Exchange-sponsored analyst coverage

ABSTRACT

Several major stock exchanges, including the NASDAQ and NYSE Euronext, have recently embarked on schemes to sponsor and promote analyst coverage for firms listed on their exchanges. We evaluate the efficacy of one such scheme pioneered by the Singapore Exchange (SGX). We find that sponsored analysts produce forecasts with similar bias, but lower accuracy than those issued by analysts voluntarily following a firm. In analyses that control for self-selection into the SGX Scheme, we find that sponsored firms enjoy at best minor improvements in their information environments and stock liquidity. Any benefits accruing from the Scheme are insufficient to make sponsored firms fully comparable to those of firms with voluntary analyst following on the measured attributes.

1. Introduction

A large body of literature documents the beneficial effects of analyst coverage for firms' information environments, stock liquidity, corporate governance, access to external financing, and cost of capital. There is substantial evidence that larger firms tend to attract analyst coverage, whereas smaller firms attract scant attention and that firms even commit resources to obtain such coverage. In recent times some stock exchanges have attempted to attract and retain client-firm listings by offering exchange sponsored analyst coverage. Such an exchange sponsored program is expected to attract firms to the exchange if, like voluntarily analyst coverage, it is able to improve participating firms' information environment and stock liquidity, lowering their cost of financing (e.g. Chang, Dasgupta, and Hilary 2006). Therefore, several stock exchanges, including Euronext and the NASDAQ, have considered acting as intermediaries to sponsor or fund independent research (Canivet 2009) for firms that have low or no analyst coverage. This study evaluates the efficacy of the first such scheme, the 'Research Incentive Scheme', introduced by the Singapore Exchange (SGX) in December 2003.[1]

Given the investments stock exchanges make to extend coverage to poorly covered firms, it is important to examine whether such capital market intervention generates research that investors find useful, and ultimately whether liquidity is improved. The answers to these questions, however, are not straightforward. Prior research documents that voluntary sell-side analyst coverage and the informativeness of analyst reports are driven by incentives for generating revenue through trading and/or investment banking activities (O'Brien and Bhushan 1990; Schipper 1991). However, the existence of boutique research firms and paid-for-research

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[1] The SGX was closely followed by the Bursa Malaysia, which initiated a similar scheme in 2005. Meanwhile, the NYSE Euronext, the NASDAQ-OMX and the London Stock Exchange (LSE) all introduced variants of the scheme in 2009 (Mayhew 2009).

suggests that such sell-side incentives still leave some firms wanting more analyst coverage (Kirk 2011). Is it therefore possible that a stock exchange can effectively intervene as an independent intermediary to promote the production of credible analyst reports? Can such intervention yield the benefits that are normally associated with voluntary coverage? The SGX's Research Incentive Scheme (hereafter the "Scheme" or the "SGX Scheme") offers a natural experiment to study these questions.

The SGX is the largest securities exchange in Southeast Asia, (ranking 9th of 17 in the Asia Pacific region in terms of market capitalization of listings), and it is almost twice the size of the next-ranked Bursa Malaysia.[2] Its prominence is reflected in the large number of international firms that it attracts, with 40 percent of its listed firms being foreign. The SGX Scheme partially funded analyst coverage of previously un-followed or poorly followed stocks with the Exchange acting as a "clearing house" to match companies seeking coverage through the Scheme with at least two research firms. The research firms were selected from a panel of such firms that independently elected to participate in the Scheme.[3] Thus, both the listed companies and the research firms (employing the analysts) volunteered to enter the Scheme, but critically, the research firms did not choose the companies to cover, or vice-versa. The SGX assigned listed companies to research firms on a random basis, after considering the preferences and exclusions stated by the research firms (Singapore Exchange 2003b). In this way, the SGX injected an element of independence and credibility into the analyst reports, which is difficult to achieve with research purchased directly by a firm. This marks an important distinction from analyst research paid for by covered firms, which has been studied by Kirk (2011). The Scheme attracted

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[2] World Federation of Exchanges, http://www.world-exchanges.org/statistics, accessed December 5, 2013.
[3] These research firms also tend to provide brokerage and investment banking. Furthermore, research firms that volunteer to participate in the Scheme were required to offer a team of at least three analysts, each with a minimum of three years relevant experience (Singapore Exchange 2003a).

a high degree of participation from SGX listed firms, with more than 20 percent of the SGX listed firms being covered by the Scheme as of 2007.[4]

This study investigates the effects and consequences of this pioneering scheme. First, we benchmark the properties of earnings forecasts issued under the SGX Scheme by comparing them with those issued for firms that are voluntarily followed by analysts. Second, we investigate whether sponsored analyst coverage improves a firm's information environment and stock liquidity, attributes believed to be directly affected by voluntary analyst coverage. Although success of the Scheme does not imply that sponsored firms (i.e., firms covered by the Scheme) must "catch up" or become comparable to voluntarily followed firms, we examine the extent to which the Scheme yields benefits that are similar to those enjoyed by voluntarily followed firms. As our analyses could be affected by firms self-selecting to join the Scheme, or by analysts selecting the companies they voluntarily follow, we take care to control for potential self-selection biases employing either propensity-score matching combined with a difference-in-differences approach or a full maximum likelihood estimation treatment effects model.

The empirical analyses reveal that although the forecasts issued for sponsored firms are similar to those issued for voluntarily followed firms in terms of bias, the forecasts are less accurate, that is, they have larger absolute forecast errors. Market reactions to forecast revisions and to the earnings announcements of sponsored firms indicate that sponsored research reports help investors better formulate their earnings expectations. However, there is little evidence of any other effect from a firm joining the Scheme. Specifically, we find little discernible effect on timeliness with which stock prices reflect information, stock price synchronicity, extent of media coverage or stock liquidity. Overall, with the exception of an improvement in the formulation of

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[4] As of June 2007, the end of our study period, there were 722 companies listed on the Singapore Stock Exchange and of these, 150 companies were receiving analyst coverage through the Scheme.

earnings expectations, we find very little benefit to firms that join the SGX Scheme.

When we compare the information environments of sponsored firms with those of the voluntarily followed firms, we find that sponsored firms' information environment or stock liquidity are poorer than those of voluntarily followed firms. These results for sponsored versus voluntarily covered firms reflect one of two possibilities: either, sponsored firms are inherently different from voluntarily followed firms and receiving analyst coverage is not able to change that difference, or investors respond differently to sponsored coverage than they do to voluntary coverage.

Our findings have relevance for practitioners and academics. Although the study specifically investigates the effectiveness of the SGX Scheme, its findings speak to the potential results that stock exchanges in other countries might expect on the introduction of similar schemes. Such extrapolations, however, need to be tempered by the possibility that institutional, regulatory or political differences across countries could affect scheme outcomes.

This study also contributes to the literature on the effects of analyst coverage. Prior evidence on the consequences of analyst coverage is based on either cross-sectional analysis or on the choice of an analyst to start covering a firm, even though the firm concerned could have had prior coverage from other analysts. We add to this literature by documenting the effects of first-time initiation of analyst coverage by exchange-sponsored analysts.[5] The SGX Scheme acts as an exogenous shock which generates a sample of firms that enjoy initiation of analyst coverage.

The rest of this study proceeds as follows. We summarize related literature and the SGX Scheme setting in Section 2. Section 3 develops hypotheses on the consequences for firms that

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[5] Bradley, Jordan and Ritter (2008) and Dhiensiri and Sayrak (2010) also study stock price reactions to first-time initiation of analyst coverage, but they do not analyse any other effects of initiating such coverage.

join the Scheme. Sections 4 and 5 outline our research design and sample selection procedures. Section 6 presents the study's results, and we offer our conclusions in Section 7.

2. Prior Literature and Research Setting

Companies joining the SGX Scheme are likely to do so in the hope that analyst coverage will lower financing costs by improving their information environment or by attracting investors. Therefore, we restrict our review of prior literature to studies on the effects of analyst coverage.

2.1. *Effects of analyst coverage*

Analysts can affect a firm's information environment by disseminating information that assists in correcting stock mis-valuations (Hong, Lee, and Swaminathan 2003; Graham, Harvey, and Rajgopal 2005). Also, analysts' coverage makes it easier for firms to raise equity financing by drawing investors' attention to the firms' share issuances, and by reducing deviations of the firms' stock prices from fundamentals (Chang, Dasgupta, and Hilary 2006; Bowen, Chen and Cheng 2008). Prior studies also point out that analyst coverage affects firm value by generating publicity and making it easier for consumers, investors and others to obtain information about the firm (e.g., Stoughton, Wong, and Zechner 2001).

