological development, or by the existence of formal or informal barriers to foreign investors. Two recent studies look at the evidence from emerging markets: Fama and French (1998) and Rouwenhorst (1998) show that the factors that drive cross-sectional differences in expected stock returns in emerging markets are qualitatively similar to those that have been found in developed markets: size, book-to-market, earnings-price and momentum.

In this chapter, I first re-evaluate the importance of industry and country specific effects in explaining the structure of returns. I then investigate the role of a battery of *a priori* specified factors in each market and assess whether those factors are common to the universe of emerging markets. In addition, I compare the main determinants for emerging markets' stocks to those found for the major stock markets in the world.

6.2 UNDERSTANDING THE CORRELATION OF RETURNS

In section 2.5 I have studied the correlation of returns within emerging markets and with mature markets, in detail. I showed that:

- correlation of returns across countries is low, and even lower for emerging markets and between these and mature markets.
- correlation coefficients do not seem to be stable but there is only weak evidence supporting an increasing trend.
- there is a downward bias in weekly contemporaneous correlations resulting for non-synchronous trading (time differences across markets) and lags in information transmission. Still, after adjusting for these, cross-markets correlations remain low.

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160 Exceptions are Divecha, Drach and Stefek (1992), Claessens, Dasgupta and Glen (1995) and recently, Bekaert, Erb, Harvey and Viskanta (1997), Fama and French (1998) and Rouwenhorst (1998).

Table 6.1 here below shows the correlation coefficients of weekly returns for the IFC emerging markets' indices and with the FT/S&P-A World index for the period from January 1990 to December 1996.

The average weekly dollar return pair-wise correlation for 26 emerging markets is 0.07 and can be found in the range [-0.15, 0.52].[161] There seems to be present some regional effect but not as strong as one would expect given the increasing economic links in some geographical areas. Within mature markets, the average weekly correlation is 0.43.[162] The average correlation with the World index is 0.14 and the coefficients are in the range [-0.13, 0.45]. For mature markets, the average correlation with the World index is 0.62 and correlations vary between 0.40 and 0.94.

Why are these cross-markets correlations so low?

6.2.1 Industrial Composition of Market Indices

The first explanation says that cross-market correlations are low because of the way market indices are constructed. Given that the choice of the market indices' constituents is usually based on some criteria such as market capitalisation or value traded, it turns out that some indices are concentrated in a few firms. From 1992 to 1996, the IFC Global indices represented between 40% and 70% of the underlying market capitalisations. However, this coverage drops to between 2% and 50% if we look at the number of firms. Thus, it is true that for some markets, IFC indices focus on some large firms and therefore concentrate on a few sectors. It should be reminded, however, that one of the IFC criteria to select stocks to integrate its indices, is industrial comprehensiveness. On the other hand, the fact that indices are concentrated on large stocks does not mean that correlations would be higher if all stocks were included. On the contrary, increasing the number of firms would lead to increasing the number of small stocks that usually carry more idiosyncratic risk, and it is likely that this enlargement would result in even lower correlations.

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161 Heston and Rouwenhorst (1994) report an average sample correlation of monthly returns of 0.41 for twelve European markets over the period 1978-1982.

162 I study the following mature markets: France, Germany, Italy, Japan, UK and USA. I look at FT/S&P-A indices.

Table 6.1 - Market Indices' Correlations

This table shows the correlation between US $ total returns' indices (weekly data, January 1990 to December 1996). Markets listed above China have complete series. The sample data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. FT&SP-A indices were obtained from Datastream.

	Mean	St.Dev	Comp	Arg	Bra	Chi	Col	Gre	Ind	Ind	Jord	Kor	Mal	Mex	Phi	Por	Tai	Tha	Tur	Ven	Chi	Hun	Pak	Per	Pol	SAf	Sri	Nig	Zim
Composite	0.0006	0.0224	1.00																										
Argentina	0.0047	0.0678	0.19	1.00																									
Brazil	0.0030	0.0758	0.40	0.15	1.00																								
Chile	0.0045	0.0296	0.25	0.17	0.19	1.00																							
Colombia	0.0058	0.0387	0.10	0.04	0.09	0.02	1.00																						
Greece	0.0013	0.0412	0.16	0.02	0.08	0.09	0.09	1.00																					
India	0.0010	0.0433	0.10	0.01	0.01	0.00	0.01	0.08	1.00																				
Indonesia	0.0007	0.0325	0.36	0.04	0.09	0.06	0.02	0.12	0.09	1.00																			
Jordan	0.0015	0.0217	0.14	0.05	0.00	-0.02	0.05	0.05	0.05	0.05	1.00																		
Korea	-0.0017	0.0339	0.37	0.06	0.01	0.11	-0.07	-0.06	0.00	0.06	0.05	1.00																	
Malaysia	0.0025	0.0292	0.49	0.00	0.06	0.04	0.02	0.17	0.05	0.38	0.12	0.18	1.00																
Mexico	0.0024	0.0410	0.44	0.31	0.24	0.21	0.02	0.09	-0.03	0.10	-0.02	0.13	0.21	1.00															
Phil	0.0020	0.0366	0.40	0.09	0.06	0.12	0.11	0.14	0.01	0.37	0.05	0.01	0.41	0.21	1.00														
Portugal	0.0005	0.0248	0.34	0.08	0.20	0.11	0.12	0.38	0.07	0.09	0.08	0.10	0.27	0.16	0.18	1.00													
Taiwan	-0.0008	0.0531	0.74	0.00	0.08	0.08	0.06	0.08	-0.05	0.14	0.14	0.09	0.23	0.14	0.28	0.16	1.00												
Thailand	0.0010	0.0422	0.48	0.12	0.10	0.07	0.08	0.12	0.10	0.30	0.17	0.16	0.52	0.17	0.34	0.28	0.22	1.00											
Turkey	-0.0013	0.0776	0.20	-0.04	0.07	-0.01	0.10	0.23	0.07	0.12	0.09	-0.01	0.17	-0.01	0.17	0.17	0.10	0.16	1.00										
Venezuela	0.0053	0.0668	-0.06	0.07	-0.04	-0.02	0.03	-0.05	0.03	-0.04	-0.02	-0.01	-0.07	-0.01	-0.03	0.00	-0.08	-0.02	0.07	1.00									
China	0.0002	0.0746	0.19	0.07	0.15	0.06	0.02	0.15	0.13	0.16	0.00	0.04	0.15	0.05	0.01	0.11	0.00	0.09	-0.01	0.04	1.00								
Hungary	0.0020	0.0369	0.15	0.15	0.14	0.22	0.12	0.17	0.15	0.07	0.00	0.06	0.00	0.12	0.09	0.21	-0.10	0.04	0.01	0.05	-0.03	1.00							
Pakistan	0.0020	0.0344	0.08	-0.02	-0.01	-0.03	0.16	0.06	-0.03	0.09	0.05	-0.02	0.07	0.04	0.13	0.06	0.02	0.10	0.10	0.08	-0.04	0.00	1.00						
Peru	0.0041	0.0422	0.36	0.43	0.28	0.38	0.12	0.01	-0.04	0.10	0.03	0.11	0.03	0.31	0.08	0.09	0.11	0.15	0.06	0.09	0.06	0.18	-0.02	1.00					
Poland	0.0099	0.0800	0.13	0.12	0.08	0.01	0.09	0.08	-0.04	0.15	0.14	-0.01	-0.01	0.14	0.01	0.18	0.00	0.15	0.05	0.00	-0.01	0.20	0.13	0.00	1.00				
SAfrica	0.0040	0.0316	0.30	0.22	0.05	0.20	-0.09	0.21	0.00	0.13	0.11	0.24	0.23	0.06	0.12	0.14	0.08	0.16	0.11	0.10	0.08	0.14	0.14	0.15	0.14	1.00			
Sri Lanka	-0.0005	0.0341	-0.01	-0.05	-0.09	-0.02	0.11	0.03	0.04	0.00	0.00	0.05	-0.02	-0.07	-0.01	0.11	-0.01	0.05	0.08	0.03	0.02	0.18	0.17	-0.03	0.15	-0.12	1.00		
Nigeria	0.0064	0.1088	0.01	-0.15	0.16	0.08	0.05	0.03	0.08	0.02	0.00	0.12	-0.17	-0.10	-0.13	-0.08	0.00	-0.11	0.01	-0.01	-0.04	0.06	0.03	0.10	0.01	0.01	0.05	1.00	
Zimbabwe	0.0097	0.0338	0.11	0.06	0.02	0.07	0.16	-0.07	0.13	0.11	-0.02	0.05	0.12	0.11	0.15	0.08	-0.10	0.07	-0.15	0.01	-0.04	0.15	0.02	0.15	0.23	0.07	0.22	-0.06	1.00
World	0.0014	0.0163	0.45	0.15	0.20	0.06	0.03	0.26	-0.04	0.05	0.09	0.21	0.45	0.30	0.22	0.43	0.27	0.32	0.17	-0.04	-0.01	0.17	0.02	0.26	0.08	0.25	-0.06	-0.13	0.05

The previous argument is related to another position: cross-market correlations are low because they reflect the differential industrial composition of the market indices. On the assumption that firms within a sector are reasonably correlated and that industry cross-correlation is imperfect, then markets with different industrial structures should correlate imperfectly.

I have first investigated how different the industrial compositions of market indices are. Tables 6.2 and 6.3 show the industrial and geographical composition of the IFC indices at an individual market/industry level.[163] In 1996, we can see that for 20 out of the 26 markets, the indices were concentrated in two or three sectors (out of the nine broad sectors) that account for more than 80% of the total market capitalisation. The three dominant sectors are: Manufacturing (present in all markets); Transportation, Communication and Utilities (in 21 markets) and Finance, Insurance and Real Estate (in 20 markets). Similarly, when I looked at the industry indices: some sectors are completely dominated by one market and there are several industry indices that do not have constituents from all markets. This is the case, for example, of Agriculture, Forestry and Fishing which Malaysia dominates with 68% of the total market capitalisation and 39% of the total number of firms.

I have also compared the structure of these indices with the one observed for the European markets as reported in Heston and Rouwenhorst (1994). For the twelve European markets they cover, the Finance sector is dominant, followed by either one of the two sectors: Consumer Goods or Basic Industries. For the industry indices, the UK firms dominate both the Energy and the Utility sectors. Yet, except for these two sectors, the remaining industry indices include firms from all of the twelve markets.

These figures confirm that the industrial composition of market indices are diverse. Yet the relation between the diverse industrial structures and the low correlation of returns is not obvious. Similarly the comparison of the industrial structure of the emerging markets' indices with the one of European markets is not very revealing. The broad industry classification seems to shadow the analysis.[164]

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[163] Please refer to section 2.4 for a detailed discussion of these figures.

[164] Further, there is no equivalence between the SIC classification and the FTA classification used by Heston and Rouwenhorst (1994).

Table 6.2 - Industry Composition of IFC Global Market Indices

This table shows the industrial composition of the IFCG market indices by the end of 1996. Panel I refers to the number of firms in each market in each sector. Panel II gives the percentage of each sector in the respective index total capitalisation.

I. Number of Firms

	Agricult	Mining	Construct	Manufact	Trans,Ut	Trade	Fi,Ins,RE	Services	Other	IFCComp
Argentina	0	3	1	19	7	0	3	0	2	35
Brazil	2	7	0	52	14	2	6	0	3	86
Chile	2	2	0	20	15	0	6	1	1	47
China	2	1	5	100	19	14	20	5	14	180
Colombia	0	1	0	13	1	3	9	0	0	27
Greece	2	1	11	25	3	5	9	2	0	58
Hungary	0	1	0	9	1	3	2	1	1	18
India	2	2	0	107	9	0	9	2	0	131
Indonesia	3	2	0	25	4	2	11	1	2	50
Jordan	1	1	0	26	2	0	18	3	0	51
Korea	0	0	11	82	8	13	46	2	0	162
Malaysia	13	3	13	39	9	4	28	6	33	148
Mexico	0	2	0	26	7	11	10	3	10	76
Nigeria	0	0	0	19	0	8	7	0	1	35
Pakistan	0	0	0	39	9	1	15	0	0	64
Peru	0	11	0	19	1	1	4	0	0	36
Philippines	0	4	1	9	8	0	22	0	8	52
Poland	0	0	3	18	0	4	6	0	0	31
Portugal	1	0	3	14	1	1	9	1	2	32
S.Africa	0	21	0	16	0	6	6	1	13	63
Sri Lanka	3	0	1	20	0	4	14	2	3	47
Taiwan	1	1	7	58	3	1	17	2	0	90
Thailand	1	4	5	19	9	5	42	1	2	88
Turkey	0	0	0	37	4	3	11	1	2	58
Venezuela	0	0	0	11	2	0	4	0	1	18
Zimbabwe	0	5	0	9	0	1	3	1	3	22
Composite	33	72	68	831	136	92	337	35	101	1705

Source: IFC Emerging Markets Factbooks, International Finance Corporation, World Bank.

Table 6.2 - Industry Composition of IFC Global Market Indices (cont.)

II. Market Capitalisation Weights (%)

	Agricult	Mining	Construct	Manufact	Trans,Util	Trade	Fin,Ins,RE	Services	Other
Argentina	0%	45%	0%	20%	19%	0%	13%	0%	0%
Brazil	0%	7%	0%	33%	44%	0%	14%	0%	0%
Chile	1%	2%	0%	42%	47%	0%	5%	0%	3%
China	1%	0%	2%	48%	17%	5%	19%	1%	7%
Colombia	0%	0%	0%	42%	2%	6%	49%	0%	0%
Greece	1%	1%	7%	38%	8%	4%	40%	2%	0%
Hungary	0%	19%	0%	52%	5%	2%	15%	6%	1%
India	3%	0%	0%	78%	9%	0%	8%	3%	0%
Indonesia	1%	1%	0%	53%	21%	1%	14%	1%	8%
Jordan	0%	4%	0%	21%	2%	0%	70%	4%	0%
Korea	0%	0%	5%	44%	21%	5%	25%	1%	0%
Malaysia	5%	1%	7%	15%	19%	1%	23%	7%	23%
Mexico	0%	4%	3%	35%	23%	9%	10%	0%	15%
Nigeria	0%	0%	0%	73%	0%	19%	9%	0%	2%
Pakistan	0%	0%	0%	59%	32%	0%	9%	0%	0%
Peru	0%	20%	0%	17%	37%	1%	25%	0%	0%
Philippines	0%	1%	0%	19%	17%	0%	49%	0%	14%
Poland	0%	0%	5%	37%	0%	15%	44%	0%	0%
Portugal	0%	0%	2%	23%	16%	2%	47%	0%	9%
S.Africa	0%	26%	0%	25%	0%	3%	17%	0%	28%
Sri Lanka	2%	0%	1%	26%	0%	3%	46%	5%	17%
Taiwan	1%	3%	4%	43%	4%	0%	45%	0%	0%
Thailand	1%	10%	6%	15%	18%	4%	45%	1%	0%
Turkey	0%	0%	0%	37%	9%	5%	36%	1%	12%
Venezuela	0%	0%	0%	34%	40%	0%	26%	0%	0%
Zimbabwe	0%	10%	0%	27%	0%	5%	50%	3%	5%
Composite	1%	6%	3%	34%	18%	2%	25%	2%	9%

Source: IFC Emerging Markets Factbooks, International Finance Corporation, World Bank.

I have examined whether it was possible to establish a simple relation between the diversity in industrial structures of any two market indices and the correlation of returns. I find that the more two indices differ, the lower the pair-wise correlations and the average difference is statistically significant.[165]

The comparison of the structure of the indices for Emerging and European markets, indicates, *a priori*, that an investment strategy of investing domestically in emerging markets would provide lower diversification benefits because they are more concentrated; and the diversification potential for investing internationally within one sector should also be more limited. Table 6.4 shows the summary statistics for the industry indices. I only present here the results of the indices for the nine SIC one-digit sectors because the statistics at a two-digit level are difficult to analyse, given that the sample covers more than sixty groupings. Standard deviations of the industry indices are not very far from the

[165] To measure the diversity I have used a simple sum of the absolute differences between the weights of each industry in the market capitalisation of the indices by the end of 1996.

IFC Composite Index, suggesting that there are important geographical diversification benefits regardless of the sector elected for diversification.

Table 6.3 - Geographical Composition of IFC Global Industry Indices
This table shows the industrial composition of the IFCG market indices by the end of 1996. The figures are the percentage of each market in the respective sector index aggregate capitalisation.

Market Capitalisation Weights (%)

	Agricult	Mining	Construct	Manufact	Tranp,Ut	Trade	Fi,Ins,RE	Services	Other	Comp.
Argentina	0%	20%	0%	2%	3%	0%	1%	0%	1%	3%
Brazil	2%	11%	0%	9%	22%	2%	5%	0%	3%	9%
Chile	1%	1%	0%	4%	9%	0%	1%	1%	1%	3%
China	3%	0%	2%	5%	3%	8%	3%	3%	3%	4%
Colombia	0%	0%	0%	1%	0%	2%	2%	0%	0%	1%
Greece	1%	0%	2%	1%	0%	1%	2%	1%	0%	1%
Hungary	0%	1%	0%	1%	0%	0%	0%	1%	0%	0%
India	11%	0%	0%	11%	2%	0%	1%	8%	0%	5%
Indonesia	3%	1%	0%	7%	6%	3%	3%	4%	4%	5%
Jordan	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
Korea	0%	0%	12%	9%	8%	14%	7%	3%	0%	7%
Malaysia	68%	2%	40%	7%	17%	7%	15%	68%	41%	16%
Mexico	0%	5%	7%	7%	9%	28%	3%	1%	11%	7%
Nigeria	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Pakistan	0%	0%	0%	1%	1	0%	0%	0%	0%	0%
Peru	0%	3%	0%	0%	2%	0%	1%	0%	0%	1%
Philippines	0%	0%	0%	3%	4%	0%	9%	0%	7%	5%
Poland	0%	0%	1%	1%	0%	3%	1%	0%	0%	1%
Portugal	0%	0%	1%	1%	1%	2%	3%	0%	2%	2%
S.Africa	0%	38%	0%	6%	0%	12%	6%	2%	25%	8%
Sri Lanka	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Taiwan	8%	8%	21%	18%	3%	2%	25%	3%	0%	15%
Thailand	3%	10%	13%	2%	6%	9%	10%	3%	0%	6%
Turkey	0%	0%	0%	2%	1%	4%	2%	1%	2%	2%
Venezuela	0%	0%	0%	1%	2%	0%	1%	0%	0%	1%
Zimbabwe	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%

Source: IFC Emerging Markets Factbooks, International Finance Corporation, World Bank.

