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Even-Tov, O, [Ryans, J](#) and Solomon, S D

(2022)

*Representations and Warranties Insurance in Mergers and Acquisitions.*

Review of Accounting Studies.

ISSN 1380-6653

(In Press)

DOI: <https://doi.org/10.1007/s11142-022-09709-w>

Springer Verlag (Germany)

<https://link-springer-com.lbs.idm.oclc.org/article...>

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# Representations and warranties insurance in mergers and acquisitions

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Accepted: 1 August 2022  
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## Abstract

To mitigate information asymmetry in acquisitions, the seller makes contractual representations and warranties (referred to as “R&W” or “reps”) about the state of the target, such as attesting to the accuracy of the target’s financial statements. While seller indemnities allow buyers to impose costs due to breaches in the reps discovered after the deal’s close, these indemnities involve significant contracting costs. To mitigate these costs, the acquisition parties have increasingly turned to purchasing representations and warranties insurance. Using a proprietary and novel sample of R&W insurance policies issued worldwide for acquisitions of non-public targets, we find that the demand for R&W insurance, the premium charged for it, and the likelihood of a claim being filed are correlated with industry metrics for valuation uncertainty, the type of acquirer and seller, and the target’s legal regime. In particular, we find higher demand for R&W insurance and a higher R&W insurance premium charged when the target belongs to an industry with weaker internal controls. We also find that a higher premium is charged when the target is in an industry with relatively high levels of R&D to sales, indicating that the insurance company expects unrecognized intangible assets to have a greater risk of future claims. Our study adds to our understanding of how parties reduce target valuation uncertainty and the role of disclosures and R&W insurance policies in private mergers and acquisitions transactions.

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**Keywords** Information asymmetry · Representations and warranties · Insurance · Valuation uncertainty · Mergers and acquisitions · Seller indemnities

**JEL codes** D82 · G22 · G34 · K12 · K22 · K41 · L14 · M41

## 1 Introduction

Information asymmetry between an acquirer and a target is an underlying issue in merger and acquisition (M&A) discussions and outcomes and derives from the acquirer's incomplete knowledge of the target's value. It is more pronounced for private targets, which, unlike public targets, are not subject to securities regulations, disclosure requirements, and public shareholder oversight. To mitigate the increased information asymmetry surrounding private targets, these sellers provide representations and warranties (referred to as "R&W" or "reps") regarding the state of the seller's business that are more extensive than those provided by public sellers. Through these reps, a seller promises that a set of facts about the target in the acquisition agreement are true. If the reps are found to have been breached following the closing of the deal, then the buyer's remedies include pursuing damages under applicable law or including an indemnity provision in the merger agreement, usually accompanied by a holdback or escrow amount used to adjust the purchase price post closing. Alternatively, the parties may purchase an R&W insurance policy, and the value of damages can be recovered through an insurance claim. In this paper, we use a proprietary sample of R&W insurance policies to investigate the factors that affect the decision to purchase a policy (the decision to transfer risk to the insurer), the factors that determine the premium charged by the insurance company (the market measure of the risk), and the factors that are correlated with the likelihood of a claim (the realized risk).

Representation and warranties insurance transfers indemnification risk to a third-party insurer for an up-front premium payment.<sup>1</sup> These policies were first introduced in the 1990s but have only gained significant traction over the past ten years (Griffith 2020). These products arose because reps and indemnities introduce significant contracting costs for both buyers and sellers and are among the most difficult and time-consuming aspects of the acquisition agreement to negotiate (e.g., Freund 1975; Gallozi and Phillips 2002; Hill et al. 2016).<sup>2</sup> These costs arise because the seller may not have, or may not want to disclose, a complete and accurate picture of the state of the business, including the true value of its assets and liabilities. In this case, it may limit the types of warranties and the amount of indemnification it provides. In addition, risk aversion on the part of the buyer or the seller may preclude agreement on the amount or duration of an indemnity to guarantee the R&Ws. Lastly, if a seller maintains a relationship with the buyer post acquisition—e.g., the buyer retains the seller as a manager—any attempt to recover an indemnity from the seller/manager represent a direct principal-agent conflict.