Furthermore, the extant literature shows that analyst coverage has an effect on stock liquidity. Theoretical studies predict that analyst coverage tends to improve (worsen) stock liquidity if the coverage attracts more uninformed (informed) investors (Glosten and Milgrom 1985; Brennan and Subrahmanyam 1995; Easley, O'Hara, and Paperman 1998). In line with these conflicting predictions, empirical evidence on this issue has been mixed. Brennan and Subrahmanyam (1995) and Roulstone (2003) both document a positive relation between analyst coverage and liquidity, but Chung, McInish, Wood, and Wyhowski (1995) find a negative relation. Both Irvine (2003) and Mola, Rau and Khorana (2013) study the effects of changes in

analyst coverage and find stock liquidity improves following "strong buy" initiations and declines following loss of analyst coverage.

Consistent with analysts coverage yielding net benefits to a firm, Kelly and Ljungqvist (2012) show that when a firm loses some analyst coverage due to an exogenous brokerage closure, the firm's share-price drops by as much as 2.61 percent on the closure announcement. Also, Cliff and Denis (2004), Krigman, Shaw, and Womack (2001) and Mehran and Peristiani (2010) show that firms value analyst coverage and commit resources to obtaining such coverage.[6]

While it might seem that firms seeking coverage can easily purchase coverage from specialist research firms, such paid-for research is not entirely credible, as it suffers from a potential conflict of interests. Firms can also "opinion-shop" to obtain favorable analyst opinions (Kirk 2011). An alternative route to analyst coverage has been pioneered by the SGX, by which the exchange acts as a clearing house for matching analysts (research firms) with companies to be covered, thereby obviating the conflicts of interests inherent in paid-for-research coverage. This study investigates the efficacy of the SGX Scheme.

2.2.   *Institutional background to the SGX's sponsored analyst Scheme*

In December 2003, the SGX instituted a program to sponsor analyst coverage of previously unfollowed or poorly followed SGX-listed stocks. This Scheme was introduced in phases, with each phase covering a two-year period. A total of 115 companies and 9 research firms signed up in the initial phase in 2004, but by 2007 this number had increased to over 150 companies and 12 research firms. Almost all those participating in the first phase of the Scheme

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[6] Analysts can also contribute to a firm's value by improving corporate governance (Jensen and Meckling 1976; Fairfield and Whisenant 2001; Healy and Palepu 2001; Dyck, Morse, and Zingales 2010).

continued to participate in the program's subsequent phases.

The SGX matched each company with two participating research firms, which were required to initiate coverage within six months and commit to generating regular research reports. This matching was done randomly, after considering preferences and exclusions indicated by the research firms (Singapore Exchange 2003b).[7] The research reports were posted on the SGX's website and were downloadable free of charge. The sponsored companies each paid a nominal fee to the SGX, with the balance of the Scheme's costs subsidized by the SGX and the Monetary Authority of Singapore. Appendix 1 presents further institutional details. Panel A shows the eligibility criteria and the guidance provided by the SGX concerning the types and frequencies of reports required from the research firms. We understand from senior SGX officials that although sponsored reports were naturally expected to vary in content, the SGX did monitor the types and the frequency of research reports issued. Panels B and C of Appendix 1 present statistics on the frequency of the sponsored research reports and on the participating research firms. We see that the numbers of sponsored firms and the numbers of associated earnings forecasts increased steadily over time. More than 95 percent of the issued reports contained earnings forecasts, and the analyst reports were five or more pages long on average. For most of the period studied, at least 12 research firms participated in the Scheme. Most of these research firms represented major local brokerage houses and investment banks with large client bases, but they also included some smaller independent research houses.

In November 2004, within a year of the start of its first two-year phase, the SGX

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[7] This account of the process was confirmed in discussions with several senior (Vice-President level) SGX executives. Consistent with random assignment, we find little correlation between broker size (measured by number of analysts employed) and (sponsored) firm size. Also, for the 42 sponsored analysts for whom we are able to obtain data on IBES, we find that these analysts cover other voluntarily followed firms in the same industries, and that these analysts have work experience that is comparable to those that cover only voluntarily followed firms.

announced the continuation of the Scheme for a second phase. The SGX attributed this early announcement to the enthusiasm displayed by additional companies and research firms seeking to participate in the Scheme, and to the interest shown by market participants. In their announcement of January 2006 notifying a further extension of the Scheme, the SGX stated its objectives of improving the information environment and the investor recognition of listed firms, enhancing the investors' ability to make informed decisions, and developing a vibrant marketplace (Singapore Exchange 2006).

2.3. *Subsequent developments to the sponsored analyst Scheme*

Anecdotal evidence suggests that the original Scheme was unpopular with some of the participating companies that received "sell" ratings. These companies complained about the poor quality of analysis in the sponsored reports.[8] The original Scheme was replaced in July 2009 with the SGX Equity Research Insights (SERI) Scheme, under which relatively standardized reports were supplied by one of two providers: either Standard and Poor's LLC (S&P) or DnB NOR Markets (DnB) (Singapore Exchange 2009). However, this change proved unpopular with investors, as the structured reports from these providers typically did not offer stock recommendations. SERI was terminated in June 2013, and replaced in 2014 by a portal on the SGX website known as StockFacts.[9] This portal displays factsheets for *all* of the SGX listed companies as supplied by S&P Capital IQ (a business unit of McGraw Hill Financial). The factsheets summarize company financials, charts, industry data and stock ranking tools, but make no recommendations. The SIAS (Securities Investors Association of Singapore) responded to the

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[8] See, for example, http://guanyu9news.blogspot.com.au/2014/10/paid-research-should-sgx-bother.html, accessed on June 28, 2015.
[9] See the SGX website at http://www.sgx.com/wps/portal/sgxweb/home/company_disclosure/stockfacts, accessed on January 4, 2016.

StockFacts program with a press release on Sept. 23, 2014, calling for the re-introduction of the original independent stock research reports (which are investigated in this study). The SIAS stated that although the factsheets would be helpful, retail investors needed guidance on investment decisions, and that research reports would be more meaningful.

3. Hypothesis Development

This section develops the empirical predictions on the effectiveness of the original form of the SGX Scheme (between 2004 and 2007). Although prior studies provide evidence on the consequences of voluntary analyst coverage for a firm, this evidence is based on cross-sectional analysis, and so does not directly deal with the question of whether a firm can reap benefits from first-time initiation under the sponsorship Scheme.[10] Firms enter the scheme, presumably, because they expect to enjoy benefits from participating in the scheme that outweigh any expected costs. While we can't know exactly what benefits firms were expecting, it is likely they were hoping for the same type of benefits enjoyed by firms with voluntary analyst following, i.e., an improved information environment and greater stock liquidity, contributing to a lower cost of capital. We focus mainly on the Scheme's effectiveness in these two dimensions (i.e., a change in the information environment and stock liquidity). However, before evaluating whether these benefits materialized, we first look at the qualities of the earnings forecasts produced under the Scheme, examining forecast accuracy and forecast bias relative to forecasts produced by voluntary analysts.

3.1. *Properties of analyst forecasts for sponsored relative to voluntarily followed firms*

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[10] Few studies investigate the effects of first-time initiation of analyst coverage (i.e., initiation for firms with no prior analyst following). These studies include Bradley, Jordan and Ritter (2003) and Dhiensiri and Sayrak (2010), who study stock price reactions to first-time initiation of analyst coverage, and Dhiensiri, Sayrak and Zarowin (2005), who study the effects of analyst coverage initiation on the market's ability to predict future earnings.

3.1.1. *Forecast accuracy*

There are at least two reasons why the accuracy of sponsored forecasts could be worse relative to that of voluntary forecasts. Firstly, a likely reason for why some firms do not attract analyst coverage is that their earnings are inherently difficult to forecast. Voluntary analysts, concerned about their reputations, may view forecasting for firms with more uncertain earnings as more costly and purposefully avoid such firms. If sponsored analysts are assigned to firms with greater future uncertainty, then we expect to observe lower forecast accuracy by exchange sponsored analysts, even if sponsored and voluntary analysts exert the same amount of effort.

Secondly, Frankel, Kothari and Weber (2006) argue that the quality of analysts' reports is determined endogenously, by the demand for research reports. They show that analysts adjust the quality of their reports according to how much private information investors seek. Voluntary analysts have greater incentive to search for private information on the firms they follow in order to attract business from such investors. Sponsored analysts, on the other hand, did not choose to follow the firm, without the intervention of the exchange. So it is likely that they do not expect to generate as much business and therefore would exert less time and effort in constructing their forecasts. Moreover, sponsored analysts could be less concerned with investor attention to reports, as report-related revenues are not entirely dependent on the quality of the information provided. This suggests that sponsored analysts would rationally keep costs low by acting as mere aggregators and disseminators of publicly available information, rather than expending extra effort to generate new information resulting in their forecasts being less accurate.