To find out more about the pertinence of this position, I looked at the validity of its assumptions.

First, I looked at the correlation of returns between portfolios of stocks in the same industry across markets. Overall, I observed that cross-country correlation of returns within a particular industry are low, with coefficients of the magnitude of the correlation matrix of market index returns. Cross-country returns within a particular industry never correlate more than the market indices. On the contrary, for some industries, those correlations are even lower, suggesting that it may be better to diversify across countries within a particular industry (for example, Agriculture or Services) than to adopt a traditional geographical market index diversification. Two reasons could justify this low co-movement: industries are not global or the broad sector classification (SIC one-digit) shadows the true relations by aggregating many industries that bear no relation with each other. Some industries are expected to be more global (for example, paper) than others (for example, real estate) but the correlations here are all low, whatever the industry considered.[166] In summary, for the particular case of emerging markets, there is no evidence that firms from the same industry are highly correlated across markets.

166 The underlying assumption when one computes an industry index is that markets are integrated. If markets were not integrated then international industry factors would mean very little and industry effects could no longer be considered as common (global) factors.

Table 6.4 - Industry Indices' Correlations

This table shows the correlation coefficients between IFC industry indices returns (weekly data for the period of 1990 to 1996). The sample data were obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank.

	Mean	St.Dev.	Agricult	Mining	Constr	Manuf	TranpUt	Trade	Fi,In,RE	Services	Other
Agriculture	0.0000	0.0272	1.00								
Mining	-0.0009	0.0374	0.41	1.00							
Construction	-0.0016	0.0293	0.47	0.40	1.00						
Manufacturing	-0.0017	0.0206	0.60	0.56	0.56	1.00					
Transport, Utilities	0.0012	0.0233	0.45	0.48	0.49	0.66	1.00				
Wholesale Retail Trade	-0.0011	0.0248	0.41	0.41	0.68	0.66	0.53	1.00			
Finance, Insurance, RE	-0.0017	0.0315	0.62	0.52	0.75	0.73	0.62	0.72	1.00		
Services	0.0007	0.0300	0.59	0.45	0.60	0.58	0.43	0.53	0.73	1.00	
Other	0.0005	0.0273	0.68	0.48	0.59	0.62	0.59	0.54	0.71	0.69	1.00

Second, I looked at the cross-industry correlations at an emerging markets aggregate level.[167] Table 6.4 shows that cross-industry correlations are always higher than cross-markets correlations. The average weekly dollar return correlation across sectors is 0.54 against the 0.07 obtained across markets.[168,169] To evaluate properly the importance of industry effects, one has to adjust first for the geographical composition in each industry index. On an individual country basis, that is free from any potential geographical bias, I find that the cross-industry correlations are also very high, suggesting that a common national factor is driving the returns.[170] This preliminary result implies that strategies recommending geographical diversification either by investing on aggregate indices or within a single sector leave an investor better off than strategies that bet on diversification across sectors within only one market. Thus, the second piece of evidence here is that cross-industry correlations are high.

Griffin and Karolyi (1998) suggest than one should look at a narrower industry classification so that the information about the cross-sectional variation of returns due to industry effects is not lost. When I use a two-digit SIC industry classification (sixty categories) against one-digit (nine categories), the average cross-industry correlation across industries drops from 0.54 to 0.18. This result can be misleading given that some classifications have very few constituents.[171]

The industrial structure of the indices has changed over the last five years and the main reason for this change is that, over time, more and more firms became public and joined the indices. If industrial composition of the indices were driving the correlations, then changes in industrial composition, should be followed by changes in correlations between the indices. Further, correlations should keep on changing until emerging markets become mature and the entry or exit of new firms will no longer significantly affect the indices. Given the dynamics of correlation in recent years (discussed in section 2.5), it seems unlikely that correlations could be mainly driven by that change.

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[167] These are home-made equally and value-weighted portfolios based on the stocks in my sample.

[168] Heston and Rouwenhorst (1994) report average sample correlations across broad industry sectors of 0.71.

[169] Meric and Meric (1989) also find that international industry portfolios returns, based on 17 countries, are more closely correlated than national stock markets returns.

[170] Statistics and correlation matrices of returns across countries within a particular sector and across sectors within a particular market were not included here due to space limitations but are available under request.

[171] 17 out of the 60 two-digit SIC industry portfolios in my sample comprise five or less firms.

One aspect has to be stressed here. Even if a market index reflects the stock market industrial structure, that index may not reflect the country industrial structure. Market capitalisation can represent as little as 10% of GNP for some of these developing countries. Especially for those countries whose stock markets have recently emerged following a process of privatisation, the firms that are listed on the stock exchange are not always a representative sample of the industrial structure of that country. One would expect that the stock markets in countries that have similar underlying industrial structures move together; one may not observe that, simply because only a subset of firms are publicly traded on the stock market. Arguing that correlations reflect the true underlying economic structures is thus a different argument and leads us to the third suggested explanation.

6.2.2 Real Economic Integration

A simple discounted cash flow model can be used to identify the links between macroeconomic variables and stock returns. Economic variables may influence stock returns through the underlying cash flows or the discount rates. If the relevant economic forces are international then they should simultaneously affect all equity returns across the world (global shocks).[172] However, if the relevant economic forces are mainly domestic, then the correlation of returns across countries will only be high if business cycles move in tandem. Previous research has shown that correlation is high when both countries are in a common recession but it is low when they are recovering or when business cycles are out of phase (see Bekaert, Erb, Harvey and Viskanta 1997 or Solnik, Boucrelle and Le Fur 1996).[173]

In recent years, most economies became more open and integrated especially at a regional level (through economic and monetary unions). Given the globalisation of the economy and of some industries, in particular, we would expect that, more and more, shocks would be global, i.e., that they affect the world economy globally and every country business cycle. If real integration is the main determinant of correlations, then we should be already observing higher correlations, especially at a regional level, and they

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[172] In a fully integrated economic world, a common shock would have the same impact on economic growth and thus on profits and dividends in any country. This argument ignores the effects of asynchronous business cycles.

[173] Ammer and Mei (1996) show that the correlation between two countries' stock returns is substantially greater than the correlation of measures of real output growth. Dumas, Harvey and Ruiz (1998) get a similar result.

should rise even more in the future. Until now, this has not happened. As discussed in chapter 2, the evidence supporting a rise in correlations is weak.

6.2.3 INTEGRATION OF CAPITAL MARKETS

The last explanation is motivated by the international asset pricing theory. Markets are segmented when, across countries, the rule to price and/or the price of risk are different. Markets can be segmented because of formal or informal barriers that preclude free investment world-wide. Even if the underlying economics are linked, returns may not move closely because stock prices are established in separate worlds. This explanation does not exclude the validity of the previous arguments but focuses on financial assets as a separate and additional cause for the level of correlation of returns across countries.[174] Previous research has shown that correlation between stock returns increases when markets become more integrated as barriers fall. Foreign investors influence leads to common priced factors and common risk premiums. A recent paper by Bekaert and Harvey (1998) finds weak evidence that the liberalisation of stock markets, the introduction of country funds, and the dual listing of local shares on international exchanges impact positively on the correlation of returns between those markets and the world market.

This section has discussed the three main explanations that have been proposed to understand the low cross-market correlations. A first examination of the three hypotheses is not conclusive. It is true that market indices reflect different industrial compositions. Yet industry indices are more closely correlated than market indices, and cross-market correlations within a particular industry are low. These two pieces of evidence contradict the explanation that claims that low correlations stem from differences in the industrial composition of market indices. The increase in correlations in recent years is also not also such as economic integration and the fall of investment barriers would suggest. The analysis that follows provides further evidence on the validity of these arguments.

6.3 DATA

6.3.1 SOURCES

The main source of my data is the Emerging Markets Data Base (EMDB). I use two modules: the stock series and the index series, on a weekly basis, from the beginning of 1990 to the end of 1996.

As documented in chapter 2, high frequency data could introduce a downwards bias in correlations because of time differences between markets and non-synchronous trading. I use weekly data because of sample size and data availability. I use Friday to Friday total continuous (log) returns. I have computed adjusted prices applying the capital adjustment factor - given in the data set - to current prices. I have cross-checked the adjustment factor with the information given for capital changes. In case of misfit, I have re-computed the adjustment ratio. I follow the IFC methodology to assure that the total return index for individual stocks is comparable to the aggregate data return index.[175] Dividends are reinvested to purchase additional units of equity at the closing price applied on the ex-dividend date. I use gross dividends and thus ignore taxes or re-investment charges.

My analysis focuses on US returns but I dedicate one separate section to local returns, when I investigate the effects associated with exchange rates. Exchange rates are defined as the number of units per US dollar and are also given in EMDB.

To compute risk exposures, I use the home-made value-weighted indices measured in US dollars for emerging markets. These are almost perfectly correlated with the IFC indices but using home-made value-weighted indices I avoid comparing log returns with the log of averages of discrete returns. In addition I use the World market index from FT/S&P - Actuaries' that is also a value-weighted index.

The ratios book-to-market, earnings to price, cash-flow to price and dividend yield are all from EMDB. In particular, EMDB reports the price-to-book value and the price-to-earnings ratios. These are computed as the closing price divided, respectively, by the last reported net worth and 12 month earnings per share. Dividend yields series are, as most recently available, dividend yields brought forward for one year.

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[174] This does not mean that the reverse is true. Two markets may be highly correlated - as is to be expected if there is real economic integration - and yet their financial markets may still be segmented.

[175] See "The IFC Indices - Methodology, Definitions and Practices" (1996) for details on the computation.

Data on interest rates (commercial lending prime rate), the consumer price index, the industrial production index and changes in exports (in US dollars), for each of the home markets, are IMF series (International Financial Statistics database). These series are available on a monthly basis and were obtained from Datastream.[176]

Firms are assigned to one of the SIC broad industry categories (one and two digits) as in the IFC database. Previous research has used FT Actuaries sectors (see Roll, 1992) or the Dow Jones industry (see Griffin and Karolyi, 1998) classifications.

6.3.2 Sample Description

My sample excludes some firms that had missing or meaningless data for prices. I have also excluded those firms originating from emerging markets whose coverage started after 1993. Finally, I have also excluded all firms that seemed to have an important thin trading problem: I have removed all the firms that did not show any price changes (zero returns) for at least ten consecutive weeks.

Overall there are between 629 stocks in 1990 and 1702 stocks in 1996 from 26 emerging markets.[177,178] These numbers are very close to the aggregate number of IFC components for these markets. For example, in 1996, the IFC composite aggregated 1705 constituents for the markets analysed in this study, against the 1702 in my sample. I did not establish further a minimum number of weeks for a firm to be included, therefore, firms in my sample can have a partial or complete return history.[179]

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176 Conversion to weekly data assumed a step function for interest rates and spline approximations to generate the other three series (consumer price changes, industrial production changes and change in exports).

177 Grinold, Ruff and Stefek (1989) use monthly data from 1983 to 1988 for 24 countries in a total of 2454 securities including Malaysia (36), Mexico (13) and South Africa (69). Heston and Rowenhorst (1994) use monthly data from 1978 to 1992, covering 829 firms in 12 European countries. Griffin and Karolyi (1998) use weekly data from 25 countries covering 2400 stocks over the period December 1991 to April 1995. This latter sample includes stocks from 4 emerging markets: Mexico (31); Thailand (70); Indonesia (32) and Malaysia (76).

178 My sample ignores ownership restrictions and includes all classes of shares. In terms of equally-weighted portfolios, this necessary results in giving more weight to those stocks that have more than one class of shares.

179 Please recall that EMDB coverage includes, from 1990, individual stocks' weekly data for Argentina, Brazil, Chile, Colombia, Greece, India, Indonesia, Jordan, Korea, Malaysia, Mexico, Philippines, Portugal, Taiwan, Thailand, Turkey, Venezuela. Later Pakistan (from 1992), China, Hungary, Nigeria, Peru, Poland, Sri Lanka, South Africa and Zimbabwe (from 1993) were added.

The sample period consists of 364 weeks and includes the eight months of the Kuwait invasion (starting August 2, 1990) and the Mexican crisis in December 1993.[180] Further, I did not exclude the January weeks.

For the cross-sectional regressions, the analysis is restricted to 21 markets. I have established a minimum of fifteen firms in the cross-section. When there are lagged variables among the explanatory variables, the cross-section of returns is analysed over shorter time periods (less than 364 weeks).

Please refer to section 2.5 for a detailed discussion of the simple statistics for both emerging markets' aggregate data and individual stocks.

6.4 COUNTRY AND INDUSTRY FACTORS

Below I re-examine the influence of the stock market indices' industrial composition on the cross-sectional variance and correlation structure of country index returns for 26 emerging markets. After describing my analysis framework, I report the evidence regarding the role of industrial factors in explaining stock returns. I check the robustness of my results within regions and for a finer industry partition. Finally, I discuss the implications of my results for portfolio allocation strategies.

6.4.1 ANALYTICAL FRAMEWORK

The first step is to obtain "pure" country and "pure" industry factors. Many studies proxy these factors with aggregate indices but, as discussed above, these indices are not adjusted for the differential industrial composition across markets (or for the differential geographical composition across industries). I decompose individual stock returns into industry and country components using the methodology suggested by Grinold, Rudd and Stefek (1989) and used by Heston and Rouwenhorst (1994). I run a cross-sectional regression of individual security returns on industry and country dummies for each month, and obtain a time series of estimated industry and country effects. I then measure how these effects account for the variation of emerging markets' aggregate returns.

I define the following return generating model:

More recently Egypt, Morocco, Russia, Czech Republic, amongst others, were also added. The aggregate data are approximately available for the same periods.

[180] I have checked the influence of these observations by repeating the analysis on the series excluding the "crises" observations. My results are robust to this procedure.

$$R_{it} = \alpha_t + \beta_{jt} + \gamma_{kt} + e_{it} \tag{6-1}$$

where R_{it} is the return for the firm i in period t that belongs to industry j and country k. α_t is a base or global level return in period t, β_{jt} is the industry effect, γ_{kt} the country effect and e_{it} is a firm specific disturbance.[181]

A stock is assumed to have either zero or unit exposure on a set of dummy variables indicating country or industry affiliation. The cross-sectional regression, for each period, can be stated as follows:

$$R_i = \alpha + \sum_{j=1}^{J} \beta_j I_{ij} + \sum_{k=1}^{K} \gamma_k C_{ik} + e_i \tag{6-2}$$

where I_{ij} is a dummy variable that equals to one if the security belongs to industry j or zero otherwise and C_{ik} the country dummy that equals to one if the security belongs to country k or zero otherwise. J is the number of industry categories and K is the number of emerging markets.

To overcome multicollinearity between the regressors, the effects are measured relative to the average firm in the sample, instead of measuring the effect of each country and industry. This is equivalent to measuring industry and country effects relative to the portfolio of emerging markets' firms in the sample. For that, two restrictions have to be imposed:

- the weighted sum of industry dummies coefficients equals to zero, i.e.,

$$\sum_{j=1}^{J} n_j \beta_j = 0 \tag{6-3}$$

where n_j is the number of firms in industry j;

- the weighted sum of country coefficients equals zero, i.e.,

$$\sum_{k=1}^{K} m_k \gamma_k = 0 \tag{6-4}$$

where m_k is the number of firms in country k. Please see Suits (1984) or Kennedy (1985) for more details.

The cross-sectional regression is run for each period in the sample, obtaining a time series of estimates for the industry and country effects.

The estimate of the intercept α gives the return on the equally weighted portfolio of firms in my sample. This portfolio has neither country nor industry effects, as they were

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181 This formulation rules out any interaction between industry and country effects. This interaction could be very important if markets are segmented and consequently industry effects are local in character.

defined above. The estimates of the coefficients of the country dummy variables, γ_k, show the extent to which the behaviour in that market (averaged over all industries) is different from the emerging markets' average. The estimates of the coefficients of the industry dummy variables, β_j, show the extent to which the behaviour in that industry (averaged over all countries) is different from the emerging markets' average.

The sum of the average estimates of α and β_j yields the return on a portfolio that is diversified geographically in industry j. It tells how well industry j did in pure terms. Similarly, the sum of the average estimates of α and γ_k yields the return on a portfolio that is diversified across industries in country k. It tells how well country k did in pure terms.