In this paper, we obtain a proprietary sample of R&W insurance policies issued by a global insurance company for acquisitions of private targets between January 2011 and December 2016, representing 1,690 acquisitions and \$470 billion in

<sup>1</sup> Outside the US, R&W insurance is commonly known as warranties and indemnities (W&I) insurance.

<sup>2</sup> Coates (2015) notes that they constitute 43% of the words in the average acquisition agreement, a greater percentage than any other type of provision.

enterprise value.<sup>3</sup> For each policy, our data from the insurance company includes, among other items, the premium and liability limit. For the acquisition parties, we observe deal size (enterprise value), buyer and target ownership type, target region, and target industry. We also observe claims reported for each policy and the type of reps breached, if any, as of September 2017.

Using this sample, we first investigate variables that are associated with the decision to purchase R&W insurance policies. The first set of variables we examine are industry metrics for valuation uncertainty, which follow along the lines of Datar et al. (2001) and Cain et al. (2011) who examine the role of earnouts in valuation uncertainty in private firms and who also lack the buyer and seller identities. The second set of variables are the acquirer and seller types—private equity (PE), strategic, or individual.<sup>4</sup>

We find that there is a higher likelihood of purchasing R&W insurance when acquisition targets belong to industries with higher target valuation uncertainty, such as greater return volatility and lower-quality financial reporting, as measured by the level of internal control weakness. We also provide evidence of lower demand for R&W insurance in industries where there are more growth opportunities, as captured by the target industry Tobin's Q, consistent with the fact that the value of high-growth firms is predicated more on future prospects than on existing assets and liabilities, making R&W insurance less valuable. We also show that PE acquirers are more likely to purchase R&W insurance than are strategic buyers, consistent with the notion that an acquisition by a private-equity buyer exposes the buyer to more firm-specific financial risk than would a similar acquisition by a large diversified public acquirer. This is because PE buyers' funds usually consist of a concentrated set of portfolio companies, held over a relatively short period of time. Demand for R&W insurance is also higher among PE sellers. PE sellers are more likely than strategic sellers to want to limit their post-closing indemnification liabilities on the sale of a portfolio company so as to be able to fully distribute sales proceeds to the limited partners of the PE fund at the time of the sale, thereby providing higher internal rates of return to investors (Griffith 2020). Last, we find that demand is significantly higher if the target is in a common law regime (as opposed to civil or other legal regimes), consistent with greater expected indemnity contracting costs in these legal environments.

We then examine variables associated with the premium charged by the insurance company. Our analysis reveals that the insurance company charges higher premiums for targets in industries with poorer financial statement quality, which are perceived to be associated with a greater risk of loss. We also find that a higher premium is charged when the target is in an industry with relatively high levels of research and development (R&D) to sales, indicating that the insurance company expects unrecognized intangible assets to have a greater risk of future claims. In contrast, we find that premiums are lower in targets in industries with more growth opportunities, consistent with our prior evidence of a lower likelihood of purchasing R&W insurance for high-growth targets, given their greater

<sup>3</sup> Betton et al. (2008) estimate that non-public targets represent more than 63% of all acquisition targets. R&W insurance is more commonly utilized in acquisitions of private companies than of public companies. This is primarily due to the fact that the reps in public deals typically do not provide for post-completion indemnification for breaches.

<sup>4</sup> Private equity is composed of funds and investors that directly invest in private companies. A strategic buyer is a company that acquires another company in the same industry to capture synergies. A strategic seller is a company (not a PE) that sells a subsidiary or a business unit. An individual seller is a company being sold that is privately owned by a single person.

reliance on future prospects. We do not find differences between the premium that the insurance company charges to private equity buyers and strategic buyers. In contrast, we find that PE sellers and individual sellers pay a higher premium than do strategic sellers.