In contrast to the above arguments, it is also possible that the quality of sponsored forecasts would be comparable to that of voluntary forecasts, if participating research firms and analysts are primarily motivated by their needs to maintain reputations with market participants.

Also, analysts could aim to provide highest quality reports, regardless of who sponsors the research, in order to improve their visibility and career prospects or to generate additional business (viz., investment banking) for their employers. In these cases, analysts' forecasts would be determined almost exclusively by the ability of the analyst (and the research firm) and the supply of high quality analysts' reports would be largely inelastic with respect to the expected revenues from such coverage.

Thus, the null hypothesis for forecast accuracy is that:

H1a: The accuracy of analysts' forecasts is comparable among sponsored firms and voluntarily followed firms.

3.1.2. *Forecast bias*

Prior studies in the US find that voluntary sell-side analysts tend to issue optimistic forecasts on average and may even selectively avoid issuing unfavorable reports on firms (e.g., McNichols and O'Brien 1997). The studies attribute these patterns to analysts' pandering to managers of covered firms, as a means to get better access to private information (e.g., Lim 2001; Ke and Yu 2006). If such optimistic bias is a rational response to market incentives that lead an analyst to voluntarily follow a firm, it is not clear that these same incentives are at play for sponsored analysts. In addition, as sponsored analysts are required to issue regular reports, they have fewer opportunities to bias their forecasts by selectively reporting favorable reports. These arguments lead us to expect less optimism in the forecasts of sponsored analysts.

But in contrast, if sponsored analysts participate in the Scheme hoping to attract business from firms they follow, then they may also produce optimistically biased forecasts to entice managers of covered firms. This would be a less costly exercise for sponsored analysts as they face less market discipline compared to voluntary analysts. Alternatively, if forecast bias arises

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from skewness in firms' earnings rather than due to analysts' incentives, as suggested by Gu and Wu (2003), we do not expect differences in the bias across sponsored and voluntary analysts.

Overall, these arguments provide ambiguous predictions for forecast bias in sponsored forecasts relative to that in voluntary forecasts. Thus our empirical analysis tests the following null hypothesis:

H1b: The forecast bias of analysts' forecasts is comparable among sponsored firms and voluntarily followed firms.

3.1.3. *Market reaction to analyst forecast revisions*

Prior work, both in developed economies and in Asia-Pacific markets, shows that voluntary analysts' forecasts provide new information to investors (e.g., Elton, Gruber, and Gultekin 1981; Fried and Givoly 1982; Lim and Kong 2004). If investors view sponsored forecasts as being equally informative and credible as voluntarily issued forecasts, then the stock price and volume reactions to forecast revisions should be comparable across these groups. However, if market participants view sponsored forecasts as being predominantly based on public information, then they are likely to respond less to earnings forecasts by sponsored analysts compared to voluntary analysts. In the extreme, if sponsored forecasts reflect only public information, then we would expect to see no reaction to their announcements. Clement, Frankel and Miller (2003) suggest that in addition to directly reacting to new information, investors could even react to confirming earnings forecasts (i.e., forecasts that corroborate existing market expectations), if these forecasts reduce uncertainty associated with future earnings. To the extent that investors in sponsored firms face a poorer information environment, and hence greater uncertainty about future earnings, forecast revisions could lead to abnormally positive stock price and volume reactions, even if these forecasts merely corroborate market

expectations. Formally stated, our hypothesis in the null form is:

H2: The stock price and volume reactions to analyst forecast revisions are comparable across sponsored firms and voluntarily followed firms.

3.2. *Effect of sponsored research on firms' information environments and stock liquidity*

To examine the SGX Scheme's effect on a firm's information environment, we consider how participating in the scheme changes the market's reaction to earnings announcements; their intra-period stock price timeliness; their stock price synchronicity and the media coverage they attract. In addition, we study the effects of the Scheme on stock liquidity.

3.2.1. *Market reaction to earnings announcements*

Analysts' information production and dissemination activities can aid stock investors to form earnings expectations, and consequently reduce the relevance of subsequent earnings announcements as sources of new information (Ball and Shivakumar 2008). Therefore, if sponsored forecasts help market participants to form earnings expectations, then the news content of earnings disclosures (i.e., absolute earnings announcement returns) should be smaller after a firm's entry into the SGX Scheme.[11] However, if sponsored analysts primarily disseminate publicly available information, then little change is anticipated following the initiation of sponsored coverage for the firm.

Sponsored analyst coverage can also affect trading volume at earnings announcements, albeit in a potentially different way to price. Trading volume represents the sum total of trading effects from belief revisions of all investors, whereas price changes reflect average effects from revisions in investors' beliefs of firm value. Theoretical models predict that private information

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[11] We do not evaluate changes in earnings response coefficients around a firm joining the SGX scheme, as market expectations (i.e., analyst forecasts) needed to estimate the response coefficients are unavailable for the pre-Scheme period.

search activities by investors can cause greater dispersion in their pre-announcement earnings beliefs, leading to higher trading volumes at earnings announcements, even when price effects are minimal (Kim and Verrecchia 1991; Bamber and Cheon 1995). To the extent that analysts' research helps converge investors' expectations of earnings by substituting their own private information gathering with those of analysts', we would expect sponsored research to lead to lower dispersion in investors' beliefs in the pre-earnings-announcement period and thus reduce trading volume at earnings announcements.

However, recent research documents significant heterogeneity in investors' interpretation of analysts' research, implying that release of analysts' reports could increase heterogeneity in investors' beliefs of earnings expectations rather than decrease it. Malmendier and Shantikumar (2007) document that sophisticated investors recognize biases in analysts' research and forecasts and accordingly undo such distortions, while other investors interpret analysts' forecasts and recommendations more naively. Also, as investors are known to be subject to a confirmatory bias (Rabin and Schrag, 1999), some investors would either disregard or misinterpret evidence in analysts' research that contradicts their privately-held views. Consistent with these biases, prior studies (e.g., Bhattacharya (2001) and Battalio and Mendenhall (2005)) document evidence that small investors fail to efficiently use publicly available analysts forecasts and instead wrongly anchor their earnings expectations on a seasonal random-walk model, while large investors do not make such errors. These arguments suggest that, even if all investors had identical prior beliefs, release of sponsored research would increase heterogeneity in investors' earnings expectations and consequently, increase trading volume at earnings announcements for sponsored firms.

In contrast to the above arguments, if sponsored analysts primarily disseminate publicly

available information, then little change is anticipated following the initiation of sponsored coverage for the firm.

These ambiguous predictions lead us to the following null hypothesis on market reactions at earnings announcements:

H3a: Stock price and trading volume reactions at earnings announcements are unaffected by the initiation of sponsored analyst coverage.

3.2.2. *Timeliness with which stock prices reflect information*

Prior studies find that analysts scrutinize not only financial data, but they also consider non-financial information (Rajgopal, Shevlin, and Venkatachalam 2003; Simpson 2010). Thus, analysts' activities could hasten the incorporation of non-financial information into stock prices. To the extent that analysts' activities generate new information in a timely manner, we should expect value-relevant information (both earnings- and non-earnings-related) to be reflected earlier in stock prices. If sponsored analysts generate value-relevant information, then we would expect intra-period timeliness (i.e. speed with which stock prices reflect information) to increase for firms joining the SGX Scheme. Thus, our null hypothesis is as follows:

H3b: Intra-period timeliness is unaffected by the initiation of sponsored analyst coverage.

3.2.3. *Stock price synchronicity*

Piotroski and Roulstone (2004) argue that analysts lack access to inside information on firms, and so their reports primarily contain industry- and market-wide information, rather than firm-specific information. Morck, Yeung and Yu (2000) reinforce these arguments in the context of an emerging market, and observe that payoffs from producing firm-specific information are lower in emerging markets, owing to weaker property rights. Chan and Hameed (2006)

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empirically confirm this prediction by showing that stock price synchronicity (which is a proxy for the amount of industry and market-wide information in stock prices relative to firm-specific information) in emerging markets is greater for firms with analyst coverage. If analysts sponsored by the Singapore Exchange behave like voluntary analysts, incorporating more market-wide information, these findings lead us to expect sponsored firms to have higher stock price synchronicity after joining the Scheme. Thus, our null hypothesis is:

H3c: Stock price synchronicity is unaffected by the initiation of sponsored analyst coverage.