This estimation procedure allows us thus to reinterpret the individual country/industry indices corrected for industry/geographic composition.[182] The equally-weighted index for any country k can be stated as:

$$R_k^{EW} = \hat{\alpha} + \frac{1}{m_k}\sum_{i=1}^{m_k}\sum_{j=1}^{J}\hat{\beta}_j I_{ij} + \hat{\gamma}_k \tag{6-5}$$

and similarly for the equally-weighted index for any industry j:

$$R_j^{EW} = \hat{\alpha} + \frac{1}{n_j}\sum_{i=1}^{n_j}\sum_{k=1}^{K}\hat{\gamma}_k C_{ik} + \hat{\beta}_j \ . \tag{6-6}$$

For the value-weighted indices, the regression is estimated using weighted least squares, and the restrictions to overcome the perfect multicollinearity problem are:

- the weighted sum of industry coefficients equals zero, i.e.,

$$\sum_{j=1}^{J} w_j \beta_j = 0 \tag{6-7}$$

where w_j is the weight of the market capitalisation of industry j on the aggregate market capitalisation of emerging markets' firms;

- the weighted sum of country coefficients equals zero, i.e.,

$$\sum_{k=1}^{K} v_k \gamma_k = 0 \tag{6-8}$$

where v_k is the weight of the market capitalisation of country k on the aggregate market capitalisation of emerging markets' firms.

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[182] The fact that (6-5) and (6-6) hold exactly results from the OLS assumption that errors are not correlated with the independent (dummy) variables. It directly results from that assumption that the average error in any country or in any industry is zero. And, consequently, the error for the average firm in the sample is also zero.

Under these restrictions, the weighted least square estimate of the regression intercept is now the emerging markets' value-weighted index. As before, industry and country factors are diversified portfolios, in the sense that they have, respectively, the same geographical and industrial composition as the emerging market value-weighted index.

To decompose a value-weighted index for any country k, we now have:

$$R_k^{VW} = \hat{\alpha}^{VW} + \sum_{j=1}^{J}\sum_{i=1}^{m_k} x_{ij}^k \hat{\beta}_j{}^{VW} + \hat{\gamma}_k{}^{VW} \tag{6-9}$$

where x^k_{ij} is the weight of the market capitalisation of firm i in industry j on that market k aggregate capitalisation. For a value-weighted index for any industry j:

$$R_j^{VW} = \hat{\alpha}^{VW} + \frac{1}{n_j}\sum_{k=1}^{K}\sum_{i=1}^{n_j} x_{ik}^j \hat{\gamma}_k{}^{VW} + \hat{\beta}_j{}^{VW} \tag{6-10}$$

where x^j_{ik} is the weight of the market capitalisation of firm i in country k on that industry j aggregate market capitalisation.

6.4.2 EMPIRICAL RESULTS

Country and Industry Effects

Table 6.5 shows the time-series variances of the several components for each of the market/industry equally-weighted index, in excess of the emerging markets' average, as in equations (6-5)/(6-6). That decomposition for the value-weighted (VW) indices, as in equations (6-9)/(6-10), is available upon request. As seen, the variance of an excess return market index can be decomposed into the sum of the effects of its constituent industries and the "pure" country effect. Similarly, the variance of an excess return industry index can be decomposed into the sum of the effects of its constituent markets and the "pure" industry effect.[183]

There are several results of interest. First of all, the country effects account for almost all the variance of market indices' returns. Indeed, the average (median) variance of the sum of the constituent industries' effects is, on average, only 0.7% (0.3%) of the variance of the excess equally (value) weighted (EW) market indices' returns. For the value-weighted (VW) indices, the average (median) ratio is 1.1% (0.9%). For the equally-weighted indices, the ratio has a maximum for the Philippines, 7%, followed by South Africa with 2%. Heston and Rouwenhorst (1994) - HR from here on - found 0.6% and 7% respectively for equally and value-weighted indices.

[183] The effects do not sum to one because country and industry effects are not uncorrelated.

Table 6.5 -Variance Decomposition of Country and Industry (EW) Indices

This table gives the variance of global, country and industry effects for the equally-weighted country and industry indices (weekly data, January 1990 or later to December 1996). Markets listed above China have complete series. Each country index return is decomposed in a common effect plus a country "pure" effect and a sum of the constituent industry effects. Each industry index return is decomposed in a common effect plus an industry "pure" effect and a sum of the constituent country effects. Country and industry effects are the differential effects relative to the emerging markets' average. The ratios give the proportion of the variance of a particular component relative to the variance of the index return, raw or in excess of the emerging markets' average. All returns are measured in US dollars per week.

I. Country Indices

	EM Average		Pure Country*		Sum of Industry Effects**	
Country	Variance	Ratio to Market Index	Variance	Ratio to Market Index in Excess of EM Average	Variance	Ratio to Market Index in Excess of EM Average
Argentina		0.0589	0.0048	0.9969	0.0000	0.0010
Brazil		0.0652	0.0038	0.9998	0.0000	0.0005
Chile		0.3920	0.0009	1.0229	0.0000	0.0152
Colombia		0.2368	0.0014	1.0030	0.0000	0.0011
Greece		0.2107	0.0013	1.0047	0.0000	0.0037
India		0.3059	0.0006	1.0050	0.0000	0.0023
Indonesia		0.1688	0.0017	1.0012	0.0000	0.0050
Jordan		0.5069	0.0007	1.0226	0.0000	0.0043
Korea		0.2561	0.0011	0.9975	0.0000	0.0035
Malaysia		0.2599	0.0008	0.9648	0.0000	0.0117
Mexico		0.1937	0.0014	0.9991	0.0000	0.0018
Philippines		0.2650	0.0009	0.9690	0.0001	0.0657
Portugal		0.4433	0.0006	1.0183	0.0000	0.0055
Taiwan		0.1082	0.0022	1.0026	0.0000	0.0006
Thailand		0.1669	0.0013	0.9934	0.0000	0.0039
Turkey		0.0506	0.0055	1.0045	0.0000	0.0007
Venezuela		0.0757	0.0044	1.0065	0.0000	0.0006
Cross-Country Average (#17)	*0.0003*	*0.2214*	*0.0020*	*1.0007*	*0.0000*	*0.0075*
Cross-Country Median (#17)		*0.2107*	*0.0013*	*1.0026*	*0.0000*	*0.0035*
China		0.0379	0.0045	1.0007	0.0000	0.0003
Hungary		0.1354	0.0016	1.0046	0.0000	0.0039
Pakistan		0.2178	0.0009	1.0018	0.0000	0.0016
Peru		0.1092	0.0018	1.0167	0.0000	0.0087
Poland		0.0337	0.0058	0.9979	0.0000	0.0007
South Africa		0.2154	0.0008	0.9725	0.0000	0.0202
Sri Lanka		0.1797	0.0012	0.9999	0.0000	0.0026
Nigeria		0.0187	0.0117	1.0034	0.0000	0.0004
Zimbabwe		0.1995	0.0012	1.0094	0.0000	0.0057
Cross-Country Average (#26)	*0.0003*	*0.1889*	*0.0024*	*1.0007*	*0.0000*	*0.0066*
Cross-Country Median (#26)		*0.1867*	*0.0013*	*1.0220*	*0.0000*	*0.0031*

* Average return of firms in a country in excess of the emerging markets' average after adjusting for its industrial composition.

** Component of a country index that is due to a differential industrial composition in relation to the emerging markets' average.

Table 6.5 -Variance Decomposition of Country and Industry (EW) Indices (cont.)

II. Industry Indices

	EM Average		Pure Industry*		Sum of Geographical Effects**	
Industry	Variance	Ratio to Industry Index	Variance	Ratio to Industry Index in Excess of EM Average	Variance	Ratio to Industry Index in Excess of EM Average
Agriculture		0.5777	0.0002	0.6018	0.0001	0.4794
Mining		0.4488	0.0003	0.7240	0.0002	0.5191
Construction		0.4585	0.0001	0.4169	0.0002	0.5076
Manufacturing		0.8913	0.0000	0.3247	0.0000	0.6487
Transport, Utilities		0.6232	0.0001	0.6558	0.0001	0.4341
Wholesale, Retail Trade		0.7411	0.0001	0.5893	0.0001	0.4874
Finance, Insurance, RE		0.7986	0.0001	0.5679	0.0000	0.5291
Services		0.4242	0.0002	0.4658	0.0002	0.5286
Other		0.4715	0.0001	0.3013	0.0002	0.6443
Cross-Industry Average	*0.0003*	*0.6039*	*0.0001*	*0.5164*	*0.0001*	*0.5309*
Cross-Industry Median		*0.5777*	*0.0001*	*0.5679*	*0.0001*	*0.5191*

* Average return of firms in an industry in excess of the emerging markets' average after adjusting for its geographical composition.

** Component of an industry index that is due to a differential geographical composition in relation to the emerging markets' average.

The relatively small variability of the industry pure effects compared with the market pure effects explains these results. On average, the variance of pure industry effects is 1.3 (1.9 for VW) percent-squared which is much smaller than the average weekly variance of pure market effects, 24 (22 for VW) percent-squared. This is a ratio of 18 to 1 (12:1 for VW) making clear why pure country effects dominate market indices. HR found pure industry monthly variances of 5.4 and 6.5 percent-squared, respectively for EW and VW industry indices. For the average variance of pure market effects, HR found a monthly 24 percent-squared (both for EW and VW indices).[184]

Second, table 6.5 shows that, on average, the pure industry effects account for 52% (49% for VW) and the median is 57% (47% for VW) of the industry indices variance. In HR, the pure industry effects accounted for a more important part of the variance of the industry indices (91% and 89% for EW and VW indices). My results show that, geographical effects thus account for a more important stake of the industry indices' variation than in previous studies and this stems from larger variances in the returns of emerging markets' indices. The maximum is for the Manufacturing broad sector, 65%. Most of these industry indices could be rich diversification tools for diversifying internationally as a large part of its variation is due to specific country effects.

Third, I looked at the intercept of the cross-sectional regressions over the sample period. The intercept series are, by construction, the emerging markets' equally or value-weighted index with the constituents in sample. The variance of the intercept relative to the total variance of the indices gives an idea of the importance of a common factor among emerging markets. This will be further discussed when I discuss the results by region and within region. The first two columns in table 6.5 document that effect. The common factor variance (0.0003 and 0.0005 respectively for EW and VW indices) accounts, on average, for 19% (37% for VW) of the average weekly index variance (that are 0.0026 and 0.0027, respectively for EW and VW). For equally-weighted indices, this factor has a maximum for Jordan, with 50% and a minimum of 5% for Turkey. These figures suggest that a common factor exists, is important, but small. These numbers are mirrored in the low correlation within emerging markets, highlighted in the previous section. For the industry equally-weighted indices, the common effect accounts for as much as 60% of industry indices variance, reflecting simply, as remarked before, that the variances of industry indices are small. In HR, the intercept variance represented, on average, as much as 73% for the EW market indices and 94% for the EW industry indices.

Table 6.6 gives some statistics on the average fit of the cross-sectional regressions of these estimates. As a whole, the common factor and the country and industry factors account for as much as 38% of the variability of the time-series cross-sectional returns.[185] The median R^2 (adjusted R^2) over the 364 week period is 32% (30%). The fit of the regression gives us an idea of how important other omitted common risk factors may be. No special pattern is observed over time.[186] The *F* tests on the global significance of the regression are always significant and the same is true for the joint tests on the subset of country effects' coefficients. The common factor - captured by the intercept - is significant 291 times out of 364. The subset of industry effects' coefficients is only significant around one third of the times.

For value-weighted indices, the fit is even better. The explanatory power is 46%, the median adjusted R^2 is 41% and both the common factor and the set of industry effects' parameters are almost always significant.

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184 In annualised terms, the emerging markets' indices in my sample show an average (median) standard deviation of 35% (26%) against 17% for HR.

185 The *EP* (Explanatory Power) statistic is obtained as one minus the ratio of the sum of errors for all the weekly cross-sectional regressions divided by the sum of total returns variation, again for all the weekly regressions.

186 The maximum R^2 occurs in April 1995 and the minimum in April 1991.

Table 6.6 -Variance Decomposition of Country and Industry Indices (Equally-Weighted) Fit and Significance

This table gives an overall look of fit of the weekly cross-sectional regressions over the period January 1990 to December 1996. *EP* is obtained as one minus the ratio of the sum of errors for all the cross-sectional regressions divided by the sum of total returns' variation again for all the periodical regressions. R^2 and *Adj.* R^2 are, respectively, the cross-sectional regression R^2 and Adjusted R^2. *t-Common* gives the *p*-value of a *t*-test on the intercept. *F* gives the *p*-values for *F* joint tests, on all coefficients, or only on the set of country or industry coefficients. "Significance" gives the number of times a set of coefficients was significant at a 5% level.

	EP	R^2	*Adj.* R^2	*F-All*	*t-Common*	*F-Country*	*F-Industry*
	0.38						
Mean		0.33	0.31	(0.0001)	(0.0881)	(0.0001)	(0.2564)
St.Error		0.01	0.01	(0.0000)	(0.0113)	(0.0000)	(0.0150)
Median		0.32	0.30	(0.0001)	(0.0001)	(0.0001)	(0.1332)
Minimum		0.09	0.07	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Maximum		0.85	0.85	(0.0001)	(0.9887)	(0.0001)	(0.9991)
Count		364	364	364	364	364	363
Significance (# times p<=0.05)				364	291	364	130

The inference using the Generalised Method of Moments, to overcome heteroscedasticity, produces very similar results. Specifically, the joint tests on the set of country and industry parameters (using a Lagrange Multiplier test) have the same implications as the *F* tests given by the OLS covariance matrix, except that we are able to reject more often the null of no industry effects.[187]

Table 6.7 presents some summary statistics for the estimated market returns adjusted for their industrial structure. The entries in this table can be compared to the statistics provided for raw market indices' returns in table 6.1. As discussed previously, if industry composition were important in explaining the indices behaviour, then the adjusted indices would now show more uniform mean returns and standard deviations, and cross-market correlations for adjusted returns should be higher. As in HR, I find that the differences between the statistics for raw and adjusted indices are tiny.[188]

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[187] See SAS ETS User's Guide for more details on the Lagrange Multiplier test statistic used here.

[188] In HR, the average correlation of the adjusted equally (value) weighted market indices is 0.74 (0.77) against 0.71 (0.76) for raw returns. The average correlation of the adjusted equally (value) weighted industry indices is 0.42 (0.40) against 0.41 (0.43) for raw returns.

Table 6.7 - Adjusted Country and Industry (EW) Indices
Statistics and Correlation Coefficients
This table shows means and standard deviations and cross-country/industry correlations of the estimated weekly equally-weighted emerging markets' dollar indices, adjusted for, respectively, their industrial and geographical composition. The table also shows the correlation of returns between these adjusted indices and the World FT&SP-A index (not adjusted). All returns are measured in US dollars per week.

I. Adjusted Country Indices

Country	Mean	Std.Dev.	EM	Arg	Bra	Chi	Col	Gre	Ind	Ind	Jor	Kor	Mal	Mex	Phi	Por	Tai	Tha	Tur	Ven	Chi	Hun	Pak	Per	Pol	SAf	Sri	Nig	Zim	World
EM average	-0.0003	0.0175	1.00																											
Argentina	0.0030	0.0722	0.26	1.00																										
Brazil	-0.0008	0.0686	0.50	0.13	1.00																									
Chile	0.0029	0.0280	0.23	0.17	0.13	1.00																								
Colombia	0.0036	0.0361	0.15	0.08	0.10	0.01	1.00																							
Greece	-0.0008	0.0382	0.33	0.02	0.08	0.08	0.07	1.00																						
India	-0.0012	0.0270	0.31	0.01	0.04	0.02	0.02	0.09	1.00																					
Indonesia	-0.0001	0.0429	0.34	0.05	0.10	0.10	0.05	0.12	0.08	1.00																				
Jordan	0.0003	0.0247	0.20	0.14	-0.03	-0.05	0.02	0.00	0.04	0.04	1.00																			
Korea	-0.0029	0.0344	0.31	0.02	0.00	0.07	-0.08	-0.03	0.03	0.05	0.05	1.00																		
Malaysia	0.0019	0.0337	0.54	-0.05	0.07	0.03	-0.04	0.18	0.09	0.30	0.11	0.13	1.00																	
Mexico	0.0004	0.0397	0.38	0.23	0.20	0.19	0.04	0.10	-0.01	0.09	0.03	0.09	0.16	1.00																
Philippines	0.0001	0.0335	0.43	0.10	0.09	0.16	0.10	0.13	0.04	0.28	0.09	0.05	0.32	0.21	1.00															
Portugal	-0.0011	0.0262	0.39	0.02	0.15	0.05	0.08	0.40	0.15	0.06	-0.01	0.09	0.25	0.14	0.18	1.00														
Taiwan	-0.0013	0.0533	0.49	0.01	0.06	0.05	0.05	0.09	-0.03	0.08	0.16	0.06	0.22	0.12	0.26	0.16	1.00													
Thailand	-0.0018	0.0426	0.55	0.09	0.09	0.06	0.08	0.16	0.16	0.22	0.18	0.12	0.50	0.16	0.30	0.24	0.24	1.00												
Turkey	-0.0014	0.0780	0.33	-0.07	0.08	0.00	0.12	0.23	0.05	0.10	0.04	0.02	0.22	0.01	0.14	0.16	0.09	0.15	1.00											
Venezuela	0.0039	0.0638	0.01	0.05	-0.06	-0.02	0.06	-0.02	0.01	-0.02	-0.02	-0.04	-0.05	-0.02	0.01	0.00	-0.04	-0.03	0.07	1.00										
China	-0.0002	0.0734	0.33	0.05	0.10	0.06	0.04	0.10	0.08	0.14	-0.02	-0.03	0.13	0.06	0.05	0.01	0.01	0.04	-0.02	0.03	1.00									
Hungary	0.0010	0.0391	0.10	0.04	0.07	0.14	0.02	0.08	0.09	0.13	0.01	0.05	0.00	0.13	0.01	0.16	-0.06	0.03	-0.06	0.01	-0.09	1.00								
Pakistan	-0.0029	0.0304	0.15	0.04	0.00	-0.01	0.05	0.08	-0.01	0.12	0.09	0.05	0.09	0.07	0.12	0.03	-0.02	0.10	0.07	0.04	-0.02	0.06	1.00							
Peru	0.0022	0.0436	0.17	0.16	0.14	0.23	0.08	0.01	-0.04	0.08	0.04	-0.04	0.02	0.28	-0.01	0.05	0.04	0.08	0.07	0.03	0.00	0.15	-0.07	1.00						
Poland	0.0086	0.0777	0.11	0.03	0.05	-0.01	0.06	0.05	-0.04	0.15	0.10	-0.03	0.06	0.13	0.00	0.07	-0.01	0.09	0.06	-0.02	-0.02	0.23	0.10	0.06	1.00					
South Africa	0.0038	0.0303	0.22	0.08	0.03	0.10	-0.07	0.13	0.02	0.13	0.05	0.13	0.17	0.08	0.11	0.04	0.02	0.08	0.06	0.05	0.06	0.16	0.09	0.10	0.21	1.00				
Sri Lanka	-0.0014	0.0336	0.07	0.00	-0.05	0.00	0.06	0.01	0.03	-0.02	0.00	0.03	0.01	-0.06	0.00	0.04	-0.02	0.04	0.09	0.02	0.02	0.11	0.19	-0.02	0.15	-0.10	1.00			
Nigeria	0.0057	0.1084	0.04	-0.03	0.06	0.05	0.04	0.02	0.03	0.02	-0.01	0.06	-0.08	-0.10	-0.07	-0.03	-0.01	-0.06	-0.01	0.02	-0.02	0.00	0.01	0.11	0.01	0.00	0.03	1.00		
Zimbabwe	0.0075	0.0332	0.10	0.03	0.05	0.13	0.09	0.02	0.05	0.13	-0.03	-0.04	0.04	0.12	0.11	0.06	-0.01	0.08	-0.08	0.03	-0.01	0.21	-0.05	0.20	0.20	0.09	0.20	-0.03	1.00	
World (not adjusted)	0.0014	0.0163	0.44	0.10	0.20	0.00	0.00	0.28	-0.01	0.04	0.05	0.17	0.40	0.25	0.18	0.46	0.28	0.33	0.16	-0.03	-0.01	0.11	0.00	0.14	0.04	0.13	-0.04	-0.06	0.04	1.00

Table 6.7 - Adjusted Country and Industry (EW) Indices
Statistics and Correlation Coefficients (cont.)