We conclude by investigating the factors that are correlated with the likelihood of a claim, which reflects the realized risk. Somewhat surprisingly, we find that most industry-related factors are not associated with the likelihood of a future claim (with the exception of R&D to sales), but that these industry factors are related to the demand for R&W insurance or the premium charged. We also find that private equity buyers are less likely to file claims. A finding that is consistent across our three analyses is that deals with private-equity sellers are more likely to involve the purchase of R&W insurance than are deals with other types of sellers, have higher premiums, and are more likely to result in a claim. Overall, the results suggest that the *ex ante* risks inherent in the demand and premium charges are, to a large extent, not consistent with the realized incidence of breaches.

Our study contributes to several strands of the accounting and finance literature. First, we add to research on target valuation uncertainty in acquisitions (Shleifer and Vishny 2003; Rhodes-Kropf and Viswanathan 2004; Officer 2004) and on the impact of contracting on reducing valuation costs (Cain et al. 2011). We extend this literature by demonstrating the prevalence of R&W insurance as a replacement for the seller indemnity, which is a contracting mechanism to allocate risk and reduce information asymmetry and valuation uncertainty between buyers and sellers. Second, we add to literature that examines contractual mechanisms used to allocate risk in acquisitions. Some studies examine the determinants and effects of earnout provisions—contractual mechanisms that allocate post-transaction performance risk and create value in mergers and acquisitions (Bates et al. 2018; Cadman et al. 2014; Cain et al. 2011; Datar et al. 2001; Kohers and Ang 2000). Other studies of risk allocation in acquisitions explore material adverse change or event clauses (Denis and Macias 2013; Gilson and Schwartz 2005; Talley 2009). Our study extends these papers by being the first empirical paper to explore R&W insurance, which has only been explored theoretically (e.g., Gallozi and Phillips 2002; Griffith 2020; Hill et al. 2016). Last, we contribute to the body of research on disclosures in mergers and acquisitions by extending the analysis to private targets, which constitute the majority of M&A targets (Cain et al. 2011); most studies to date have focused on the effect of disclosures on the valuation of publicly traded target companies (e.g., Raman et al. 2013; McNichols and Stubben 2015; Skaife and Wangerin 2013).

## 2 Background

### 2.1 Representations and warranties insurance

Representations and warranties insurance transfers the risk of losses incurred due to breaches in the reps of an acquisition by compensating the policyholder in the event that such losses do occur. R&W insurance is issued either as a “buy-side” or a “sell-side” policy, depending on whether the policyholder is the acquirer or the seller, respectively. In a buy-side policy, the seller indemnity is not required, since the value of a breach is claimed directly from the insurance company. When the seller purchases the policy, the indemnity provision is retained, and R&W insurance compensates the seller for any subsequent indemnity claims made by the buyer.

In recent years, the use of R&W insurance has become significantly more widespread. Although first introduced in the 1990s, developments in the underwriting process, expansion of coverage, and the prevalence of PE participants in the acquisition market have dramatically expanded R&W insurance usage over the past ten years (Griffith 2020). Industry reports estimate that the US market for R&W insurance was less than 100 policies in 2011 and grew to more than 2,500 policies in 2018.<sup>5</sup> It is now estimated that R&W insurance is obtained in the majority of significant private deals.

## 2.2 R&W insurance policy terms

There are four key terms in an R&W insurance policy: liability limit, retention, policy period, and premium. The liability limit is the maximum amount that the insurance company will pay for all claims made under the policy. The limit usually, but not always, matches the indemnification amount included in the merger agreement; indeed, the limits are sometimes synthetic, in that the policy provides coverage even in the absence of a contractual seller indemnity. The retention represents the initial amount of losses that the insured must pay before insurance coverage applies. Retentions mitigate moral hazard by guaranteeing that the insured bears some of the economic cost of losses. In addition, since the insurer incurs significant administrative overhead, broker commissions, and premium taxes, it is not efficient to insure small or frequent losses. The retention eliminates these costs because the insured pays small claims directly (e.g., Grossman and Hart 1983; Holmstrom 1979; Mirrlees 1999). The policy period begins at the acquisition's closing and ends at an agreed upon expiration date. In order for a claim to be paid, the insurance company must be notified of the loss during the policy period. The premium is the amount paid to the insurer for providing coverage when the policy is bound, generally prior to the deal's close.