3.2.4. *Media visibility*

Analysts are often quoted in popular press articles for their views on individual firms, trends and forecasts. Moreover, journalists are also likely to write articles on firms that already have research coverage, as information on these firms is more readily available. Consistent with this expectation, Bushee, Core, Guay and Hamm (2010) show that press coverage is greater for firms with higher analyst following. Bushee and Miller (2012) also observe that investor relations professionals often view media coverage as creating "credibility" for a company. Based on these arguments, we expect that the initiation of sponsored analyst coverage will improve media visibility. Formally stated, the null hypothesis is that:

H3d: Media visibility is unaffected by the initiation of sponsored analyst coverage.

3.2.5. *Stock liquidity.*

Prior theoretical literature provides some guidance concerning the effect of analyst coverage on stock liquidity. While the analytical models provide mixed predictions for the effect of analyst coverage on stock liquidity (as elaborated in Section 2.1), empirical findings based on initiation or loss of analyst coverage indicate a positive relation between changes in analyst

coverage and stock liquidity. These prior findings, if extrapolated to the context of analyst coverage initiated under the SGX Scheme, suggest that firms joining the Scheme should enjoy improved stock liquidity. Thus, our final hypothesis as stated in the null form is:

H4: Stock liquidity is unaffected by the initiation of sponsored analyst coverage.

4. Research Design

This section describes our main variables of interest and the methodological issues involved in addressing self-selection issues. Detailed definitions of all variables are provided in Appendix 2.

4.1. Variables measurement

For tests on the quality of forecasts, we follow the standard approach taken in the literature to calculate "bias" in forecasts as signed forecast errors (FEs), and to measure accuracy as the absolute value of forecast errors (ABSFE). The FEs are calculated as the difference between the forecasted earnings and the actual earnings, divided by the stock price at the beginning of the year. We expect the average FE to be insignificantly different from zero if the forecasts are unbiased, and the ABSFE to be lower when forecasts are more accurate.

We capture market reactions to forecast revisions as either cumulative abnormal returns (CAR(REV)) or cumulative abnormal volume (ABVOL(REV)) in the three day (-1, 1) windows around forecast revision dates, using benchmarks for normal returns and volume from event days -100 to -10. The forecast revision (REV) is computed as the difference between the new forecast and the previous forecast issued by an analyst for a specific firm-quarter, scaled by stock price at the beginning of the year.

In tests of information environment effects, we capture market reactions at earnings

announcements by using CAR(ERN) and ABVOL(ERN) in the three days around earnings announcement dates. This approach is analogous to the method of capturing market reactions at forecast revisions. The speed with which information is impounded in stock prices is computed by using the intra-period timeliness (IPT) measure developed by Butler, Kraft and Weiss (2007). For each firm-year, IPT is defined as $\sum_{m=1}^{11}\left(\mathrm{BH}_m/\mathrm{BH}_{12}\right)+0.5$, where $\mathrm{BH_m}$ is the buy-and-hold returns from months 1 through m. Intuitively, IPT is a weighted average of the fraction of annual returns occurring in each of the constituent months, with greater weights assigned to the fraction of returns occurring earlier in the year. A higher IPT value indicates that a greater proportion of the annual stock returns occur earlier in the year. As the IPT can be sensitive to low values of 12-month buy-and-hold returns, we convert the IPT to ranks in our analysis. More timely incorporation of information in stock prices implies a higher rank for IPT. Stock price synchronicity (SYNC) is measured as in Morck et al. (2000), and is defined as the $\mathrm{Log}[R^2/(1-R^2)]$, where R^2 is the R-squared from regressing weekly stock returns on market returns over a calendar year. This measure tracks the relative extent to which a firm's stock price moves with market-wide information that is reflected in market-wide returns. Last, media visibility (MEDIA) is proxied by the number of times a company's name is mentioned in the heading or the lead paragraph of a news article in the Factiva database.

While theoretical models predict a relationship between stock liquidity and analyst coverage, these models do not precisely define stock liquidity. Lee, Mucklow and Ready (1993) contend that liquidity has both a price dimension (the spread) and a quantity dimension (the depth), and that market makers and liquidity providers can protect against information-based trading by either increasing quoted spreads or by lowering quoted depth. Lee et al. (1993) also

show that trading volume affects liquidity. Hence, we measure liquidity along the following three dimensions: (1) relative quoted spreads (i.e., difference between the best bid and ask prices, scaled by bid-ask midpoint, labeled SPREAD), (2) quoted depth (i.e., average value of shares available at the best bid and best ask, labeled DEPTH) and (3) trading volume (i.e., log of the average daily value of shares traded, labeled VOLUME). Finally, recent studies evaluate liquidity beyond merely the depth at best bid-ask quotes. They also consider the price impact of trades as an additional dimension of liquidity (Kyle 1985). The price impact of trades (AMIHUDP) is computed following Amihud (2002) as the absolute value of daily returns, divided by daily share volume, multiplied by 1,000,000, and then averaged over the year. A higher value for AMIHUDP indicates lower liquidity.

4.2. Non-parametric difference-in-differences propensity score matching approach

To identify the causal effect of sponsored coverage on firm attributes (viz. information environment and stock liquidity), we compare *changes* in sponsored firms' attributes around their time of joining the Scheme, relative to those for a sample of not-followed firms. We use a two-stage procedure that involves matching treatment firms to control firms, based on propensity scores from a first stage Probit regression, followed by an estimation of a difference-in-differences regression using the matched sample. This methodology controls for both observable differences and time-invariant unobservable differences across treatment and control groups (Todd 1999, 2008). Compared to the two-stage least squares method, this approach has the advantage that strong exclusion restrictions are not needed (Girma and Gorg 2007). However, as the matching procedure only controls for chosen observed variables and time-invariant unobservables, potential biases could remain from latent determinants that are correlated with the

outcomes of interest and are not constant over time (Tucker 2010).[12] In our implementation, we

find that the pseudo R-squared of the first-stage Probit model is 13.2 percent, which while

similar to the results of other studies using this procedure (e.g., Kirk 2011), is relatively low. To

the extent that any excluded determinant in the first stage model is correlated with the main

outcomes of interest, endogeneity remains an issue.

To keep our focus on the consequences of firms joining the SGX Scheme, we leave

details of the first-stage estimation to Appendix 3 (Section A3.2) and restrict discussions in the

main text to results from the following second-stage difference-in-differences analyses.

$$\text{VAR\_EFFECT}_{it} = \beta_0 + \beta_1 \text{POST}_t + \beta_2 \text{SGXSP}_i + \beta_3\, \text{POST*SGXSP}_i + e_{it} \qquad (1)$$

where, VAR_EFFECT_{it} refers to proxies for information environment or stock liquidity

described in Section 4.1; SGXSP_i is a firm specific dummy variable, set to 1 for SGX-sponsored

firms, and 0 otherwise; POST_t is an indicator variable, set to 1 in the post-SGX Scheme periods,

and 0 otherwise.

4.3. Endogenous treatment effects model

To provide a reference for the benefits associated with sponsored analyst coverage and to

evaluate the quality of sponsored forecasts, we compare firm attributes and forecasts from the

post-SGX Scheme period across both sponsored and voluntarily followed firms, using a

"treatment effects model" that accounts for analysts' self-selecting firms to voluntarily cover.[13]

Specifically, we estimate the following endogenous treatment effects model using observations

from the post-Scheme period of 2004–2007:

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[12] In addition, researchers' choice of exclusion restrictions is vital for implementing the selection model in a way that convincingly controls for endogeneity.

[13] We recognize that there are two sequential choices made before a firm joins the SGX scheme. In a first stage, analysts choose not to cover the firm, and then in a second stage the firm chooses to participate in the SGX scheme. If unobserved factors driving these two choices are correlated, then our results could be biased. Additional tests (discussed in Appendix 3, Section A3.1) reveal that no such correlation exists.

$$\Pr(\text{SPONSOR}_{it} = 1) = \Omega(\alpha_0 + \boldsymbol{Y_{it}} + \text{YEAR FIXED-EFFECTS} + e_{it}) \qquad (2a)$$

$$\text{VAR\_EFFECT}_{it} = \alpha_1 \text{SPONSOR}_{it} + \text{CONTROLS}_{it} + \text{YEAR FIXED-EFFECTS} + e_{it} \qquad (2b)$$

where SPONSOR_{it} is a firm-year specific dummy variable, taking the value 1 for sponsored

firms and 0 otherwise (for voluntarily followed firms). $\boldsymbol{Y_{it}}$ is a vector of variables that predict

voluntary coverage by analysts, and other variables are as defined earlier. The variables in the

selection Equation 2(a) are size, market-to-book ratio, stock returns, trading volume, return

volatility, stock price synchronicity, intangible intensity, and indicator variables for equity issues

and for inclusion in the Morgan Stanley Capital Index. The analysis of the outcome variable in

Equation 2(b) includes controls identified from prior literature.