II. Adjusted Industry Indices

Industry	Mean	Std. Dev.	Agriculture	Mining	Construct	Manufact	Tranp,Util	Trade	Fin,Ins,RE	Services	Other
Agriculture	-0.0017	0.0219	1.00								
Mining	-0.0002	0.0239	0.51	1.00							
Construction	-0.0007	0.0226	0.64	0.58	1.00						
Manufacturing	-0.0007	0.0171	0.79	0.65	0.82	1.00					
Transportation, Utilities	0.0017	0.0228	0.66	0.56	0.71	0.81	1.00				
Wholesale, Retail Trade	-0.0001	0.0196	0.67	0.55	0.73	0.83	0.68	1.00			
Finance, Insurance, RE	0.0008	0.0202	0.73	0.63	0.80	0.88	0.79	0.78	1.00		
Services	-0.0018	0.0212	0.62	0.57	0.66	0.76	0.64	0.68	0.75	1.00	
Other	-0.0006	0.0201	0.73	0.62	0.76	0.85	0.74	0.74	0.84	0.70	1.00

Countries that had high volatility continue to do so and the average cross-market correlation does not increase. The average cross-markets correlation is now 0.06 (0.07 for VW indices) against 0.07 before and the average correlation with the World index drops from 0.14 to 0.12 (0.15 for VW indices).[189]

For industry indices, and contrasting the results with those presented in tables 6.4 for raw returns, the adjustment for geographical effects is not very important, but mean returns are different for some industries and overall the adjusted industry indices show lower standard deviations. The correlation matrix shows that there is an important increase in the average cross-industry correlation, from 0.54 to 0.72. Thus, these results confirm the diagnosis that came out from the preliminary analysis: cross-industry correlations are, on an aggregate basis, higher than cross-market correlations. This result may stem from the fact that the SIC-one-digit industry classification is very wide.

To give a better idea of the diversification benefits of different investment strategies suggested by these results, I have compared the variance of four different portfolios. The first one, I have identified as "No Diversification" and its variance is obtained as the average of the individual stocks' variance:

$$\sigma_{ND}^2 = \frac{\sum_{i=1}^{N} \sigma_i^2}{N}. \tag{6-11}$$

The second portfolio is a global portfolio that invests in all the emerging markets' firms. As the number of firms grows, only the covariance terms matter. The variance of the equally-weighted portfolio provides the variance estimate of this global portfolio and is here identified as "Maximum Diversification".

$$\sigma_{MD}^2 = \sigma_{EW}^2. \tag{6-12}$$

The two other portfolios involve:

- diversifying across industries within a country and I have called it "Industry Diversification". The variance of this portfolio is given by the weighted average of the variances of the twenty-six emerging markets' indices:

$$\sigma_{ID}^2 = \sum_{k=1}^{K} \frac{m_k}{M} \sigma_k^2, \tag{6-13}$$

189 The world index is not adjusted. Therefore, there remains here a differential between the industrial structure of the world index and that of the average emerging market.

where the weights are given by the average ratio of the number of companies in a market relative to the total number of firms in the sample.[190]

- diversifying across countries within an industry and I have called it "Geographical Diversification". The variance of this portfolio is given by the weighted average of the variances of the nine emerging markets' industry indices:

$$\sigma_{CD}^2 = \sum_{l=1}^{L} \frac{n_l}{M} \sigma_l^2 \; . \tag{6-14}$$

where the weights are given by the average ratio of the number of companies in an industry relative to the total number of firms in the sample.

Table 6.8 reports the results and relates the variance of the latter three portfolios relative to the scenario of "No Diversification". The scenario of "Maximum Diversification" indicates that potentially, risk could be eliminated to 6% of the average individual risk. In practice, it would be very difficult to hold such a portfolio, especially given the restrictions that still exist in some of these markets and their small size. The two other more realistic strategies, that involve investing in a particular sector across markets, or diversifying across industries in a sole country, show that the variance can be reduced to, respectively, 8% and 43% of the "No Diversification" strategy.[191,192] Both these strategies provide important diversification benefits but it seems more fruitful to focus on geographical diversification. Whatever industry you pick, and not only on average, if you diversify across markets you are almost always better off - in terms of risk reduction - than if you choose to invest domestically in any of these markets.[193,194]

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[190] For the value-weighted indices, the weights are given by the average ratio of the capitalisation of a market/industry relative to the total capitalisation of the firms in the sample over the sample period.

[191] HR find that variance by complete diversification could be reduced to 18% of the average individual stock's variance. Industry Diversification within a single country and Geographical Diversification within a single industry could reduce the portfolio variance to, respectively, 38% and 29% of the average individual stock's variance.

[192] When I use value-weighted averages, the "Maximum Diversification", the "Industry Diversification" and the "Geographical Diversification" strategies reduce risk to, respectively, 13%, 52% and 18% of the "No Diversification" scenario.

[193] Dual listed stocks, country funds and multinationals have made international diversification easier. These securities retain part of its diversification potential even if when they trade abroad.

[194] To have an idea how these strategies would do in terms of performance I have looked at the historical returns of these three strategies. All of them involved historical average negative returns during the sample period. Yet the "Industrial Diversification" strategy has earned only 0.01% more than the "Geographical Diversification" for an additional standard deviation of 4%.

Table 6.8 - Diversification Benefits

Country vs. Industry Allocation (Equally-Weighted)

This table compares the average variance of individual stock returns (*No Diversification*) with the variance of an equally-weighted portfolio of the emerging markets' firms in sample (*Diversifying Across All Emerging Markets' Stocks*) and the variances attainable by *Diversifying Across Emerging Markets Within a Single Industry* and by *Diversifying Across industries Within a Single Country*. These latter variances are weighted by the average ratio of the number of companies of a market or industry relative to the total number of firms in the sample. The proportions are computed relative to the scenario of no diversification. Weekly variances of total returns are measured in US dollars for the period of January 1990 to December 1996.

	Variance	Proportion	
Average Individual Stocks	0.0051	100%	*No Diversification*
Average Country Indices	0.0022	43%	*Industry Diversification*
Average Industry Indices	0.0004	8%	*Geographical Diversification*
EW Emerging Markets' Index	0.0003	6%	*Maximum Potential Diversification*

In section 6.2, I predicted that the adjustments for emerging markets' indices would be stronger than what had been reported for mature markets. That is what I found. I have also predicted that emerging markets would provide less diversification potential, on average, than European markets because markets and industry indices are more concentrated. While for the Industry Diversification that is marginally true, for Geographical Diversification, the potential diversification with emerging markets is much more substantial than the one observed for the mature markets studied by HR[195]. The reason for this difference could lie in the more idiosyncratic character of each of these markets and therefore the lower importance of common factors within the group of emerging markets.

One of the reasons why results are stronger for emerging markets is the fact that mature markets' indices include multinationals or more global stocks. Yet emerging markets' indices also include large firms (some are conglomerates) and some are dual-listed on international exchanges.

[195] This is true even in absolute terms. Complete diversification in emerging markets involves a variance of $(0.037)^2$ while the first best in mature markets, given by HR is $(0.045)^2$.

In summary, results so far, using a broad industrial classification, are consistent with the findings of previous literature by HR and contrast with previous studies that found an important role for the industry effects. For the particular case of emerging markets, country specific effects are also the main driving force of country indices and industry composition cannot account for the low cross-market correlations. Yet, and as suggested by the significance tests on the subset of industry parameters, it would be unwise to simply forget these effects. Finally, and because the cross-market correlations do not seem to be affected by industrial composition, I confirm the idea suggested by the preliminary diagnosis, that it pays to diversify internationally but it may be more interesting to do so within some particular sectors instead of others.

I have repeated the analysis for regions instead of country indices and using a two-digit industry classification instead of the one-digit classification. I discuss those results below.[196]

Regional Effects

Markets are increasingly more and more influenced by the trading activity of international investors that treat emerging markets or some emerging markets' regions as a single asset class. I have investigated whether that fund allocation was effectively reflected on the returns' structure.

I have repeated the regressions using region dummies, instead of country dummies and, in addition, I have analysed the results within two regions.[197] I discuss how much diversification can be obtained by investing in only one region and, if one decides to invest in one market in a region instead of investing in all the markets in that region.

Across Regions

Tables in the appendix summarise the inter-region evidence that is compared below with the reference tables 6.5, 6.7 and 6.8. There are some interesting results:

- The fit of the regressions decreases dramatically. The explanatory power is only 8% and the median R^2 is now 6% against, respectively, 48% and 32% before. These figures reflect that regional factors have a very small explanatory power compared with country factors suggesting that regional commonality is not very strong.

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196 From here on, I only report the results for the equally-weighted indices. Results for the value-weighted indices are, overall, similar and are available under request.

- Regional indices have different means but similar standard deviations. The Asian index has lower standard deviation than the Latin American counterpart.

- Cross-regional correlations are low but higher than cross-market correlations. On average, the cross-regional correlation is 0.17 against the average of 0.07 between single markets. The correlation with the World market index is also higher: 0.25 against 0.14 for markets, with a maximum of 0.36 for Asia.

- As with the country-industry regressions, the region-industry effects' decomposition shows that the industry effects play a trivial role in explaining regional indices. The correlation matrix of adjusted regional indices is very close to the correlation matrix of raw regional indices returns.

- For the industry indices, however, there is an important difference. While before I found that pure industry effects' variability was, on average, 52% of the variance of excess industry index returns, the variance ratio is now 92%. This again reflects the small importance of region effects.

- The average variance of the regional indices is 0.0006 compared with an average of 0.0022 for countries. This shows that investing in a region is not the same as investing in one particular country. Not only do you get more industrial diversification but, mainly, you gain through international diversification because countries within a region are not all alike. While previously investing across industries in one single country allowed to reduction of total risk to 43% of the "No Diversification" scenario, now investing across industries within a single region allows to reduce risk to 12% of the "No Diversification" scenario (10% in Asia, 20% in Latin America). Still, on average, it is better to invest across regions in one single industry (as before, up to 8% of total risk). Yet, if you had chosen to invest in Asia, you would have been better off than if you had chosen to diversify across all regions, for example, in the Mining, Services or Construction industries.

In sum, these results highlight that there is a lot of diversity within a region and that is why, at least over the past seven years, picking up only one region, on average, almost eliminated the need to diversify across the universe of emerging markets.[198] This is a partial statement that looks at one aspect of the game: risk. This finding combined with observed returns may explain the regional strategies of asset managers observed in

[197] I have only looked at Asia and Latin America because these are the two regions in my sample with a reasonable number of constituent markets, respectively, 10 and 7.

[198] This is the case for Asia. Still, investing in Latin America is still much better in terms of risk reduction, than electing a domestic industry diversification, on average, and for almost any of the individual emerging markets.

practice. To attain risk diversification, it is enough to choose only one region. Capital flows migrations from one region to another could reflect the investors' returns forecasts.

Within a Region

To study further how regional benefits can be reaped, I have looked at what happened within two regions: Asia and Latin America. *A priori*, I expect to find stronger common industry factors at a regional level, as industries are expected to be more integrated on a regional basis rather than on a world-wide basis. This is only true for Latin America: industry regional pure factors accounted, on average, for 75% of the variance of that region's industry index against the 52% in table 6.5, when I examined the universe of emerging markets. Yet industrial effects still play a trivial role when we look at the market indices' decomposition. Consequently, the correlation matrices of raw or adjusted indices do not differ much.

Nevertheless, there seems to exist regional commonality and that is reflected in the greater importance of the intercept in the cross-sectional regressions. The variability of the intercept over time in relation to the market indices' variability, is now 30% and 52%, respectively, for Asia and Latin America, against the 19% observed for the universe of emerging markets. Thus, there is commonality but it seems to be more related to other factors other than industry affiliation that I control for here.

The diversification analysis confirms that, even within a particular region, the benefits of geographical diversification are larger than those of industry diversification. Thus, for example, an investor that has decided to invest only in Asia, will be better off investing in any single industry across the ten Asian markets (risk reduction of up to 14% of the total risk of the "No Diversification" scenario) than to confine herself to cross-industry diversification in any single Asian country (risk reduction up to 39%).

A Finer Industry Partition

Another proposed aim of this study was to find out if the results derived here could be driven by the use of a broad industrial classification.[199] It is fallacious to say that investing across-markets, in the broad Manufacturing sector, does not involve any industry diversification. To settle that, I have repeated the analysis using a finer industry

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[199] Many emerging markets firms are conglomerates. Industry effects mean very little for these type of firms. To assess the impact of these firms, I have excluded the firms in SIC 9. The results are very similar to the core results.

affiliation. The danger of this approach is that the affiliation may become too narrow to meaningfully interpret the results.

In the appendix, I show the results that I contrast with tables 6.5 and 6.8 (markets and SIC one-digit industries).[200] Whether one uses the one or two-digits industry classification, market indices are driven by pure country effects. Adjusted correlations are, as before, almost the same as raw ones. Yet, for industry indices, there are non-trivial changes. As expected, because these categories include less constituents, the variance is larger (an average variance of 0.0013, against the 0.0006 for one-digit sectors) and that is reflected mainly in the lower role of common effects (30% against 60% before). Consequently, as a percentage of the total index, both the sum of the country constituents' adjustments and the pure industry effects are more important but pure industry effects take a stronger share of that percentage. Thus it seems that using a finer partition unveils that the effect of industrial common factors is more important.

Griffin and Karolyi (1988) report that a finer partition does not result in a different evaluation of industrial diversification benefits. My results contradict this evidence: on average, the geographical diversification reduces risk to only 34% of the variance of the "No Diversification" scenario (against the 8% with a broader industry classification). The figure of 8% included some industry diversification. The importance of these results is not trivial: the loss in risk reduction if one adopts a "Geographical Diversification" strategy alone involves losing 28% (34% minus 6%) while before, with a broader industry classification, it seemed that one was losing only 2% (8% minus 6%). Of course, the 34% I get now also reflect that the two-SIC affiliation generates very narrow indices with sometimes only two constituent firms.[201] The average adjusted correlation between two-digit industries is now 0.27 (raw average of 0.18), well below the average 0.54 (0.62 adjusted) between broad industrial categories, but still well above the average of 0.07 (0.06 adjusted) between markets.

In sum, a narrow industrial affiliation shows that ignoring the industrial mix will lead to an important loss of diversification benefits and that the broad classification approach may be misleading, making what is industry diversification look like country diversification.

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200 I have also performed the analysis using regions together with the narrow industry partition. Results are available upon request. The implications of those results are similar to the ones discussed here for single markets.

201 When I exclude those industries for which there is no geographical diversification, my results change slightly. On average, investing in a particular industry, diversifying across countries, reduces risk to 27%. Ignoring industrial diversification still involves a loss of 21% (27%-6%).

I have also investigated whether the importance of country factors is the same over the sample period. This investigation was motivated by the arguments that suggest that increasing economic and financial integration lead to the dominance of global factors over local factors. I estimated annual variances and the resulting variance ratios. Pure country effects always dominate the behaviour of market indices and this is true for all markets, regardless of having observed or not increasing economic or financial integration over the sample period.