## 3 Literature review

There is a rich literature on valuation uncertainty in acquisitions (Shleifer and Vishny 2003; Rhodes-Kropf and Viswanathan 2004; Officer 2004). In order to reduce this uncertainty, parties to the acquisition agreement apply different contractual mechanisms of risk allocation. One mechanism is the inclusion of material adverse change or event clauses, which are used to protect parties against the risk of unforeseen events or circumstances (Denis and Macias 2013; Gilson and Schwartz 2005; Talley 2009). Another mechanism is the inclusion of earnout provisions, which allocate post-transaction performance risk. Earnouts allow the seller to insure future growth and earnings prospects (e.g., Cain et al. 2011; Datar et al. 2001). A third, more significant mechanism is the inclusion of reps, which are a set of promises, made by the seller, warranting that statements made about the target are true, and of indemnities, which are financial guarantees to the buyer against breaches discovered in reps after the closing of the deal. Several theoretical studies have explored the role of reps and indemnities to allocate risk and to reduce information asymmetry and valuation uncertainty (e.g., Gallozi and Phillips 2002; Griffith 2020; Hill

<sup>5</sup> Risk and Insurance Magazine (<https://riskandinsurance.com/the-value-of-reps-warranties/>). Retrieved November 2019.

et al. 2016). However, despite reps and indemnities being more common and more fundamental to the acquisition process than other contractual features, there has not been any empirical research into their economic magnitude, most likely because information about reps, indemnities, and breaches is rarely, if ever, publicly disclosed.

We contribute to the existing literature by empirically examining R&W insurance policies, which effectively replace the seller indemnity and thereby decrease contracting costs associated with negotiating the indemnity and subsequently litigating indemnity disputes. Using a novel dataset, we investigate three key issues with respect to R&W insurance. First, we examine the factors that affect the demand for R&W insurance. Second, we explore the factors that determine the premium charged by the insurance company. Third, we examine R&W insurance claims data in order to identify the factors that are associated with the likelihood of a claim.

## 4 Sample and data description

### 4.1 M&A transaction sample

We examine a proprietary sample of 1,690 R&W insurance policies issued worldwide by a global insurance company for acquisitions of non-public targets between January 2011 and December 2016. The sample represents \$470 billion in enterprise value acquired. Our data does not include the acquisition of public targets, because R&Ws for public targets typically do not survive the closing and because it is impractical for the acquirer to seek indemnification from or make holdback payments to a large number of public shareholders (Hill et al. 2016).<sup>6</sup> However, our data does include the acquisition of subsidiaries or units of public companies. For all policies, our data from the insurance company includes liability limits, duration, retention, and premium. For the acquisition parties, we observe deal size (enterprise value), buyer and target ownership type, target region, and target industry. We also observe claims reported for each policy through September 2017.

To understand how acquisition parties who purchase R&W insurance differ from those who do not, we compare our sample to similar acquisitions from the same time period in the Mergers and Acquisitions database of the Securities Data Corporation (SDC). Note that some of the acquisitions in the SDC sample may also have R&W insurance policy coverage; this will only serve to weaken our results. In order to align our sample with the SDC's, we exclude, from the SDC database, observations in which (1) the acquirer did not purchase full ownership in the target, (2) the target is a public company, (3) the acquirer and the target are the same firm, (4) the transaction value is missing from the SDC database, or (5) the target company is located in Central America. We remove Central American targets because our R&W insurance sample does not include policies written in this region. After applying these filters, the SDC sample consists of 36,769 completed acquisitions.