Both Equations 2(a) and 2(b) are estimated in a single step, using a full maximum

likelihood estimation procedure. As mentioned previously, to keep our focus on the main

analyses of interest, the discussions are restricted to results from estimating Equation 2(b), even

though we tabulate estimates for both equations in Tables 3 and 6.[14]

5. Sample Selection and Descriptive Statistics

5.1. Sample and data

Our empirical analyses focus on the first two phases of the SGX Scheme, which ran from

December 2003 to December 2007. The first phase essentially covered the 2004–2005 period,

and started with 115 companies and 9 research firms. The Scheme was extended in 2005 for a

further two years (2006–2007) and, by the end of 2007 there were 174 companies and 12

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[14] The estimation of Equation (2a) is analogous to that of Equation A1 in Appendix 3. But, unlike Equation A1, Equation 2(a) excludes the not-followed firms. Also, we examine the robustness of our results from the endogenous treatment effects model to alternative controls for self-selection, namely a control function method and a two-stage least squares method (Wooldridge 2010, Chapter 21). Both our conclusions and the magnitudes of the test statistics for coefficients of interest from these alternative approaches are highly comparable to those reported in this study.

research firms participating in the Scheme.[15] We are able to obtain sponsored analyst reports on

154 of the 174 firms that were reported to have entered the Scheme.[16] We identify *sponsored*

firms from SGX announcements at various dates, starting on November 5, 2003. We identify the

set of voluntarily followed firms as all Singapore-listed firms with analysts' forecasts available

on the IBES database that are not also in the sponsored firms sample in the same year.[17] Finally,

any Singapore-listed firm that is not in the sponsored group or the voluntarily followed group is

classified as a not-followed firm. Each of these classifications is year-specific, although in our

difference-in-difference analyses, the classifications are firm-specific.

Analyst forecasts for earnings per share (EPS) are obtained from IBES for the voluntarily

followed firms. For sponsored firms, we hand-collect EPS forecasts from reports downloaded

from the SGX website, as these reports are not always available on IBES. This approach raises

the issue of sourcing the actual EPS. While it is customary in the analyst literature to use

"actuals" from IBES to be comparable with IBES forecasts, this is not feasible for sponsored

firms that are not covered by IBES. Hence, to have a consistent estimate across all observations,

we obtain EPS data from Datastream for both sponsored and voluntarily followed firms. We

check for the validity of this approach by comparing reported EPS amounts from Datastream

with IBES actuals for voluntarily followed firms, and find that these figures are nearly the

same.[18] We also perform sensitivity tests to check whether the results change when we use IBES

actuals for voluntarily followed firms, and use Datastream EPS for sponsored firms. Our results

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[15] We restrict the post-Scheme period sample to 2004–2007, as the SGX modified the scheme soon afterwards to offer only standardized research reports from S&P LLC and DnB NOR Markets.

[16] The reports were downloaded in PDF format from the SGX website between 2007 and 2008.

[17] To avoid overlap between the voluntarily followed and the sponsored firm samples, we exclude from the voluntarily followed firm sample any firms that had some level of voluntary coverage prior to their election into the Scheme. These firms tended to have very low levels of coverage prior to entering the Scheme, and they remain in the sponsored firm sample. Our results are robust to excluding these firms from the sponsored firm sample.

[18] Thirty-seven percent of our firm-year comparisons have an IBES "actual" that is exactly equal to the Datastream EPS, and 72 percent of these comparisons differ by less than 10 percent.

are robust to this modification.

Share returns, share price, trading volume and financial statement data are obtained from Datastream (Thompson Reuters). Share returns are calculated using the daily total return index in Datastream. Liquidity measures are calculated using transaction-level data from the Thompson Reuters TAQTIC database. Media coverage data are hand-collected from the Factiva database. All of the above data items are extracted for the January 2002 to December 2007 period, with the exception of forecasts for sponsored firms, which are only available from the start of the Scheme in 2004.

Table 1 presents our sample selection process. We start with all 154 sponsored and 355 voluntarily followed firms for which earnings forecasts are available on the SGX website or IBES, respectively. We are able to match 442 of these (143 sponsored and 299 voluntarily followed) with observations for the same firm-years from Datastream. We then follow Richardson, Teoh and Wysocki (2004) and delete absolute FEs that exceed 100 percent of share price, as these errors are likely due to data errors and/or small prices.[19] This yields a base sample (Table 1, Panel A) of 132 sponsored firms and 224 voluntarily followed firms.

From the base sample, we select all observations which satisfy data requirements for various sets of remaining tests. Panels B and C report the samples used in difference-in-difference analysis, and in treatment effects analysis of firm attributes, respectively. As stock liquidity measures are only available for part of the base sample, fewer observations are used in analyses of stock liquidity than in analyses of information environment attributes.

To ensure that our results are comparable across different information attributes (and in

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[19] Our criterion of deleting observations with absolute forecast errors exceeding 100 percent of share price is more conservative than that of Richardson et al. (2004). Richardson et al. (2004) use a cut-off of 10 percent of share price, and they lose 2 percent of their sample. Using 100 percent of price as the cut-off causes us to lose 1 percent of our sample. Our results are robust to using the same cut-off criteria as Richardson et al. (2004).

the case of stock liquidity tests, across different liquidity proxies), we maintain a constant sample across all attributes (or across liquidity proxies). However, our conclusions remain unaffected when we remove this restriction. After these restrictions, our final sample consists of 109 (66) matched pairs of firms for the difference-in-difference analysis of information environment attributes (stock liquidity). For the treatment effect model–based analyses, the final sample consists of 358 (144) firm-year observations of sponsored firms and 587 (274) of voluntarily followed firms in analysis of information environment attributes (stock liquidity).

5.2. Descriptive statistics

Panels A and B of Table 2 report the distribution of the sample forecasts and forecast revisions over time and across industries, respectively. Between 2004 and 2007, the number of sponsored forecasts more than doubles, as do the number of sponsored firms. But voluntary forecasts decrease by a third over this period, although the number of firms is relatively stable. Over 40 percent of the sponsored forecasts and forecast revisions are for industrial firms, whereas for voluntarily followed firms, financials and industrials account for most of the forecasts and forecast revisions.[20]

The univariate statistics, reported in Panel C of Table 2, reveal that the forecast errors (FE) and absolute forecast errors (ABSFE) are significantly smaller for voluntarily followed firms than for sponsored firms. The average magnitude of forecast revisions (ABSREV) is also smaller for the voluntarily followed firms, which is likely due to the larger number of analysts and the more frequent revisions for voluntarily followed firms.[21] On average, there are 2.108

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[20] To ensure that our results are not driven by differences in time trends or industry characteristics across voluntarily followed and sponsored firms, we conduct sensitivity tests that include year and industry fixed effects, or year, industry and analyst fixed effects. Our conclusions are robust to these modifications. Our conclusions are also not materially affected by the exclusion of fixed effects.

[21] These dramatic differences in the numbers of analysts across sponsored and voluntarily followed firms could

forecast revisions per year per analyst for each sponsored firm, whereas the corresponding figure

for voluntarily followed firms is 5.154 (untabulated). However, conclusions from these

univariate statistics need to be cautiously interpreted, as Panel D of Table 2 shows voluntarily

followed firms are, on average, significantly larger and have higher market-to-book ratios and

stock returns.

When we compare sponsored firms with not-followed firms in Panel E of Table 2, we

find sponsored firms are relatively smaller in size and are more profitable. The average market-

to-book ratio is smaller for sponsored firms. Sponsored firms also attract greater trading volume

around their earnings announcements, and have more media visibility. Finally, neither the stock

returns nor the stock liquidity measures are significantly different across these sets of firms.

6. Empirical Results

6.1. *Properties of forecasts issued by sponsored analysts relative to those by voluntary analysts*

6.1.1. <u>Forecast accuracy and bias</u>

We compare forecast accuracy and bias across sponsored and voluntarily followed firms

using the endogenous treatment effects models given in Equations 2(a) and 2(b). The outcome

variable of interest in this analysis (VAR_EFFECT$_{it}$, in Equation 2(b)) is either the forecast error

(FE$_{it}$) which measures forecast bias or the absolute value of forecast errors (ABSFE$_{it}$) which

measures forecast accuracy.[22] Following prior studies, these regressions include a variety of

controls. We include firm size (SIZE) and number of analysts following (N_ANALYSTS) as

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affect our analyses if the relation between analyst coverage and forecast attributes is non-linear. To check this possibility, we include the squared number of analysts as an additional explanatory variable in regressions of forecast attributes. Our results are unaffected by this modification.