To analyse whether the results could be associated with business cycles (or anticipation of those cycles), I broke the time series of estimated effects in two: negative and positive index returns. I then computed the variances and the variance ratios for the sub-samples. The ratios over periods of positive and negative index returns are not significantly different for country pure indices but the difference is significantly different from zero for the sum of industrial effects (t-statistic of 2.27) and the ratio is higher for the sub-sample of negative returns. This finding is supportive of common factors being more important when returns are low. The analysis is of course insufficient given that I concentrate on one single set of commonality: industry affiliation.

Contribution of Currency to Country Effects

With returns expressed in a common currency (US dollars, for example), part of a stock return volatility is induced necessarily by changes in the exchange rate. One could think that converting local currency returns into common currency returns (US dollar denominated) would remove monetary phenomena such as changes in actual local inflation rates. However, on one hand, exchange rates themselves are not entirely driven by monetary phenomena. On the other hand, the interaction between the stock market and exchange rates is not clear. I do not take a stand on whether stocks are or are not hedges against exchange rate movements. Previous evidence has shown that the correlation between stock returns and currency fluctuations is low and that currency variability is very small relative to stock market volatility. For some emerging markets, however, this is not always true.

If exchange rates reflect only monetary policies, returns measured in US dollars will offset those policies. Consequently, country effects would be less strong for US dollars than in local currency returns. Alternatively, if exchange rates changes carry real effects or if stock prices are either positively or negatively correlated in any other way with exchange rates changes, then the analysis in US dollars will unveil additional factors.

The arguments above seem to syndicate that the analysis in US dollars or in local currency may not produce the same results. I have examined the sensitivity of the results for local currency returns. Results are available upon request. The average fit of the local currency cross-sectional regressions is similar to what was reported for US dollars in table 6.6. As before, country "pure" effects play the leading role and the importance of the industrial composition of the indices is trivial. Therefore, raw or adjusted indices have similar means, standard deviations and cross-market correlations. A difference *t*-test comparing the variance ratios for US dollars and local currency returns, shows that the difference is not significantly different from zero. The important role of country effects does not seem to arise from the fact that returns are expressed in US dollars. Local currency denominated market indices can be read as full hedges to exchange rate exposures. For diversification purposes, diversifying across markets in any industry and hedging currency risk, can reduce risk up to 9% compared with the 8% of a completely unhedged position. Thus, currency diversification can provide some, even if small, benefits. The US dollars analysis considered them a part of the "pure" country benefits.

An alternative test suggested by Heston and Rouwenhorst (1994), regresses US dollars country effects on exchange rate changes.[202] Recall that I have estimated differential country effects relative to the return on an equally (or value-weighted) emerging markets index. Similarly, I have to consider exchange rate changes relative to the currency basket in the emerging markets' index.

The currency components of the dollar return on the equally (or value) weighted index of country *k* relative to the emerging markets' index are given, respectively, by:

$$\chi_k^X = R_k^X - \frac{1}{M}\sum_{k=1}^{K} m_k R_k^X \tag{6-15}$$

$$\chi_k^{XVW} = R_k^X - \sum_{k=1}^{K} v_k R_k^X , \tag{6-16}$$

where R_k^X is the change in the exchange rate measured in local currency of country *k* per US dollar. m_k and v_k are, as defined above, respectively, the number of firms in country *k* in the sample and the weights of the total market capitalisation of firms in country *k* relative to the aggregate market capitalisation of all the emerging markets' firms in the sample. *M* is the total number of firms in the sample.

For each country, I regress the time-series of the estimated country effects γ_k (obtained in the US dollars dummy regressions) on the currency effects χ_k over the sample period

[202] Using the dummy regression (6-2), it is not possible to disentangle country and currency effects.

and test if the coefficient on the regression is minus one. This hypothesis assumes that the country effects measured in local currency are approximately uncorrelated with the exchange rate movements and therefore the difference between the local currency and the US dollars country effects would result from currency conversion alone.[203] The fit is modest: the R^2 of the time-series regression for each market, that gives information on whether currency effects are a major source of the variance of country specific returns, varies widely across countries. Note that Mexico is among the markets where the R^2 is high. 24 times out of 26, the *t*-test rejects the null that the currency component is irrelevant. However, 18 out of 26 times the null that the slope in the regression is minus one is also rejected. Exchange rates play a role in country effects but there seems to be much more than a mere conversion effect.

6.5 THE CROSS-SECTIONAL DETERMINANTS OF STOCK RETURNS

This study so far has re-evaluated the importance of country and industry effects for the particular case of emerging markets' stock returns and found that country pure effects are the most important factor driving the behaviour of emerging markets' individual stock returns. Understanding the correlations of returns across countries requires the examination of which factors influence security prices across countries. We still don't know to what these country factors are associated, except that currency effects play a trivial role. The next section investigates the role of other common attributes (such as volatility, size, book to market) in explaining the cross-section of returns. I explicitly look at the role of a set of *a priori* factors - that were found important for mature markets - in explaining the within-market variation in stock returns and then compare the results across emerging markets and with the previous evidence for the major markets in the world.

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203 If the stock market and the exchange rate market are uncorrelated, then the volatility in US dollar returns results from the sum of two volatilities: the one of the effects in local currency and the one of the exchange rate. As can be seen below, when returns are continuously compounded there is no cross-product term to worry about.

$$(1 + R_i^{US\$}) = (1 + R_i^{LC}) / (1 + R_i^{X})$$

$$\log(1 + R_i^{US\$}) = \log\left[(1 + R_i^{LC}) / (1 + R_i^{X})\right] = \log(1 + R_i^{LC}) - \log(1 + R_i^{X})$$

6.5.1 ANALYTICAL FRAMEWORK

6.5.1.1 Empirical Specification

For each market, I test for the explanatory power of a number of *a priori* appealing factors. For a given week, I specify the following factor model:

$$R_i = \sum_{j=1}^{J} P_{j,t} F_{i,j} + u_{i,t} \qquad (6\text{-}17)$$

where R_i is the return of firm i. $P_{j,t}$ is the payoff to factor j in week t, $F_{i,j}$ is the exposure of firm i to factor j and $u_{i,t}$ is security i's unexplained component in week t. J is the number of factors included in the return generating model. Examples of $F_{i,j}$ are predetermined variables such as beta, size, yield, volatility or industry assignments.

I estimate the weekly cross-sectional coefficients above using GMM and obtain a time series of coefficients estimates for the sample period. I repeat the analysis separately for each market. The factors are then ranked, based on the absolute value of the t statistics of their time series mean (as in Fama and Macbeth, 1973).[204] The commonality of factors is assessed by comparing the ranking and sign consistency of the most important factors across markets. This ranking reveals if the same risk factors affect the expected returns across emerging markets. Moreover, I investigate whether the payoffs are highly correlated across markets. Finally, I compare the elected factors for emerging markets with the ones that have ranked first in previous studies for mature markets (in particular, Haugen and Baker, 1996).

6.5.1.2 Discussion of Variables

I follow closely Haugen and Baker (1996) to choose the factors to include in the analysis. The final set of factors was reduced given the data constraints. Most of the factors are risk-related but I also include liquidity, price level and price history factors.

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where $R_i^{US\$}$ is the discrete return for the firm i measured in US dollars, R_i^{LC} is the discrete return for the firm i measured in local currency and R_i^{X} is the discrete change in the exchange rate for that firm's country (defined as number of units of local currency per dollar).

204 My procedure is valid only if the estimates for each period are independent samples of the estimated parameters and the linear factor model is well-specified. If measurement errors in betas are large or the model is misspecified, the Fama and Macbeth (1973) t-values can overstate the precision of the estimates. Moreover, when the linear beta pricing model is misspecified, the cross-

Please refer to Haugen and Baker (1996) for a detailed discussion of each of the factors that I briefly motivate below.

Risk factors

Risk factors are dictated by theoretical models of asset pricing (Capital Asset Pricing Model, Arbitrage Pricing Theory Model in their local or international versions). If markets are liquid and efficient, differences in expected returns should result from differences in risk. Further, there is substantial evidence of the power of risk measures in explaining the cross-section of returns not only in the US but in other developed and emerging markets. I examine the following risk factors:

- Market betas[205]
- Macroeconomic betas
- Volatility

I expect that the payoffs to these factors are positive: higher risk stocks require higher returns.

Firm characteristics or factors indicating over-reaction

Several recent studies have shown that fundamental valuation ratios have a very important role in explaining returns. Yet there is much controversy on what they account for: some authors claim they are a proxy for distress, some say they that they indicate whether a stock is selling cheap or dear. I examine the following ratios:[206]

- Earnings to price
- Book-value to price
- Dividend yield

Regardless of whether the payoffs to these attributes compensate risk or overreaction, the coefficients on these attributes should be positive.

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sectional estimates are not consistent even for the correctly specified factors (see Jagannathan and Wang, 1998).

[205] I investigate the role of univariate and multivariate betas. Jagannathan and Wang (1998) motivate this procedure showing that when the true beta specification is unknown, investigating only the role of multivariate betas can be misleading.

[206] In appendix, I show the time-series averages of four attributes for the median stock in each emerging market.

Liquidity factors

Differences in liquidity can also drive the cross-sectional differences in returns. Investors require a super risk premium to hold illiquid securities to compensate for higher bid-ask spreads. I use two measures for liquidity:[207]

- Market capitalisation
- Price per share

Again it is controversial to say that market capitalisation is only picking up liquidity. Size could be a proxy for risk. Anyway, more liquid stocks should have lower expected returns. Therefore, I expect the coefficients on these factors to be negative.

All price-level factors and size share a common variable: current market price per share. One could argue that the importance of those variables could only reflect that returns are mechanically related to price by a present value relationship. The rank correlation between price and these variables is usually high and significant and it is highest for the market correlation. Furthermore previous studies have shown that there is a significant cross-sectional correlation between price per share and average returns. In some markets, with fixed commissions, price could be proxying liquidity. But price could also be significant because there is a relation between returns and low price. Thus the effects observed for price level-attributes would be capturing that firms have recently declined or increased in price and that may have resulted in more (less) leveraged capital structure and, other things equal, more (less) risk.

Technical factors

Efficient markets preclude any significant relation between the price history of a stock and its future expected return. Yet several papers have found significant relations between past and future returns. There is mixed evidence on the profitability of strategies that bet on short term reversals and only a few studies have looked at long term reversals, but there is growing evidence of the importance of momentum or inertia in predicting returns in the US and in other developed and emerging markets. I examine lagged (raw and excess) weekly returns for several lags (1 to 12, 26 weeks) and also lagged buy and hold returns of 8, 12, 26 and 52 weeks. I expect that the payoffs for the lagged returns up to 12

[207] There are other factors that may be more closely associated to liquidity. These are, for example, volume, value of trade or bid-ask spreads. EMDB does not provide the first information on a weekly basis and has no information on quotes.

weeks to be negative; for lagged returns of 26 weeks, positive. And negative again for the 52 weeks.[208]

Appendix G provides more information about the factors used in the analysis and on computational procedures.

6.5.2 Empirical Results

6.5.2.1 Procedures

Collinearity seems to be a problem when using more than one buy and hold excess returns because of overlapping observations. To overcome this, I had to drop some variables. In particular I kept together horizons 8 weeks and 26 weeks, 8 and 52 and 12 and 52. I also investigate the role of a set of lagged returns as suggested by Jegadeesh (1993).[209] This procedure overcomes collinearity and gives a picture of predictability for different lags; yet it does not allow us to capture inertia/momentum or long term reversal trends.

Extreme observations are common in the returns of individual stocks from emerging markets. To avoid those observations affecting the regression results, I looked at the results after trimming the explanatory variables. I dropped the observations in the tail of the distribution by excluding those stocks whose values were more than three standard deviations away from the median (for any explanatory variable in the case of multiple regressions) and, as an alternative, I excluded the observations below percentile 5 and above percentile 95.

The cross-sectional estimates are obtained using the Generalised Method of Moments (GMM). GMM allows for correlated disturbances and heterokesdasticity. If the disturbances are uncorrelated and using the independent variables as the instruments, GMM estimates will be OLS but the asymptotic covariance matrix will be the White estimator.[210]

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[208] It is very difficult to establish when the short term ends and the same goes for the medium and long terms.

[209] Jegadeesh (1993) suggests investigating the serial correlation properties of individual stock returns using a cross-sectional regression model instead of the traditional approaches of time-series regression tests or variance ratios.

[210] A set of factors, specifically the risk factors, are statistical estimates and are thus measured with error. Further work should account for that, for example, by running weighted cross-sectional regressions, deflating each risk factor estimate by its time-series standard error.

I use the time-series standard deviations of the slopes in the week-by-week cross-sectional regressions to construct standard errors for the average slopes as suggested by Fama and Macbeth (1973). The importance of each factor individually is then assessed by using the resulting *t*-statistic. Since I do not adjust the standard errors by the sample autocorrelation of the weekly slopes, one has to be conservative when reading the *t*-statistics.

To test the null hypothesis that the time-series mean of the payoffs to all factors (excluding the dummy variable coefficients) are zero across the entire period, I looked at the time series average of the weekly Wald tests. I also ran a multivariate test of the joint significance of the time series means of the non-intercept estimated parameters. This multivariate statistic has an approximate *F* distribution.[211]

I use three measures of fit: R^2, adjusted R^2 and the explanatory power statistic described in the previous section.

6.5.2.2 Market by Market Cross-Sectional Regressions

The payoffs associated with the various factors are obtained separately for each individual market. The Fama and Macbeth (1973) mean estimates and associated *t*-statistics for each market are available upon request. The precision of the dimension of the cross-section varies from market to market and, for each market, from week to week with the necessary consequences for the precision of the estimates of the payoffs. The smallest cross-section occurs for Argentina with 15 stocks; the largest cross-section occurs for South Korea with 135 stocks.

The individual market mean estimates and associated *t*-values show that there is an important degree of commonality over the 21 markets. This is confirmed by the individual markets rankings available upon request.

I have also looked at additional significance statistics for each individual market, for each week and computed time-series averages. The null hypotheses test if the mean payoffs to a set of factors is zero. In particular, the null hypothesis on the set of "Risk" factors is rejected for the 21 markets; the null hypothesis on the set of "Attributes" or "Price Level" factors is rejected for 9 out the 21 markets; the hypothesis on the set of "Liquidity" factors is never rejected; the null hypothesis on the set of "Price History" or "Technical" factors is also never rejected.

211 Please refer to SAS STAT User's Guide for more information about this test.

Confirming the findings of the first part of this chapter, the set of dummy variables that proxy industry factors is also not significantly different from zero. The time-series average *F*-test on the significance of these variables, is never significant.

Finally, a multivariate test for the null that all the mean payoffs are zero is significant for all the 21 markets.

6.5.2.3 Commonality of Factors

I concentrate now on the commonality of factors across the 21 emerging markets. To find the top 6 factors in the universe of emerging markets, I have averaged the absolute *t*-values across the 21 markets and I define the rankings based on that average.

I have looked at different specifications to ensure my results were robust. Here below I analyse only two of them. The final set of elected factors that the alternative specifications not discussed here produce is similar. For the two specifications here analysed, the final set of elected factors is not very different but there are differences in the way some factors are constructed and on the signs of the estimates obtained. Table 6.9 and 6.10 summarise the results. The tables show the mean estimates and *t*-statistics for the 6 most important factors across the 21 emerging markets.

In the first specification, I have regressed the individual stock returns on four risk exposures (exposures to the local market, to the world market and to currency risks, and volatility), three attributes (earnings-to-price, book-to-market and dividend yield), two liquidity factors (market value and price per share) and two price history factors (12 and 52 weeks holding period lagged returns).[212] Table 6.9 shows the results. I find evidence of short-term reversal in returns. I also find that the payoffs to "Attributes" and "Liquidity" factors are among the top 6 important factors. Yet, except for the "Dividend Yield", the signs of the estimates of these factors are against my expectations and against the evidence that has been documented for mature markets. I find that high book-to-market stocks registered lower average returns than low book-to-market stocks; high earnings-to-price stocks also showed lower average returns than low earnings-to-price stocks; and large stocks paid on average higher returns than small stocks. The sign of the estimates is "wrong" in more than 17 emerging markets out of the 21, and more than half of these are significant.

The second specification includes the same set of Risk, Liquidity and Price History factors but uses instead trailing (52 to 104 weeks) time trends for the "Attributes" factors.

[212] In this base specification betas are multivariate betas and I have done no trimming.

This procedure accounts for reporting lags that may lead to asynchronocity between book-values and price information. Furthermore, it may smooth the regressors and overcome the influence of outliers in the regressors that are common in emerging markets. Table 6.10 shows the results. The factors elected are essentially the same but now the average estimates for the "Attributes" factors are different. The payoff for the earnings-to-price factor is now positive in 10 out of the 21 emerging markets, but only a few of these are significant. The payoff for the book-to-market factor is now positive in 17 out of the 21 emerging markets, and 10 of these are significant at a 5% level. As before there is evidence supporting short-term mean-reversion. Liquidity factors also remain among the top 6, but as before the associated estimates have the "wrong" signs. The positive sign for the size coefficient could be explained by the fact that foreign investors concentrate their investments in large well-known companies.

It is notorious that local and world betas are never significant and that is also true for the macroeconomic betas.

Table 6.9 - Mean Payoffs and *t*-Statistics for the 6 Most Important Factors across 21 Emerging Markets (1990-1996)

- Base Specification -

This table presents the mean payoffs and *t*-statistics of the six most important factors in explaining the cross-section of returns (measured in US dollars over the period 1990 to 1996). The payoffs are based on cross-sectional weekly coefficients, obtained for each individual market, averaged over the sample period. The elected factors result from ranking the absolute *t*-statistics across the 21 markets. *Sign* (+) and (-) denote the number of markets for which the mean average estimate was, respectively, positive or negative. *Signif* (+) and (-) denote the number of markets for which the mean average positive or negative estimates were significant at a 5% level of confidence.

I. The 6 Most Important Factors across 21 Emerging Markets

Ranking	Factor	Expected Sign	Sign(+)	Sign(-)	Signif (+)	Signif (-)
1	Lagged 12 Weeks Holding Period Returns	(-)	0	21	0	14
2	E/P	(+)	3	18	0	16
3	BTM	(+)	1	20	0	14
4	DY	(+)	19	2	14	0
5	Size	(-)	18	3	10	0
6	Price per Share	(-)	17	4	11	0

II. Mean Payoffs and *t*-Statistics for the 6 Most Important Factors

Factor	Arg	Bra	Chi	Chn	Col	Gre	Ind	Ido	Jor	Kor	Mal	Mex	Pak	Per	Phil	Por	SAf	Sri	Tai	Tha	Tur
Lag12	-0.0251	-0.0376	-0.0096	-0.0072	-0.0477	-0.0080	-0.0026	-0.0257	-0.0016	-0.0264	-0.0183	-0.0192	-0.0286	-0.0210	-0.0269	-0.0038	-0.0230	-0.0172	-0.0068	-0.0057	-0.0170
	(-2.09)	(-8.00)	(-1.84)	(-1.07)	(-3.17)	(-1.09)	(-0.44)	(-6.19)	(-0.20)	(-3.09)	(-4.93)	(-3.30)	(-4.96)	(-1.92)	(-3.60)	(-0.55)	(-4.17)	(-2.09)	(-1.46)	(-1.20)	(-2.38)
E/P	0.0650	-0.0028	-0.0606	-0.1211	-0.0346	-0.0357	-0.0689	-0.0786	-0.0433	0.0063	-0.1117	-0.0449	-0.0447	-0.1518	-0.0555	-0.0278	-0.0841	0.0662	-0.0751	-0.0976	-0.1591
	(0.19)	(-0.28)	(-2.69)	(-2.84)	(-0.80)	(-2.88)	(-2.99)	(-3.47)	(-2.64)	(0.35)	(-5.13)	(-2.73)	(-2.05)	(-4.68)	(-2.05)	(-2.19)	(-3.43)	(1.43)	(-3.21)	(-5.11)	(-4.52)
BTM	-0.0129	-0.0022	-0.0036	-0.0082	-0.0014	-0.0052	-0.0041	-0.0189	-0.0046	-0.0085	-0.0009	-0.0074	-0.0079	-0.0099	-0.0037	-0.0065	-0.0020	-0.0223	-0.0207	0.0014	-0.0191
	(-2.08)	(-4.08)	(-1.94)	(-1.87)	(-0.51)	(-2.38)	(-1.74)	(-5.58)	(-1.47)	(-4.60)	(-0.45)	(-5.78)	(-2.70)	(-2.19)	(-0.88)	(-3.17)	(-1.19)	(-3.70)	(-4.00)	(0.73)	(-1.99)
DY	0.1142	0.1394	0.1259	0.1213	0.0227	0.0629	0.1412	0.1603	0.0622	0.1523	0.1208	0.0251	0.0126	0.1790	-0.1185	0.0948	0.1732	0.1747	0.0478	0.1282	-0.0010
	(1.31)	(3.87)	(2.15)	(2.57)	(0.14)	(3.20)	(3.07)	(3.63)	(2.28)	(2.70)	(4.08)	(0.92)	(0.40)	(2.53)	(-0.83)	(2.90)	(2.28)	(3.35)	(1.23)	(4.08)	(-0.03)
Size	0.0037	0.0052	0.0010	-0.0009	0.0065	0.0002	0.0002	0.0026	0.0008	0.0031	-0.0001	0.0004	0.0030	0.0009	-0.0008	0.0000	0.0045	0.0046	0.0016	0.0029	0.0034
	(1.60)	(6.04)	(1.55)	(-0.69)	(1.99)	(0.27)	(0.21)	(4.35)	(1.06)	(4.71)	(-0.22)	(0.77)	(3.05)	(1.18)	(-0.68)	(0.01)	(4.81)	(3.53)	(1.96)	(4.50)	(3.50)
Price per	0.0005	-0.0002	-0.0003	0.0056	0.0010	0.0043	0.0049	0.0006	0.0003	0.0103	0.0037	0.0022	0.0018	0.0003	0.0015	0.0029	-0.0007	0.0032	-0.0019	0.0015	0.0043
Share	(0.73)	(-0.55)	(-0.58)	(2.09)	(0.44)	(4.41)	(3.85)	(1.43)	(0.37)	(4.47)	(3.94)	(3.78)	(1.42)	(0.18)	(2.87)	(2.20)	(-1.29)	(2.63)	(-1.22)	(2.77)	(1.97)

Table 6.10 - Mean Payoffs and *t*-Statistics for the 6 Most Important Factors across 21 Emerging Markets (1990-1996)
- Time Trend Specification -

This table presents the mean payoffs and *t*-statistics of the six most important factors in explaining the cross-section of returns (measured in US dollars over the period 1990 to 1996). The payoffs are based on cross-sectional weekly coefficients, obtained for each individual market, averaged over the sample period. The elected factors result from ranking the absolute *t*-statistics across the 21 markets. *Sign* (+) and (-) denote the number of markets for which the mean average estimate was, respectively, positive or negative. *Signif* (+) and (-) denote the number of markets for which the mean average estimates positive or negative were significant at a 5% level of confidence.

I. The 6 Most Important Factors across 21 Emerging Markets

Ranking	Factor	Expected Sign	Sign(+)	Sign(-)	Signif (+)	Signif (-)
1	Price per Share	(-)	19	2	15	0
2	Size	(-)	21	0	15	0
3	Lagged 12 Weeks Holding Period Returns	(-)	1	20	0	11
4	BTM-Trend	(+)	17	4	10	1
5	EP-Trend	(+)	10	11	3	3
6	Lagged 52 Weeks Holding Period Returns	(+/-)	13	8	2	4

II. Mean Payoffs and *t*-Statistics for the 6 Most Important Factors

Factor	Arg	Bra	Chi	Chn	Col	Gre	Ind	Ido	Jor	Kor	Mal	Mex	Pak	Per	Phil	Por	SAf	Sri	Tai	Tha	Tur
Price per	0.0001	-0.0001	-0.0006	0.0116	0.0006	0.0037	0.0088	0.0017	0.0000	0.0097	0.0046	0.0025	0.0049	0.0031	0.0010	0.0041	0.0001	0.0044	0.0063	0.0026	0.0141
Share	(0.39)	(-0.28)	(-1.27)	(4.63)	(0.26)	(3.66)	(7.54)	(3.84)	(0.01)	(4.29)	(5.13)	(4.41)	(3.73)	(2.20)	(1.93)	(3.09)	(0.18)	(3.52)	(4.62)	(4.63)	(6.43)
Size	0.0048	0.0058	0.0024	0.0002	0.0082	0.0004	0.0022	0.0035	0.0010	0.0031	0.0000	0.0011	0.0031	0.0012	0.0023	0.0005	0.0038	0.0065	0.0015	0.0037	0.0032
	(3.59)	(6.89)	(3.20)	(0.22)	(2.04)	(0.61)	(2.58)	(5.35)	(1.13)	(4.84)	(0.00)	(2.26)	(3.14)	(1.44)	(2.04)	(0.77)	(4.10)	(5.28)	(2.00)	(5.64)	(3.25)
Lag12	-0.0169	-0.0377	-0.0063	-0.0109	-0.0645	-0.0090	-0.0046	-0.0230	0.0015	-0.0250	-0.0205	-0.0136	-0.0313	-0.0036	-0.0316	-0.0044	-0.0249	-0.0161	-0.0075	-0.0063	-0.0096
	(-2.42)	(-8.67)	(-1.25)	(-1.78)	(-3.91)	(-1.25)	(-0.78)	(-5.76)	(0.18)	(-2.70)	(-5.35)	(-2.71)	(-5.39)	(-0.38)	(-4.16)	(-0.61)	(-4.63)	(-2.02)	(-1.61)	(-1.37)	(-1.49)
BTM-Trend	-0.0024	0.0014	0.0044	0.0096	0.0014	-0.0004	0.0071	0.0040	0.0009	0.0011	0.0106	0.0006	0.0042	0.0102	0.0116	0.0011	-0.0017	-0.0153	0.0156	0.0106	0.0338
	(-1.43)	(2.94)	(2.75)	(3.24)	(0.50)	(-0.15)	(3.16)	(1.54)	(0.33)	(0.73)	(5.85)	(0.44)	(1.68)	(2.37)	(3.22)	(0.57)	(-1.50)	(-2.63)	(5.52)	(5.57)	(3.76)
EP-Trend	0.0304	-0.0328	0.0020	-0.0398	0.0564	-0.0105	0.0540	-0.0334	-0.0099	0.0289	-0.0187	0.0088	0.0041	-0.0061	-0.0495	-0.0270	0.0367	0.1121	-0.0138	0.0046	-0.0362
	(0.89)	(-3.80)	(0.14)	(-1.25)	(1.26)	(-0.87)	(2.58)	(-1.73)	(-0.69)	(1.51)	(-1.05)	(0.63)	(0.22)	(-0.18)	(-2.13)	(-2.32)	(2.11)	(3.66)	(-0.94)	(0.27)	(-1.23)
Lag52	0.0008	-0.0040	0.0045	-0.0045	0.0089	0.0028	-0.0020	0.0018	0.0011	-0.0128	0.0005	0.0074	0.0028	0.0054	0.0037	0.0033	0.0032	-0.0105	-0.0035	-0.0017	-0.0080
	(0.23)	(-1.81)	(2.00)	(-1.69)	(1.26)	(0.97)	(-0.79)	(1.04)	(0.27)	(-2.36)	(0.28)	(3.47)	(1.06)	(1.45)	(1.07)	(0.95)	(1.41)	(-2.50)	(-1.41)	(-0.81)	(-2.45)

My results are robust to:[213]

- univariate or multivariate betas;
- different holding period lagged returns and raw or unexpected returns;
- trailing time trends using the entire time-series;
- different trimming procedures;
- two sub-periods, before and after the Mexican crisis of December 1994.
- the two main regions, Latin America and Asia.

Finally, to account for the different precision of the estimates, I have computed the mean payoffs and associated t-values as suggested by Litzenberger and Ramaswamy (1979); I have then computed the market and overall rankings of these time-series precision weighted t-values. This alternative procedure elects the same top 6 factors for almost all the specifications I have analysed.

6.5.2.3 Correlation in Payoffs

To find out more about the commonality of the factors that investors elect to price securities, I have looked at the correlations between the estimated payoffs among emerging markets, over the period 1990 to 1996.

Table 6.11 summarises the results. The values for the correlations of the payoffs for any of the 6 most important factors elected for the universe of emerging markets, are very close to zero. This is true for all specifications. I have looked at the correlation of payoffs at a regional level but the average correlations are still close to zero. Both real economic integration or financial market integration do not seem to be reflected in the correlation of the payoffs. These low correlations seem to provide indirect evidence against integration and confirm the local character of pricing, as the first part of this chapter suggested.

Given that these payoffs are measured with error, it is important to interpret these results with caution. It may be the case that these low correlations simply reflect that.

6.5.2.4 Discussion

Haugen and Baker (1996) study 5 mature markets (US, Germany, France, UK and Japan) and find an even stronger degree of commonality among the most important factors in explaining the cross-section of stock returns. The average absolute t-values

213 For space constraints, I do not report here the estimates of the alternative specifications. Results are available upon request.

across the 5 markets elect primarily technical factors (1, 3 and 12 month excess returns) and attributes (book-to-market, earnings-to-price and cash flow-to-price). Yet they get the "right" signs for these latter regressors.

Table 6.11 - The Mean Correlation between Payoffs to the Top 6 Factors across 21 Emerging Markets

This table shows the average, minimum and maximum correlations of weekly payoffs within emerging markets, for the 6 most important factors for the universe of emerging markets, over the period 1990 to 1996. The factors elected result from ranking the cross-markets average of absolute time-series means of the *t*-values in each market. Panel I refers to the specification where *BTM*, *EP* and *DY* are the weekly usual ratios. Panel II refers to the specification that uses instead trailing (52 to 104 weeks) time trends for those variables.

I. Base Specification

Ranking	Factor	Mean	Minimum	Maximum
1	Lagged 12 Weeks Holding Period Returns	0.00	-0.20	0.25
2	E/P	0.00	-0.31	0.25
3	BTM	0.01	-0.22	0.22
4	DY	0.06	-0.16	0.29
5	Size	-0.01	-0.24	0.18
6	Price Per Share	0.01	-0.18	0.26

II. Time Trend Specification

Ranking	Factor	Mean	Minimum	Maximum
1	Price per Share	0.00	-0.24	0.25
2	Size	-0.01	-0.23	0.17
3	Lagged 12 Weeks Holding Period Returns	0.00	-0.25	0.26
4	BTM-Trend	0.01	-0.16	0.21
5	EP-Trend	0.01	-0.31	0.30
6	Lagged 52 Weeks Holding Period Returns	0.01	-0.20	0.29

Claessens, Dasgupta and Glen (1995), Fama and French (1998) and Rouwenhorst (1998) look at the cross-section of returns in emerging markets. The first study uses the Fama and Macbeth (1973) estimation technique but the last two analyse, instead, the differences in returns for portfolios based on book-to-market, earnings-price, size and momentum. Claessens *et al.* (1995) also gets "wrong signs" for the attributes. The other two studies get the right signs but their evidence is statistically weak.[214] Fama and

[214] For example, Fama and French (1998) find that in 12 out of 16 markets, high book-to-market stocks outperform low book-to market stocks; high earnings-price stocks outperform low earnings-price stocks in 10 out of 16 markets, and small stocks outperform large stocks in 11 out of 16 markets. Yet only a few of these differences are statistically significant. Rowenhorst (1998) finds

French (1998) suggest that the "wrong" coefficients could result from influential observations. Yet I have repeated the analysis using different trimming procedures and the signs continue to be opposite to the expectations. However, as I have shown above, when I smooth the attributes using time trends, I get the right signs in many of those markets, especially in the case of book-to-market payoffs.

Hawawini and Keim (1994) conduct a survey of the international literature on the determinants of stock returns. Models have been estimated for Australia, Belgium, Canada, Finland, France, Germany, Ireland, Japan, New Zealand, Spain, Switzerland, Taiwan and the United Kingdom. Most of these studies examine the effects of beta and size. In all countries except France and Japan, the analysis of the cross-section of returns within markets shows a negative relation between size and return and most of them are unable to find any relation between returns and market risk. There is, however, a wide range of average sizes across countries. The sample periods and size also differ across countries. As a consequence the magnitude and significance of the size premium varies widely across markets. Most of these studies use monthly data and large size and long sample periods (from 7 to 40 years).

Non-US evidence regarding other effects (for example, price-level attributes) is scarce.

It is important to stress that none of the three studies above finds a significant role for the traditional risk factors.

Similarly, both Haugen and Baker (1996) and Rowenhorst (1998) report very low correlations among any of the payoffs to the most important factors.

6.6 SUMMARY OF FINDINGS

My main findings are:

i.1 Country factors are very significant and are the most important factors driving the behaviour of emerging markets' stock returns.

i.2 Emerging markets' indices are driven by country factors as documented previously for mature markets. This result is valid on average and for any particular country index analysed. Thus, cross-markets correlations are not affected by the industrial composition of the indices.

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similar evidence for those factors and, in addition, he finds that winners outperform losers in 17 out of 20 markets. Yet, again, only a few markets show statistically significant differences in returns between winners and losers.

i.3 Industry indices are driven by industry pure factors and by geographical adjustments.

i.4 Industry indices are powerful diversification tools opposed to market indices. Cross-market diversification seems to be a better bet than cross-industry diversification. The best strategy is to invest across markets and across industries. The very close second best is to invest across markets regardless of the elected industry. Apparently, this might appear like ignoring industry diversification but it is not, because the broad industry classification already entails an important degree of industrial diversification. A finer industry partition shows that ignoring the industrial mix will lead to an important loss of diversification benefits and that the broad classification approach misclassifies some of those benefits.

i.5 The diversification potential in emerging markets is stronger than in mature markets. The reason for this difference could lie in the different importance of common factors in the two groups. Because international investors are not allowed or not willing to invest in some of these markets due to formal or informal barriers, further analysis should give estimates of the benefits of international diversification of feasible international portfolio allocation strategies.

i.6 For the period analysed, it would have been possible to obtain close to maximum diversification by focusing on one region only. Yet, within regions, it would be unwise to invest only in one market, assuming all the individual constituent markets were alike.

In regard of the cross-section of returns across 21 emerging markets, my main findings are:

ii.1 Technical factors are the most important factors.

ii.2 Attributes seem to play an important role as well. While my base specification shows negative payoffs for these factors, the use of trailing time trends generates more "reasonable" mean estimates.

ii.3 Liquidity factors are in the top 6 as well but the average payoffs are surprisingly positive.

ii.4 There is commonality of factors across emerging markets. Yet the correlation between the payoffs to these factors are close to zero. The cross-sectional differences in returns thus seem to be primarily driven by local factors, as the first part of this study has found.

ii.5 My results show some similarities with the findings for mature markets. Technical factors are among the top 6 most important factors both for emerging and mature markets; attributes also play an important role. The correlation of the payoffs is very low in both groups of markets.