[22] For ease in interpreting goodness-of-fit, we report the pseudo-R^2 for treatment effect models by obtaining R^2 from the OLS regressions of Equation 2(b), along with the hazard ratio from Equation 2(a).

these variables should capture the extent of information required for forecasting and the analysts' incentives to bias forecasts to obtain management favor (e.g., Lang and Lundholm 1996; Gu and Wu 2003). The regressions also include the absolute value of earnings changes (ECHG), as Lang and Lundholm (1996) argue that larger magnitudes of earnings changes are likely to represent unexpected changes in the underlying business and so should negatively affect forecast accuracy. We control for loss-reporting firms through an indicator variable (LOSS), and by including the level of earnings (EPS), since forecast errors are affected by managers' asymmetric incentives to take a big bath when reporting losses, compared to their incentives for overstating earnings when reporting profits (Eames and Glover 2003; Gu and Wu 2003). Previous studies suggest more optimistically biased forecasts and larger forecast errors for loss-reporting firms and for firms with lower earnings levels. The variable HORIZON controls for the length of the forecast horizon, in accordance with Brown's (2001) finding that short-horizon forecasts tend to be more accurate than longer-term forecasts. Further, Richardson, Teoh and Wysocki (2004) report evidence that early in the forecast period analysts start with optimistic forecasts and then reduce their forecasts as the earnings announcement date approaches, giving management the opportunity to beat their forecasts. Leverage (LEV) is included to control for the greater earnings uncertainty arising from increased financial risks, which can cause analysts' forecasts to be more optimistically biased and less accurate (Sadka and Scherbina 2007; Fang and Yasuda 2009). We employ year and analyst fixed effects. Similar results obtain when analyst fixed effects are either not included, or are replaced by fixed effects for the research firms.

If the forecasts issued by sponsored analysts are of a lower accuracy than those issued by voluntary analysts, then the coefficient on SPONSOR in the absolute forecast error regression is expected to be significantly positive. In the regression of signed FEs, SPONSOR is expected to

have a significantly positive (negative) coefficient if the forecasts by sponsored analysts are more optimistically (pessimistically) biased than those issued by voluntary analysts.

Table 3 presents results from estimating Equation 2(b) for FE_{it} and $ABSFE_{it}$. As it is possible that analysts may not necessarily incorporate all information in early forecasts, we report two sets of results, first from regressions that utilize all available forecasts (Panel A), and second from regressions using only the latest forecasts prior to earnings announcements (Panel B). In both panels, the coefficients on SPONSOR in the forecast accuracy regression is positive and significant, indicating that sponsored forecasts are less accurate, yet sponsored forecasts are no more or less biased than voluntary forecasts. The lower accuracy of sponsored forecasts is consistent either with the earnings of sponsored firms being more difficult to forecast or the sponsored analysts exerting less effort than voluntary analysts given the lower demand for their services. In further (untabulated) testing, we find that the accuracy of forecasts by sponsored analysts improves the longer the firm remains in the Scheme, and by the third year the accuracy is not significantly different from that of forecasts by voluntary analysts. This suggests that the forecast accuracy of sponsored analysts improves over time as they become more familiar with the firm.

6.1.2. *Market reaction to analyst forecast revisions*

To examine whether the market reaction to forecast revisions varies across sponsored and voluntary analysts, we regress each of the market-reaction measures, CAR(REV) and ABVOL(REV), on the dummy variable for sponsored firms (SPONSOR), interacted either with forecast revisions (in the regressions of CAR(REV)) or with absolute value of forecast revisions (in regressions of ABVOL(REV)). These regressions also include size, market-to-book ratio, trading volume, stock return volatility, number of analysts, a dummy for downward revisions,

stock price synchronicity, and fixed effects for year and for analysts, as control variables.

Since the potentially endogenous variable SPONSOR is entered as an interactive variable (REV*SPONSOR or ABSREV*SPONSOR) in the outcome regression, we are unable to estimate a treatment effects model here, as is done for FEs. Instead, we use the instrumental variables approach recommended by Wooldridge (2010) to control for the potential self-selection issue. The predicted value of SPONSOR (denoted by $\widehat{SPONSOR}$), having a probability between 0 and 1, is computed from a standard Probit regression of Equation 2(a) and is used as an instrumental variable in the 2nd stage analysis. The qualitative results are, however, unaffected when we use the actual SPONSOR dummy in the regressions, rather than the predicted values, suggesting that endogeneity bias is unlikely to be a significant issue for this analysis.

Table 4 presents the results based on the instrumental variable approach for analysis of stock market reactions to analyst revisions.[23] ABSREV is statistically significant in the abnormal volume model, which indicates that forecast revisions for voluntarily followed firms lead to greater trading by investors. However, ABSREV*$\widehat{SPONSOR}$ is significantly negative, indicating that the volume reaction to the release of revisions for sponsored firms is lower than that for voluntarily followed firms.[24] Moreover, based on F-tests, we are unable to reject the null hypothesis that trading volume is unrelated to forecast revisions for sponsored firms.

When we focus on REV or on REV*$\widehat{SPONSOR}$ in the return regression, we find statistically insignificant coefficients, implying that the magnitude of forecast revisions is unrelated to stock price reactions. However, the coefficient on $\widehat{SPONSOR}$ by itself is significantly positive in both the return and abnormal volume regressions, indicating that

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[23] In unreported tests, we re-estimate these regressions by further adding control variables interacted with REV or ABSREV, and find no change in the inferences drawn.

[24] Holding other factors constant, when the predicted probability of SPONSOR ($\widehat{SPONSOR}$) moves from the 10th to the 90th percentile, the volume reaction to ABSREV declines by 7.149 points.

irrespective of the magnitude of the news, investors react more positively to forecast revisions issued by sponsored analysts. This is consistent with the arguments in Clement et al. (2003) that earnings forecasts, irrespective of their news content, can give rise to positive market reactions if they reduce the uncertainty associated with future earnings. Taken together, these results suggest that investors find revisions of sponsored forecasts useful, independent of the magnitude of the revisions.

6.2. *The effects of sponsored research on firms' information environment and liquidity*

Table 5 reports on the effects of the SGX Scheme on sponsored firms relative to not-followed firms with respect to measures of the information environment and stock liquidity.[25] Our choice of control variables in these regressions is based on prior literature (e.g., Hutton, Marcus, and Tehranian 2009; Jin and Myers 2006) and it includes leverage, profitability, skewness, kurtosis of weekly returns and a dummy for loss-making firms.[26] In these analyses, the coefficient capturing the difference-in-differences effect (i.e., POST*SGXSP), is almost always statistically insignificant. The one exception is in the regression of earnings announcement returns, ABS_CAR(ERN), where the coefficient is significantly negative, indicating a decline in the magnitude of earnings announcement returns after a firm joins the Scheme. However, no such decline is observed for not-followed firms, as seen by the insignificant coefficient on POST. The decline for sponsored firms alone is consistent with sponsored forecasts aiding investors to formulate their earnings expectations and thus, lowering price reactions at subsequent earnings announcements.

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[25] All liquidity measures are based on intra-day trade and quote data, computed using averages of their daily values in a calendar year. Our conclusions are robust to alternative liquidity measures, including number of trades in a day.
[26] Analyses presented in Tables 5 and 6 include year fixed effects, but do not include analyst fixed effects or analysts' forecast properties, as the unit of observation is the firm and not the analyst. Nonetheless, our conclusions are not sensitive to including industry or firm fixed effects instead of analyst fixed effects.

Overall, the results in Table 5 indicate that the only effect of joining the SGX Scheme is a decline in market reactions at earnings announcements. None of the other information environment attributes or stock liquidity measures are significantly affected. Thus, although sponsored analysts help investors to better form earnings expectations, this benefit does not extend to other characteristics of the information environment and it does not significantly improve stock liquidity.

In an unreported analysis, we also investigate whether the percentage of shares held by institutional owners increases as a result of sponsored firms entering the Scheme. We do so by using a small sub-set of the sample for which relevant data is available. We find no evidence of the Scheme significantly affecting institutional ownership in this sub-sample.

6.3. *Comparisons of sponsored firms with voluntarily followed firms*

Table 6 presents the results from estimations of Equations 2(a) and 2(b) to evaluate how the information environments and the stock liquidity of sponsored firms in the post-SGX Scheme period compare with those of voluntarily followed firms. Panel A presents results for information environment attributes, while Panel B reports results for stock liquidity. We find that among the information environment attributes, price reaction at earnings announcements, stock synchronicity and media visibility are all significantly different across the two groups. Sponsored firms have larger surprises at earnings announcements, as seen by the positive coefficient on SPONSOR in regressions of ABS_CAR(ERN).[27] Not surprisingly, sponsored firms also have less media visibility and less market-wide information reflected in prices (i.e., have lower stock

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[27] Marginal effect at the means for ABS_CAR is 0.068 for voluntarily followed firms and 0.205 for sponsored firms, indicating that for two hypothetical observations with average values on other variables, the price reaction at earnings announcements for sponsored firms is 0.137 points higher (or three times larger) than that of voluntarily followed firms. In addition, the average marginal effect (AME) for the dummy variable "SPONSOR" is also 0.137, which indicates that on average, sponsored firms experience a higher level of price reaction at earnings announcements.

price synchronicity). The coefficients on SPONSOR in regressions of ABVOL and IPT are statistically insignificant, which implies that both abnormal trading volume at earnings announcements and the speed with which prices reflect information are not significantly different across the two groups of firms.

Panel B of Table 6 shows that stock liquidity of sponsored firms is not comparable to that of voluntarily followed firms. Sponsored firms have relatively higher spreads, smaller depth, lower volume and a higher Amihud price impact factor. Taking spreads for an example, our results indicate that, holding all other variables at their means, our measure of spreads for a hypothetical sponsored firm is 0.109, but is only 0.030 for a similar voluntarily followed firm (untabulated). The measure of spreads for a sponsored firm is around three times bigger than for a voluntarily followed firm. After controlling for the self-selection bias, the differences between sponsored firms and voluntarily followed firms are economically significant.

Overall, the results in Table 6 show that even after joining the SGX Scheme, sponsored firms differ significantly from voluntarily followed firms. The sponsored firms continue to have a less rich information environment and lower levels of stock liquidity.

7. Summary and Concluding Remarks

We investigate the efficacy of an equity research scheme introduced by the Singapore Exchange to promote analyst coverage of previously unfollowed or poorly followed stocks. We find that sponsored analysts regularly issue earnings forecasts, which has made it easier for market participants to obtain earnings forecasts for firms that were not previously followed by analysts. In the initial years of a firm joining the scheme, the sponsored analysts' forecasts are less accurate than those issued by voluntary analysts for comparable firms, indicating either more future uncertainty for sponsored firms or lower effort by sponsored analysts. However, after

participating in the sponsorship Scheme for three years or more, sponsored analysts' forecasts are just as accurate as voluntary analysts' forecasts. We also find that the forecasts biases are comparable across sponsored and voluntary analysts' forecasts and that, on average, market participants react positively (both in term of returns and trading volume) to a sponsored analyst forecast revision. However, the size of the market's reaction is unrelated to the magnitude of the earnings forecast revision.

We also investigate how joining the Scheme benefits a firm in terms of its information environment and stock liquidity, two attributes that prior literature has shown to improve with analyst coverage. We observe that investors' ability to forecast future earnings significantly improves after a firm joins the Scheme and consequently, earnings announcements become less of an information event for these firms. However, the Scheme appears to bring little improvement to other aspects of their information environments or their stock liquidity. Specifically, the scheme has little influence on the timeliness with which information is incorporated into prices, stock synchronicity or media visibility of sponsored firms. Similarly, quoted spreads, depth, price impact of trades and trading volume also remain unaffected by a firm joining the Scheme. Also, while the analyst sponsorship scheme appears to have produced some informational improvements for the sponsored firms as described above, it did not improve their overall information environment to the level enjoyed by voluntarily followed firms. But, this was never the original goal of the scheme.

Overall, our evidence from the SGX suggests that although the stock exchange was motivated to boost independent analyst coverage by acting as an intermediary, the Scheme has had only a very limited impact on firms' information environment and stock liquidity. This lack of clear benefits may explain why the SGX has moved on from sponsoring bespoke analyst

reports to a more standardized and presumably cheaper option, with S&P. Notwithstanding the issues of generalizing this evidence to other exchanges, our evidence calls into question the ability of exchange-sponsored schemes to significantly alter the information environment of sponsored firms.

References

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets* 5 (1): 31–56.

Angrist, J. D., and J. S. Pischke. 2008. *Mostly Harmless Econometrics: An Empiricists Companion.* Princeton, NJ: Princeton University Press.

Arendt, J.N., and A. Holm. 2006. Probit models with binary endogeneous regressors. *Discussion Papers on Business and Economics.* University of Southern Denmark.

Ball, R., and L. Shivakumar. 2008. How much new information is there in earnings? *Journal of Accounting Research* 46 (5): 975–1016.

Bamber, L. S., and Y. S. Cheon. 1995. Differential price and volume reactions to accounting earnings announcements. *The Accounting Review* 70 (3): 417–441.

Barth, M. E., R. Kasznik, and M. F. McNichols. 2001. Analyst coverage and intangible assets. *Journal of Accounting Research* 39 (1): 1–34.

Battalio, R., and R. Mendenhall. 2005. Earnings expectations, investor trade size, and anomalous returns around earnings announcements. *Journal of Financial Economics* 77 (2): 289-319.

Bhattacharya, N. 2001. Investors' trade size and trading responses around earnings announcements: An empirical investigation. *The Accounting Review* 76 (2): 221-244.

Bhushan, R. 1989. Firm-characteristics and analyst following. *Journal of Accounting and Economics* 11 (2–3): 39–65.

Bowen, R., X. Chen, and Q. Cheng. 2008. Analyst coverage and the cost of raising capital: Evidence from underpricing of seasoned equity offerings. *Contemporary Accounting Research* 25 (3): 657–700.

Bradley, D. J., B. D. Jordan, and J. R. Ritter. 2003. The quiet period goes out with a bang. *The Journal of Finance* 58 (1): 1–36.

Bradley, D. J., B. D. Jordan, and J. Ritter. 2008. Analyst behavior following IPOs: The "bubble period" evidence. *The Review of Financial Studies* 21 (1): 101–133.

Brennan, M., and A. Subrahmanyam. 1995. Investment analysis and price formation in securities markets. *Journal of Financial Economics* 38 (3): 361–381.

Brown, L. 2001. How important is past analyst earnings forecast accuracy? *Financial Analysts Journal* 57 (6): 44–49.

Bushee, B. J., J. E. Core, W. Guay, and S. J. W. Hamm. 2010. The role of the business press as an information intermediary. *Journal of Accounting Research* 48 (1): 1–19.

Bushee, B. J., and G. S. Miller. 2012. Investor relations, firm visibility, and investor following. *The Accounting Review* 87 (3): 867–897.

Butler, M., A. Kraft, and I. S. Weiss. 2007. The effect of reporting frequency on the timeliness of earnings: The cases of voluntary and mandatory interim reports. *Journal of Accounting and Economics* 43 (2):

181–217.

Canivet, J. 2009. Small cap analysts coverage: An "under-the-radar" dilemma. *Focus* (World Federation of Exchanges), 194: 4–6.

Chan, K., and A. Hameed. 2006. Stock price synchronicity and analyst coverage in emerging markets. *Journal of Financial Economics* 80 (1): 115–147.

Chang, X., S. Dasgupta, and G. Hilary. 2006. Analyst following and financing decisions. *Journal of Finance* 61 (6): 3009–3048.

Chung, K., T. McInish, R. Wood, and D. Wyhowski. 1995. Production of information, information asymmetry and the bid-ask spread: Empirical evidence from analysts' forecasts. *Journal of Banking and Finance* 19 (6): 1025–1046.

Clement, M., R. Frankel, and J. Miller. 2003. Confirming management earnings forecasts, earnings uncertainty, and stock returns. *Journal of Accounting Research* 41 (4): 653–679.

Cliff, M. T., and D. J. Denis. 2004. Do initial public offering firms purchase analyst coverage with underpricing? *Journal of Finance* 59 (6): 2871–2901.

Dhiensiri, N., and A. Sayrak. 2010. The value impact of analyst coverage. *Review of Accounting and Finance* 9 (3): 306–331.

Dhiensiri, N., A. Sayrak, and P. Zarowin. 2005. The impact of analyst coverage initiation on the market's ability to anticipate future earnings. Working paper, New York University.

Dyck, I. J. A., A. Morse, and L. Zingales. 2010. Who blows the whistle on corporate fraud? *Journal of Finance* 55 (6): 2213–2253.

Eames, M. J., and S. M. Glover. 2003. Earnings predictability and the direction of analysts' earnings forecast errors. *The Accounting Review* 78 (3): 707–724.

Easley, D., M. O'Hara, and J. Paperman. 1998. Financial analysts and information-based trade. *Journal of Financial Markets* 1 (2): 175–201.