6.7 CONCLUSIONS

Previous evidence has shown that portfolio diversification into emerging markets improves its risk-adjusted performance. Yet no research has been conclusive about what is behind the correlation structure of returns that is the basis for those gains. My research tries to shed light on that issue. There is still debate among academicians and practitioners about the influence of industrial composition of the indices in the less-than-perfect correlation between markets indices. Another important issue is the possible effects of the globalisation of the economy and liberalisation of capital on correlations.

I have assessed the importance of global, country and industry factors. My results show that country pure effects are the most important factors driving the behaviour of emerging markets' individual stock returns. Emerging markets' indices are driven by country factors, as documented previously for mature markets, and cross-market correlations do not seem to be affected by the industrial composition of the indices. Cross-market diversification seems to be a better bet than cross-industry diversification. The best strategy is to invest across markets and across industries. The very close second best is to invest across markets regardless of the elected industry. A finer industry partition shows, however, that ignoring the industrial mix could lead to an important loss of diversification benefits.

I have then investigated the role of risk and non-risk variables in explaining individual stock returns. My results indicate that the most important factors are common to emerging markets and these important factors are similar to those identified by the literature for mature markets. Among the top 6 factors are technical factors, attributes (price level factors) and liquidity factors. The payoffs to these factors are not correlated, however, even at a regional level, suggesting that even if investors across markets elect similar factors to price assets, those factors' risk premia are local.

The results I get - that local factors are the main driving forces of market indices after adjusting for industry effects; that the influence of common factors is small; and that payoffs to the most important pricing factors are uncorrelated - seem to suggest that markets are segmented, and this is valid even if those pricing factors are the same. The time period of my analysis spans from January 1990 to December 1996. This is a relatively short period. While a longer period would benefit the analysis by allowing more precise estimation of factors and risk premia, there is no reason to assume a constant factor structure of returns: the degree of integration, either between economies or between stock markets, in these markets has been changing over the recent period, Therefore, my results should be read as informative regarding the structure of stock returns in emerging markets for this particular period.

I have evaluated the robustness of my results to different specification models; for different estimation periods for the risk factors; to different sub-samples: before and after the Mexican crisis in 1994 and for Latin America and Asia. I have considered different procedures to account for extreme observations. Finally I have used powerful techniques to assess significance. The importance of country factors versus industry factors is notorious. The payoffs associated to each of the different factors in the cross-section of returns change across markets and for the different specifications and robustness analyses. Yet overall the top 6 factors in the universe of emerging markets remain fairly constant. Therefore, the importance of my results lies more on the commonality of important factors and less on the particular payoffs that are observed, that differ across markets and over time.

APPENDIX F - ADDITIONAL TABLES FOR CHAPTER 6

Table F.1 - Variance Decomposition of Regional and Industry Indices

This table gives the variance of global, regional and industry effects for the equally-weighted regional and industry indices. Each regional index return is decomposed in a common effect plus a region "pure" effect and a sum of the constituent industry effects. Each industry index return is decomposed in a common effect plus an industry "pure" effect and a sum of the constituent regional effects. Regional and industry effects are the differential effects relative to the emerging markets' average. The ratio gives the proportion of the variance of a particular component relative to the variance of the index return, raw or in excess of the emerging markets' average. All returns are measured in US dollars per week.

I. Regional Indices

	EM Average		Pure Region*		Sum of Industry Effects**	
Region	Variance	Ratio to Regional Index	Variance	Ratio to Regional Index in Excess of EM Average	Variance	Ratio to Regional Index in Excess of EM Average
Africa	0.0002	0.2724	0.0007	1.0398	0.0000	0.0243
Asia	0.0003	0.6710	0.0001	0.9918	0.0000	0.0024
Europe-MEast	0.0003	0.4098	0.0006	1.0214	0.0000	0.0039
Latin America	0.0003	0.3197	0.0006	0.9964	0.0000	0.0026
Cross-Region Average		*0.4182*	*0.0005*	*1.0123*	*0.0000*	*0.0083*
Cross-Region Median		*0.3648*	*0.0006*	*1.0089*	*0.0000*	*0.0032*

* Average return of firms in a region in excess of the emerging markets' average after adjusting for its industrial composition.

** Component of a regional index that is due to a differential industrial composition in relation to the emerging markets' average.

Table F.1 - Variance Decomposition of Regional and Industry Indices (cont.)

II. Industry Indices

	EM Average		Pure Industry*		Sum of Regional Effects**	
Industry	Variance	Ratio to Industry Index	Variance	Ratio to Industry Index in Excess of EM Average	Variance	Ratio to Industry Index in Excess of EM Average
Agriculture		0.5782	0.0003	0.9641	0.0000	0.0431
Mining		0.4491	0.0004	0.9278	0.0001	0.1383
Construction		0.4587	0.0003	0.8330	0.0000	0.1446
Manufacturing		0.8920	0.0000	0.9170	0.0000	0.0261
Transport, Utilities		0.6237	0.0002	0.8616	0.0001	0.2584
Wholesal,Retail Trade		0.7417	0.0002	0.9645	0.0000	0.0323
Finance,Insurance,RE		0.7988	0.0001	0.9081	0.0000	0.0858
Services		0.4243	0.0003	0.7988	0.0001	0.1538
Other		0.4721	0.0003	1.0610	0.0000	0.0421
Cross-Industry Average	*0.0003*	*0.6043*	*0.0002*	*0.9151*	*0.0000*	*0.1027*
Cross-Industry Median		*0.5782*	*0.0003*	*0.9170*	*0.0000*	*0.0858*

* Average return of firms in an industry in excess of the emerging markets' average after adjusting for its regional composition.

** Component of an industry index that is due to a differential regional composition in relation to the emerging markets' average.

Table F.2 - Adjusted Regional Indices
Statistics and Correlation Coefficients

This table shows means and standard deviations and the cross-region correlation of the weekly equally-weighted regional indices adjusted for their industrial composition. It also shows the correlation of returns between these adjusted indices and the World FT&SP-A index. All returns are measured in US dollars per week.

Region	Mean	Std. Dev.	EM Average	Africa	Asia	Europe-MEast	Latin America	World
EM Average	-0.0003	0.0175	1.00					
Africa	0.0050	0.0277	0.31	1.00				
Asia	-0.0013	0.0213	0.86	0.14	1.00			
Europe-Meast	-0.0006	0.0276	0.50	0.09	0.31	1.00		
Latin America	0.0012	0.0310	0.60	0.14	0.17	0.14	1.00	
World (not adjusted)	0.0014	0.0163	0.44	0.08	0.36	0.34	0.25	1.00

Table F.3 - Diversification Benefits

Regional vs. Industry Allocation

This table compares the average variance of individual stock returns (*No Diversification*) with the variance of an equally-weighted portfolio of the emerging markets' firms in sample (*Diversifying Across All Emerging Markets' Stocks*) and the variances attainable by *Diversifying Across Regions Within a Single Industry* and by *Diversifying Across Industries Within a Single Region.* These latter variances are weighted by the average ratio of the number of companies in a region or industry relative to the total number of firms in the sample. The proportions are computed relative to the scenario of no diversification. Weekly variances of total returns are measured in US dollars for the period of January 1990 to December 1996.

	Variance	Proportion	
Average Individual Stocks	0.0051	100%	*No Diversification*
Average Regional Indices	0.0006	12%	*Industry Diversification*
Average Industry Indices	0.0004	8%	*Regional Diversification*
EW Emerging Markets' Index	0.0003	6%	*Maximum Potential Diversification*

Table F.4 -Variance Decomposition of Markets and SIC Two-Digits Industry Indices
This table gives the variance of global, country and industry effects for the equally-weighted regional and SIC two-digit industry indices (weekly data, January 1990 or later to December 1996). Each region index return is decomposed in a common effect plus a country "pure" effect and a sum of the constituent industry effects. Each industry index return is decomposed in a common effect plus an industry "pure" effect and a sum of the constituent regional effects. Country and industry effects are the differential effects relative to the emerging markets' average. The ratios give the proportion of the variance of a particular component relative to the variance of the index return, raw or in excess of the emerging markets' average. All returns are measured in US dollars per week.

I. Country Indices

	EM Average		Pure Country*		Sum of Industry Effects**	
Country	Variance	Ratio to Market Index	Variance	Ratio to Market Index in Excess of EM Average	Variance	Ratio to Market Index in Excess of EM Average
Argentina		0.0589	0.0049	1.0003	0.0000	0.0035
Brazil		0.0652	0.0038	0.9970	0.0000	0.0023
Chile		0.3925	0.0009	1.0211	0.0001	0.0596
Colombia		0.2374	0.0014	1.0022	0.0000	0.0115
Greece		0.2109	0.0014	1.0240	0.0000	0.0190
India		0.3063	0.0006	1.0170	0.0000	0.0115
Indonesia		0.1690	0.0017	1.0062	0.0000	0.0087
Jordan		0.5074	0.0008	1.0371	0.0000	0.0171
Korea		0.2563	0.0011	0.9517	0.0000	0.0189
Malaysia		0.2602	0.0008	0.9556	0.0000	0.0183
Mexico		0.1935	0.0013	0.9799	0.0000	0.0083
Philippines		0.2652	0.0009	0.9257	0.0001	0.1012
Portugal		0.4437	0.0007	1.0538	0.0000	0.0200
Taiwan		0.1083	0.0023	1.0177	0.0000	0.0026
Thailand		0.1670	0.0013	0.9678	0.0000	0.0125
Turkey		0.0507	0.0055	1.0059	0.0000	0.0022
Venezuela		0.0758	0.0044	1.0095	0.0000	0.0022
Cross-Country Average (#17)	*0.0003*	*0.2217*	*0.0020*	*0.9984*	*0.0000*	*0.0188*
Cross-Country Median (#17)		*0.2109*	*0.0013*	*1.0059*	*0.0000*	*0.0115*
China		0.0380	0.0044	0.9869	0.0000	0.0017
Hungary		0.1358	0.0016	1.0068	0.0000	0.0168
Pakistan		0.0338	0.0059	1.0001	0.0000	0.0028
Peru		0.2230	0.0009	1.0018	0.0000	0.0092
Poland		0.1095	0.0018	1.0198	0.0000	0.0183
South Africa		0.2160	0.0008	1.0047	0.0000	0.0292
Sri Lanka		0.1801	0.0012	0.9977	0.0000	0.0072
Nigeria		0.0187	0.0117	1.0043	0.0000	0.0024
Zimbabwe		0.2001	0.0011	0.9952	0.0000	0.0132
Cross-Country Average (#26)	*0.0003*	*0.1893*	*0.0024*	*0.9996*	*0.0000*	*0.0162*
Cross-Country Median (#26)		*0.1868*	*0.0013*	*1.0033*	*0.0000*	*0.0115*

* Average return of firms in a country in excess of the emerging markets' average after adjusting for its industrial composition.

** Component of a country index that is due to a differential industrial composition in relation to the emerging markets' average.

Table F.4 -Variance Decomposition of Markets and SIC Two-Digits Industry Indices (cont.)

II. Industry Indices

	EM Average		Pure Industry*		Sum of Geographical Effects**	
Industry	Variance	Ratio to Industry Index	Variance	Ratio to Industry Index in Excess of EM Average	Variance	Ratio to Industry Index in Excess of EM Average
Cross-Industry Average	*0.0003*	*0.3035*	*0.0009*	*0.5818*	*0.0007*	*0.4694*
Cross-Industry Median		*0.2805*	*0.0004*	*0.5854*	*0.0003*	*0.4742*

* Average return of firms in an industry in excess of the emerging markets' average after adjusting for its geographical composition.

** Component of an industry index that is due to a differential geographical composition in relation to the emerging markets' average.

Table F.5 - Diversification Benefits
Market vs. SIC Two-Digits Allocation

This table compares the average variance of individual stock returns (*No Diversification*) with the variance of an equally-weighted portfolio of the emerging markets' firms in sample (*Diversifying Across All Emerging Markets' Stocks*) and the variances attainable by *Diversifying Across Markets Within a Single Industry* and by *Diversifying Across Industries Within a Single Market*. These latter variances are weighted by the average ratio of the number of companies of a market or industry relative to the total number of firms in the sample. The proportions are computed relative to the scenario of no diversification. Weekly variances of total returns are measured in US dollars for the period of January 1990 to December 1996.

	Variance	Proportion	
Average Individual Stocks	0.0051	100%	*No Diversification*
Average Country Indices	0.0022	43%	*Industry Diversification*
Average Industry Indices [Range]	0.0017 [0.0003, 0.0130]	34%	*Geographical Diversification*
EW Emerging Markets' Index	0.0003	6%	*Maximum Potential Diversification*

Table F.6 - Currency Effects (I)

Variance Decomposition of Country Indices

Local Currency *vs.* US Dollars

This table compares the variance decomposition of local currency *vs.* US dollars equally-weighted market indices' weekly returns. Each market index return is decomposed in a common effect plus a country "pure" effect and a sum of the constituent industry effects. Country and industry effects are the differential effects relative to the emerging markets' average. The "ratio" gives the ratio of the variance of a particular component relative to the variance of the index return, raw or in excess of the emerging markets' average. *t*-dif gives the statistic for a difference *t*-test between US $ and local currency denominated effects.

Country	Country Pure Effects*					Sum of Industry Effects**				
	Variance		Ratio to Regional Index in Excess of EM Average		*t*-dif	Variance		Ratio to Regional Index in Excess of EM Average		*t*-dif
	US$	LC	US$	LC		US$	LC	US$	LC	
Argentina	0.0048	0.0063	0.9969	0.9975		0.0000	0.0000	0.0010	0.0007	
Brazil	0.0038	0.0044	0.9998	1.0002		0.0000	0.0000	0.0005	0.0005	
Chile	0.0009	0.0008	1.0229	1.0153		0.0000	0.0000	0.0152	0.0172	
Colombia	0.0014	0.0014	1.0030	1.0004		0.0000	0.0000	0.0011	0.0012	
Greece	0.0013	0.0012	1.0047	1.0063		0.0000	0.0000	0.0037	0.0041	
India	0.0006	0.0016	1.0050	1.0016		0.0000	0.0000	0.0023	0.0052	
Indonesia	0.0017	0.0006	1.0012	1.0047		0.0000	0.0000	0.0050	0.0024	
Jordan	0.0007	0.0007	1.0226	1.0206		0.0000	0.0000	0.0043	0.0046	
Korea	0.0011	0.0011	0.9975	0.9981		0.0000	0.0000	0.0035	0.0036	
Malaysia	0.0008	0.0008	0.9648	0.9659		0.0000	0.0000	0.0117	0.0119	
Mexico	0.0014	0.0007	0.9991	1.0001		0.0000	0.0000	0.0018	0.0034	
Philippines	0.0009	0.0008	0.9690	0.9588		0.0001	0.0001	0.0657	0.0718	
Portugal	0.0006	0.0004	1.0183	1.0286		0.0000	0.0000	0.0055	0.0080	
Taiwan	0.0022	0.0021	1.0026	1.0032		0.0000	0.0000	0.0006	0.0006	
Thailand	0.0013	0.0013	0.9934	0.9925		0.0000	0.0000	0.0039	0.0040	
Turkey	0.0055	0.0052	1.0045	1.0045		0.0000	0.0000	0.0007	0.0007	
Venezuela	0.0044	0.0025	1.0065	1.0125		0.0000	0.0000	0.0006	0.0012	
China	0.0045	0.0045	1.0007	1.0001		0.0000	0.0000	0.0003	0.0003	
Hungary	0.0016	0.0014	1.0046	1.0091		0.0000	0.0000	0.0039	0.0043	
Pakistan	0.0009	0.0003	1.0018	0.9814		0.0000	0.0000	0.0016	0.0133	
Peru	0.0018	0.0009	1.0167	1.0026		0.0000	0.0000	0.0087	0.0018	
Poland	0.0058	0.0016	0.9979	1.0126		0.0000	0.0000	0.0007	0.0093	
South Africa	0.0008	0.0059	0.9725	0.9975		0.0000	0.0000	0.0202	0.0006	
Sri Lanka	0.0012	0.0003	0.9999	0.9421		0.0000	0.0000	0.0026	0.0480	
Nigeria	0.0117	0.0012	1.0034	0.9993		0.0000	0.0000	0.0004	0.0027	
Zimbabwe	0.0012	0.0010	1.0094	1.0069		0.0000	0.0000	0.0057	0.0065	
Cross-Country Average	*0.0024*	*0.0019*	*1.0007*	*0.9986*	(0.77)	*0.0000*	*0.0000*	*0.0066*	*0.0088*	(-1.08)
Cross-Country Median	*0.0013*	*0.0012*	*1.0022*	*1.0010*		*0.0000*	*0.0000*	*0.0031*	*0.0038*	

* Average return of firms in an industry in excess of the emerging markets' average after adjusting for its geographical composition.

** Component of an industry index that is due to a differential geographical composition in relation to the emerging markets' average.

Table F.7 - Currency Effects (II)

This table summarises the weekly time series regressions of country pure effects against the exchange rate effects over the period January 1990 to December 1996. The independent variable (X) is defined as the differential relative to the average currency effect of the equally-weighted emerging market index. The values reported in parenthesis are *t-values* for the slope. R^2 is the time-series regression R^2. The *p-value* reported in the last column is for the *t*-test of the hypothesis that the slope is equal to minus one.

	DF	Intercept	X	R^2	*p*-value X=-1
Argentina	362	0.0034	-0.0781 (-0.88)	0.00	0.0001
Brazil	362	0.0066	-0.2387 (-2.53)	0.02	0.0001
Chile	362	-0.0001	-1.1695 (-7.19)	0.12	0.2983
Colombia	362	0.0025	-0.8760 (-4.72)	0.06	0.5050
Greece	362	-0.0030	-0.8767 (-6.42)	0.10	0.3674
India	362	-0.0013	-0.7662 (-4.10)	0.04	0.2123
Indonesia	324	-0.0051	-1.1619 (-4.77)	0.07	0.5066
Jordan	362	-0.0029	-0.9150 (-4.81)	0.06	0.6548
Korea	362	-0.0063	-1.0741 (-3.60)	0.03	0.8037
Malaysia	362	-0.0005	-0.6539 (-2.89)	0.02	0.1268
Mexico	362	-0.0005	-1.1667 (-17.75)	0.47	0.0117
Philippines	362	-0.0025	-0.8236 (-6.37)	0.10	0.1735
Portugal	362	-0.0043	-0.9120 (-12.71)	0.31	0.2210
Taiwan	362	-0.0078	-1.7828 (-4.90)	0.06	0.0322
Thailand	362	-0.0047	-0.7957 (-2.52)	0.02	0.5184
Turkey	362	0.0038	-0.7430 (-5.17)	0.07	0.0744
Venezuela	362	0.0068	-1.0145 (-16.70)	0.44	0.8122
China	206	-0.0019	-0.4844 (-1.97)	0.02	0.0375
Hungary	206	0.0011	-1.1490 (-4.82)	0.10	0.5324
Pakistan	258	-0.0042	-0.8699 (-4.07)	0.06	0.5430
Peru	206	0.0010	-1.4446 (-4.28)	0.08	0.1890
Poland	206	0.0082	-0.0959 (-0.16)	0.00	0.1220
South Africa	206	-0.0001	-1.2030 (-17.99)	0.61	0.0027
Sri Lanka	206	-0.0043	-1.3999 (-2.96)	0.04	0.3987
Nigeria	180	0.0096	-0.9907 (-78.32)	0.97	0.4547
Zimbabwe	180	0.0079	-0.7413 -78.32	0.14	0.0594
Number of Rejections of			X=0		X=-1
			24		18

Table F.8 - Firms in Sample
Descriptive Statistics
This table shows the averages for a set of attributes of the firms in sample. Data was obtained from Emerging Markets Data Base (EMDB), International Finance Corporation, World Bank. The statistics are time-series averages, over the sample period, of cross-sectional medians (weekly data, January 1990 to December 1996). *N* is the number of firms for each market at the end of 1996. *PER* is the price-earnings ratio. *PBV* is the price-book value. *DY* is the dividend yield. *MV* is the market capitalisation (US $).

	N	PER	PBV	DY	MV
Argentina	38	6.37	0.96	0.0146	179
Brazil	99	6.13	0.65	0.0133	247
Chile	51	15.12	1.88	0.0139	390
Colombia	27	13.03	1.38	0.0058	261
Greece	69	12.77	2.62	0.0370	125
India	151	22.19	3.55	0.0141	232
Indonesia	110	16.23	1.95	0.0204	212
Jordan	58	13.58	1.87	0.0589	25
Korea	185	20.17	1.19	0.0168	334
Malaysia	179	26.35	3.20	0.0117	544
Mexico	114	11.67	1.46	0.0165	450
Philippines	71	20.22	2.44	0.0011	168
Portugal	46	14.48	1.40	0.0257	124
Taiwan	113	25.23	2.81	0.0083	587
Thailand	115	17.05	2.74	0.0229	400
Turkey	64	15.65	3.79	0.0443	174
Venezuela	23	14.04	1.89	0.0049	162
China	174	35.03	3.54	0.0159	120
Hungary	16	6.60	1.61	0.0458	49
Pakistan	87	16.30	3.07	0.0176	56
Peru	40	14.76	2.28	0.0114	28
Poland	28	17.64	3.00	0.0182	114
South Africa	65	20.01	2.83	0.0122	1331
Sri Lanka	51	13.30	2.29	0.0180	26
Nigeria	16	9.90	3.24	0.0920	47
Zimbabwe	24	6.38	1.02	0.0298	34

APPENDIX G - FACTORS IN THE CROSS-SECTIONAL REGRESSIONS

This appendix describes the factors used in the cross-sectional regressions in chapter 6.

I. Risk Factors

- Local market beta (trailing 52 to 104 weeks regression of excess returns on excess local market returns; US dollars; univariate and multivariate)
- World market beta (trailing 52 to 104 weeks regression of excess returns on excess world market returns; US dollars; univariate and multivariate)
- Currency beta (trailing 52 to 104 weeks regression of excess returns on exchange rate against the US dollar)
- Macroeconomic betas (trailing 52 to 104 weeks regression of local currency/US dollars returns) on:
    - Inflation rates
    - Nominal local interest rates
    - Percentage changes in industrial production
    - Change in total exports (US $)
- Volatility of total returns (trailing 52 to 104 weeks)
- Residual variances (from trailing 52 to 104 weeks regressions with one factor, the local market; or two factors, local market and world market factors)

II. Liquidity Factors

- Market capitalisation (natural log of US dollars current market price times the number of shares outstanding)
- Market price per share (prices are not adjusted for capital changes)

III. Factors Indicating Price Level (Stocks' Attributes)

- Earnings to price ratio (EP)
    - Earnings to current price (for negative earnings this variable is zero)
    - Earnings to price trend (all sample and 104 weeks trailing time trend in earnings to price)
    - Zero/one dummy variable (reflecting positive or negative earnings)
- Book-to-market ratio (BTM)
    - Ratio of book value to market value
    - Book-to-market trend (all sample and 104 weeks trailing time trend in book-to-market)
- Dividend yield (DY)
    - Dividend to price (computed as the most recently available dividend yields brought forward one year)
    - Dividend yield trend (all sample and 104 weeks trailing time trend in dividend yield)

IV. Technical Factors

- 1 to 12 and 26 weeks lagged returns
- Buy and Hold 8, 12, 26 and 52 lagged returns (all lagged one week to account for the bid-ask bounce)
- Five-weeks moving averages of Buy and Hold 8, 12, 26 and 52 lagged returns (all lagged one week to account for the bid-ask bounce)
- The same variables with unexpected returns (expected returns are defined either as the mean returns over the sample period except that week or as the local market return).

V. Sector Dummies

Sector dummies reflecting affiliation to one of the nine SIC broad industry categories:

- Agriculture, Foresting and Fishing
- Mining
- Construction
- Manufacturing
- Transportation, Communication, Electric, Gas and Sanitary Services
- Wholesale Trade and Retail Trade
- Finance, Insurance and Real Estate
- Services
- Government
- Diversified, Holding Companies

CHAPTER 7.

CONCLUSION

7.1 SUMMARY OF FINDINGS

This thesis investigated the relationship between international capital market integration and asset pricing. International Asset Pricing theory suggests that, if markets are segmented, then pricing rules should be different across markets. Furthermore, for a particular market, the pricing rule should reflect the degree of segmentation of that market.

My tests of segmentation of international capital markets use extensive new data on emerging stock markets. These are out-of-sample tests and hence my results provide additional insights into International Asset Pricing issues.

Part I provided an overview of these markets regarding the magnitude of foreign capital flows; market features; formal and informal barriers to free investment; availability of data and summary statistics. Several important features stand out:

- the importance of liberalisation and modernisation in these markets and the increasing presence of foreign investors.

- the wide differences across markets classified as emerging, in economic and financial market indicators, as well as in the severeness of restrictions to foreign investors.

- two salient common features in returns: high volatility and low correlation within emerging markets and with mature markets.

Part II reviewed the literature on International Asset Pricing, giving special emphasis to integration-segmentation and international portfolio diversification issues. A special section was dedicated to studies that have used emerging markets' data.

The existing evidence has given support to a mild segmentation pricing structure in emerging markets. Yet the asset pricing models' results did not always reflect the existing formal or informal barriers in a particular market. Better measures of the degree of segmentation could help to clarify the relationship between barriers, segmentation and asset pricing structures.

Another important result that was well established in the literature is the diversification potential of emerging markets but little was known about the driving forces of return behaviour across markets.

In Part III, I performed direct and indirect tests of international market segmentation using data from emerging markets.

Country Funds

I investigated whether the different pricing for country funds and for the underlying assets could be explained by segmentation of international capital markets. The theory states that discounts/premia would be a function of the potential diversification of assets held by the fund - reflected in the exposures of the fund and its underlying assets to world and local risk factors -, and of the degree of segmentation in that market - reflected in differential risk premia. My results suggest that country funds as well as their underlying assets, are priced as if markets are mildly segmented. I find that the variation in country funds' discounts, over time and across markets, is a function of the funds' exposures to the world market risk factor. The results are inconclusive regarding exposures to local risk factors and proxies for the degree of market segmentation. Overall, my evidence implies that a segmentation-based explanation alone cannot account for the time series and cross-sectional variation in discounts.

A side exploration of the noise traders' sentiment model, as basis for variation in discounts, shows that country funds' returns co-move with small and illiquid stocks. Yet discounts and price returns seem to be predictable in the short run, contradicting one central assumption of the sentiment model.

Dual-Listings

If markets are segmented, then the listing of a previously restricted security in an international market should partially dismantle the segmentation. We should then observe a positive impact on the valuation of the dual listed stock and a decline in its required return, reflecting that the pricing rule changed. I first examined the effects of international dual listings on local stock returns around the listing date. My results confirm previous findings for the case of emerging markets' stocks: firms experience positive abnormal returns in the weeks around the listing date and negative abnormal returns in the weeks that follow the listing. When I compared the results for emerging markets with a control a sample of European dual listings, I found that emerging markets' firms register stronger positive and stronger negative abnormal returns. I further investigated these results by comparing the abnormal returns across two stock exchanges: NYSE and London SEAQ-I. The results show that, regardless of the exchange, the pattern of abnormal returns for emerging markets' firms is similar. Differently, for mature markets' firms, the mentioned pattern occurs only with dual-listings on the NYSE. This positive valuation impact of NYSE listings could be related to awareness or liquidity arguments The fact that firms that originate from markets with high barriers to free investment always register a positive valuation impact, while European firms only show that same pattern when listing on the NYSE, could be supportive of a segmentation-based explanation. For some selected markets, I then compared the magnitude and significance of the abnormal returns observed, with the prevailing barriers in that market. Results are mixed. The cross-sectional analysis that explicitly measures the relationship between the variables dictated by an International Asset Pricing model and the valuation effects produces weak results. Yet I found one important result: one of the proxies for the degree of segmentation is economically and statistically significant. Overall, the results imply that emerging markets are segmented.

Factors in Stock Returns

My third study investigated the factors that drive individual stock returns in emerging markets.

First I analysed the importance of country vis-à-vis industry factors. Similarly to what has been found for mature markets, I found that country factors are the most important factors in explaining stock returns for all the emerging markets analysed. These results have important implications for portfolio diversification: regardless of the industry considered, geographical diversification dominates, in terms of risk reduction, domestic industrial diversification. For a finer industry classification, that dominance is still valid, but ignoring industrial diversification represents a much more important loss of diversification benefits. Another important result is the small role played by regional factors, showing that, even within one region, the constituent markets are driven by local rather than regional effects. For the period analysed, focusing on one particular region offered diversification benefits similar to those obtainable by investing over the universe of emerging markets. Finally another important result has to do with the role of common factors within emerging markets. Common factors play a smaller role for emerging markets than for mature markets, showing either that emerging markets share few pricing factors, or alternatively that those factors are priced differently. When the analysis is within one region, the common factor is only slightly more important.

Second I analyse the role of a set of factors suggested by the asset pricing literature. I find that, across emerging markets, investors elect similar factors to price assets. The most important factors are technical factors (lagged returns) and price-level attributes, such as earnings-price, book-to-market, dividend yield, price per share and size. This set of factors is similar to the ones that have been found for mature markets. For emerging markets as well as for mature markets, the cross-market correlation of the payoffs to these factors is very low.

Altogether the results of this study suggest that emerging markets are segmented amongst themselves.

7.2 IMPLICATIONS

International Capital Market Segmentation

My empirical studies confirmed previous evidence suggesting that emerging markets are segmented from mature markets as well as amongst themselves. This is suggested by the asset pricing structures that seem to characterise returns in these markets:

- both country funds and their underlying assets are priced relative to local and world risk factors;
- local and world risk factors are relevant pricing factors for dual-listed stocks. Moreover there is a positive valuation effect when dual-listing occurs and a significant increase in the exposure to the world market factor.
- individual stock returns across emerging markets share the most important pricing factors but the price of risk appears to be set locally.

Thus, these results are supportive of different pricing rules and different risk premia.

Degree of Segmentation

I have used direct and indirect measures to proxy segmentation in order to find out a relationship between the degree of segmentation and the cross-market variation in results.

In Chapter 5, I found that the valuation impact of dual-listing was stronger when firms originated from markets where barriers were more severe. Yet the results from examining a few particular markets, by comparing the actual valuation impacts with the prevailing barriers in that market, are ambiguous. Therefore it is not possible to definitely establish a relationship between the degree of segmentation and asset pricing.

Chapter 4 and Chapter 6 are also inconclusive:

- even if premia are a distinctive feature of emerging markets' country funds, the proxies I used for the degree of segmentation are not statistically or economically significant.
- the role of country effects in emerging markets' returns is slightly stronger than that which has been documented for mature markets; yet this is true across all emerging markets regardless of the reality of those markets in terms of formal or informal barriers. Furthermore, the cross-market correlation of payoffs to relevant pricing factors is close to zero no matter what the degree of segmentation is.

Emerging Markets *versus* Mature Markets

Emerging markets differ from mature markets. This is, however, a feature that does not result from their similarity but from their individual specificity. Amongst themselves, even at a regional level, there are fewer common features than there are for mature markets. A direct consequence of this is that a geographical diversification strategy is more fruitful across emerging markets than across mature markets.

My general conclusion is that emerging markets are partially segmented and, as a consequence, the pricing rule in these markets is unique and so is the price of risk. The dismantlement of formal barriers and the increasingly important presence of foreign investors in emerging markets should affect the local pricing structures. My evidence, based on data for the first half of the 1990s, already reflects those changes but these processes are slow. As markets become more integrated, premia for emerging markets' country funds should decrease; the positive valuation effects of dual listings on international exchanges should become less significant; and the payoffs to important pricing factors across markets should correlate more closely.

Practical Implications

There are two main practical implications of the evidence presented in this dissertation:

- the first one is for emerging markets' firms that consider make a foreign listing on an international exchange. If the local market where the firm is presently listed is segmented, by formal or informal barriers, a listing on an international exchange enables to reduce the firm's cost of capital. The benefits are not confined to NYSE listings, where there are benefits resulting from enlarged shareholder base and superior liquidity services. Dual-listings on international trading places like London SEAQ-I, a trading venue for large professional investors with reduced liquidity, seem to allow firms to reap a substantial part of the benefits, the part that results from segmentation effects.

- The second implication regards international portfolio diversification. First, my results imply that cross-market diversification is more productive, in terms of risk reduction, than domestic industrial diversification. Second, my results imply that, within a particular region, diversity yields similar risk reduction than that of an extensive diversification strategy over the universe of emerging markets.

7.3 FURTHER RESEARCH

Country Funds

Future investigation should try to integrate the several explanations that have been put forward to explain discounts/premia. From a methodological perspective, this corresponds to explicit variables omitted in my analysis. I used panel data methodology to control for fund and time omitted effects. The violation of the assumptions required by this methodology may result in inconsistent estimators.

Further work is required to establish the nature of this mean reversion in discount returns. Data on discount levels may help to clarify if there is mean reversion and whether the negative autocorrelation in discount returns is spurious.

Another direction to improve the results is to consider a variable-coefficients model. I stressed the importance of allowing for different coefficient across markets, that reflect the uniqueness of each of these markets' pricing rules and that result from differential degrees of segmentation. I considered the approach with dummy variables. An alternative would be a random-coefficients effects model reducing substantially the number of parameters to estimate.

Finally, the use of conditional risk exposures that incorporate time-varying segmentation may yield better estimates. This involves getting different data regarding the information variables.

Dual-Listings

It would be important to establish definitely if the effects I observe for emerging markets' dual listings are due to segmentation or to differential awareness, differential liquidity or differential listing requirements between the local market and the international exchange where the firm dual-lists. Further research should try to disentangle the effects of these different theories. To pursue that research it is necessary to have access to new data, in particular, information about the number and type of shareholders and liquidity data, for example, bid-ask spreads and volume. Another open question is the role played by managerial timing. Further research should compare abnormal stock market performance with abnormal operating and earnings performance.

Factors in Stock Returns

The problem of thin trading is more acute when studying individual stocks. New and extensive data will provide undoubtedly valuable insights.

With regard to portfolio diversification issues, it would be interesting to find out more about the behaviour of some subsets of stocks. For example, it would be interesting to evaluate how my findings on emerging markets' diversification potential benefits compare with strategies in mature markets that leave out multinational firms or focus solely on small stocks.

A complete picture of world-wide international portfolio benefits will prove very useful.

Further work should also analyse the diversification potential benefits achievable with investable stocks and internationally traded stocks.

Finally it will be important to extend the cross-section analysis to a longer period to establish if the results that I get for this decade are valid out-of-sample. Any such analysis will have to use time-varying parameters to account for time-varying integration. The different thresholds for the parameters could be data-driven, using the information about stock market openings and effective removal of formal and informal barriers, considering piece-wise linear or high-order threshold models; instead one could allow the model to find the regime shifts in the data. In particular, it would be interesting to understand if the commonality of factors in the universe of emerging markets is a recent feature; and to find out how the correlation of payoffs across emerging markets has evolved.

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