Elton, E. J., M. J. Gruber, and M. Gultekin. 1981. Expectations and share prices. *Management Science* 27 (9): 975–987.

Fairfield, P. M., and J. S. Whisenant. 2001. Using fundamental analysis to assess earnings quality: Evidence from the Center for Financial Research and Analysis. *Journal of Accounting, Auditing & Finance* 16 (4): 273–295.

Fang, L., and A. Yasuda. 2009. The effectiveness of reputation as a disciplinary mechanism for sell-side research. *Review of Financial Studies* 22 (9): 3735–3778.

Ferreira, M. A., and P. Matos. 2008. The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics* 88 (3): 499–533.

Frankel, R., S. Kothari, and J. Weber. 2006. Determinants of the informativeness of analyst research. *Journal of Accounting and Economics* 41 (1): 29–54.

Fried, D., and D. Givoly. 1982. Financial analysts' forecasts of earnings: A better surrogate for market expectations. *Journal of Accounting and Economics* 4 (2): 85–107.

Girma, S., and H. Gorg. 2007. Evaluating the foreign ownership wage premium using a difference in differences matching approach. *Journal of International Economics* 72 (1): 97–112.

Glosten, R., and P. Milgrom. 1985. Bid, ask, and transaction prices in specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14 (1): 71–100.

Graham, J., C. Harvey, and S. Rajgopal. 2005. The economic implications of financial reporting. *Journal of Accounting and Economics* 40 (1): 3–73.

Gu, Z., and J. S. Wu. 2003. Earnings skewness and analyst forecast bias. *Journal of Accounting and Economics* 35 (1): 5–29.

Healy, P., and K. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31 (1): 405–440.

Hong, D., C. M. Lee, and B. Swaminathan. 2003. Earnings momentum in international markets. Working paper, Social Science Research Network. http://ssrn.com/abstract=390107.

Hutton, A., A. J. Marcus, and H. Tehranian. 2009. Opaque financial reports, R^2, and crash risk. *Journal of Financial Economics* 94 (1): 67–86.

Irvine, P. J. 2003. The incremental impact of analyst initiation of coverage. *Journal of Corporate Finance* 9 (4): 431–451.

Jensen, M., and W. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics* 3 (4): 305–360.

Jin, L., and S. C. Myers. 2006. R^2 around the world: New theory and new tests. *Journal of Financial Economics* 79 (2): 257–292.

Ke, B., and K. Yu. 2006. The effect of issuing biased earnings forecasts on analysts' access to management and survival. *Journal of Accounting Research* 44 (5), 965–999.

Kelly, B., and A. Ljungqvist. 2012. Testing asymmetric-information asset pricing models. *Review of Financial Studies* 25 (5): 1366–1413.

Khandker S.R., G. B. Koolwal, and H. Samad. 2010. *Handbook on Impact Evaluation: Quantitative Methods and Practice*. World Bank.

Kim, O., and R. Verrecchia. 199l. Trading volume and price reactions to public announcements. *Journal of Accounting Research* 29 (2): 302–321.

Kirk, M. 2011. Research for sale: Determinants and consequences of paid-for analyst research. *Journal of Financial Economics* 100 (1): 182–200.

Krigman, L., W. H. Shaw, and K. L. Womack. 2001. Why do firms switch underwriters? *Journal of Financial Economics* 60 (2–3): 245–284.

Kyle, A. S. 1985. Continuous auctions and insider trading. *Econometrica* 53 (6): 1315–1335.

Lang, M. H., K. V. Lins, and D. P. Miller. 2004. Concentrated control, analyst following, and valuation: Do analysts matter most when investors are least protected? *Journal of Accounting Research* 42 (3): 589–623.

Lang, M. H., and R. J. Lundholm. 1996. Corporate disclosure policy and analyst behavior. *The Accounting Review* 71 (4): 467–492.

Lee, C. M. C., B. Mucklow, and M. J. Ready. 1993. Spreads, depths, and the impact of earnings information: An intraday analysis. *Review of Financial Studies* 61 (2): 345–374.

Lim, T. 2001. Rationality and analysts' forecast bias. *Journal of Finance* 56 (1): 369–385.

Lim, T. K., and H. C. Kong. 2004. New evidence on price impact of analyst forecast revisions. *International Review of Financial Analysis* 13 (2): 161–190.

Malmendier, U. and D. Shantikumar. 2007. Are investors naive about incentives? *Journal of Financial Economics* 85: 457-489.

Mayhew, M. 2009. Growing trend for exchanges to offer research. *Integrity Research Associates blog.* Available online at http://www.integrity-research.com/cms/2009/06/15/growing-trend-for-exchanges-to-offer-research, retrieved April 23, 2012.

McNichols, M., and P. C. O'Brien. 1997. Self-selection and analyst coverage. *Journal of Accounting Research* 35 (1): 167–199.

Mehran, H., and S. Peristiani. 2010. Financial visibility and the decision to go to private. *Review of Financial Studies* 23 (2): 519–547.

Mola, S., P. R. Rau, and A. Khorana. 2013. Is there life after the complete loss of analyst coverage? *The Accounting Review* 88 (2): 667–705.

Morck, R., B. Yeung, and W. Yu. 2000. The information content of stock markets: Why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58 (1): 215–260.

O'Brien, P. C., and R. Bhushan. 1990. Analyst following and institutional ownership. *Journal of Accounting Research* 28 (1): 55–76.

Piotroski, J., and D. Roulstone. 2004. The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices. *The Accounting Review* 79 (4): 1119–1151.

Rabin M. and J. Schrag. 1999. First impressions matter: a model of confirmatory bias. *Quarterly Journal of Economics* 114: 37-82.

Rajgopal, S., T. Shevlin, and M. Venkatachalam. 2003. Does the stock market fully appreciate the implications of leading indicators for future earnings? Evidence from order backlog. *Review of Accounting Studies* 8 (4): 461–492.

Richardson, S., S. Teoh, and P. Wysocki. 2004. The walk-down to beatable analyst forecasts: The role of equity issuance and insider trading incentives. *Contemporary Accounting Research* 21 (4): 885–924.

Rosenbaum, P., and D. B. Rubin, 1985. Constructing a control group using a multivariate matched sampling method that incorporates the propensity score. *American Statistician* 39 (1): 33–38.

Roulstone, D. 2003. Analyst following and market liquidity. *Contemporary Accounting Research* 20 (3): 551–578.

Sadka, R., and A. Scherbina. 2007. Analyst disagreement, mispricing and liquidity. *Journal of Finance* 62 (5): 2367–2403.

Schipper, K. 1991. Commentary on analysts' forecasts. *Accounting Horizons* 5 (4): 105–121.

Simpson, A. 2010. Analysts' use of non-financial information disclosures. *Contemporary Accounting Research* 27 (1): 249–288.

Singapore Exchange. 2003a. *SGX and MAS to Introduce Research Incentive Scheme.* SGX News Release, September 29. Available from http://www.irasia.com/regbod/sg/ses/press/03index.htm, retrieved April 23, 2012.

Singapore Exchange. 2003b. *SGX-MAS Research Scheme Receives Strong Support – 115 Listed Companies and Nine Research Firms to Participate.* SGX News Release, November 5. Available from http://www.mondovisione.com/news/sgxmas-research-scheme-receives-strong-response-115-listed-companies-and-nine-re/, retrieved September 11, 2009.

Singapore Exchange. 2006. *SGX-MAS Research Incentive Scheme Extended.* SGX News Release, January 25, 2006. Available from http://www.irasia.com/regbod/sg/ses/press/06index.htm, retrieved April 23, 2012.

Singapore Exchange. 2009. *New SGX Research Scheme Better Addresses Market Needs.* SGX News Release, July 14. Available from http://www.mondovisione.com/media-and-resources/news/new-sgx-research-scheme-better-, retrieved June 28, 2015.

Stoughton, N. M., K. P. Wong, and J. Zechner. 2001. IPOs and product quality. *Journal of Business* 74 (3): 375–408.

Todd, P. E., 1999. A practical guide to implementing matching estimators. Unpublished manuscript, University of Pennsylvania.

Todd, P. E., 2008. Matching estimators. In *The New Palgrave Dictionary of Economics*. Second Edition. Editors, Durlauf, S. N., and L. E. Blume. Basingstoke, UK: Palgrave Macmillan.

Tucker, J. 2010. Selection bias and econometric remedies in accounting and finance research. *Journal of Accounting Literature* 29 (Winter): 31–57.

Wooldridge, J. M. 2010. *Econometric Analysis of Cross Section and Panel Data*. Second edition. Cambridge, MA: Massachusetts Institute of Technology.