<sup>6</sup> R&Ws in public acquisitions generally serve to provide grounds to terminate the transaction prior to the closing for material breaches in the R&Ws, rather than to provide compensation to the buyer for breaches discovered post closing. *Akorn, Inc. v. Fresenius Kabi, AG* (Del.Ch. 2018) illustrates a case where the violation of representations regarding regulatory compliance was determined by the court to be grounds to terminate the merger agreement.



In Panel A of Table 1 we report the number of deals with R&W insurance coverage by year and compare them with the SDC population. As depicted in this panel, the 1,690 acquisitions in our sample reflect 4.6% of the total number of deals in the SDC population. Over the course of our sample period, the number of R&W insurance policies as a percentage of the number of firms in the SDC sample for a given year increases from 1.9% in 2011 to 7.7% in 2016. Panel B of Table 1 reports the industry classifications for targets in our sample and compares them to the SDC population. In Appendix B Table 8 we show the mapping between the insurance company's industry classification and that of the Securities Data Corporation. Although the target companies in our sample represent a range of industries, they exhibit some significant differences relative to the SDC population. Of the total R&W insurance sample, 37.3% of the industries possess large amounts of intangible assets, drawn from the consumer (15.6%), technology (12.5%), and healthcare (9.2%) industries. In comparison, the same three industries combined account for only 18.1% of the SDC population.

Panel C of Table 1 reports the region classifications for targets in our sample and compares them to the SDC population. Again, we note a key difference with respect to regional representation. In our sample, 73.4% of the targets are either in the United States (46.4%), the United Kingdom (14.7%), or Australia (12.3%), whereas in the SDC population these regions account for only 45.3% of the sample. The descriptive statistics in Panel D of Table 1 indicate that R&W insurance policies in our sample are more likely to be issued on large deals and to involve a private equity acquirer than are those in the SDC population. The mean deal size of our R&W insurance sample is \$278 million, compared with \$175 million for the overall SDC population. These univariate differences are consistent with minimum fixed underwriting costs, which discourage R&W insurance acquisition for smaller deals. With respect to the acquirer type, we document that PE firms represent 40.9% of the acquirers in our sample, compared to only 20.1% in the SDC population.

## 4.2 Descriptive statistics of deals, R&W insurance policies, and claims for breach of reps

Panels A and B of Table 2 provide descriptive statistics of the deals and R&W insurance policies in our sample, respectively. Panel A highlights the diversity of deal characteristics. For example, 40.9% of deals involve a PE acquirer, and 22.9% involve a seller who is an individual seller. Panel A shows that the mean (median) deal size is \$278.3 (\$120.0) million and that 74.37% of deals are negotiated under common law. The mean (median) premium is \$0.54 million (\$0.38 million).

Figure 1 illustrates the characteristics of claims filed for breach of reps for the policies in our sample through September 2017. Panel A of Fig. 1 reports the frequency of claims for breach and specifies the number of policies issued during each year of our sample period, the number of claims made on these policies as of September 2017, and the percentage of policies issued that incurred a claim. Each policy represents a specific acquisition or deal. As shown, 26.6% of all policies issued in 2011 resulted in a breach claim by September 2017. The percentage of policies issued that had claims against them in 2012, 2013, 2014, 2015, and 2016 were 24.2%, 23.5%, 20.1%, 16.2%, and 11.6%, respectively. The monotonic decrease over the years is likely due to the fact that claims can be filed for several years after the closing of the deal; consequently, fewer of the breaches of reps made in the more recent years will have occurred by the end of our



**Table 1** Comparison between the R&W insurance sample and the SDC population

<b>Panel A: Time profile</b>					
Year	R&W Insurance Sample		SDC Sample		R&W Ins. / SDC mergers
	N	%	N	%	%
2011	128	7.6%	6,590	17.9%	1.9%
2012	157	9.3%	6,369	17.3%	2.5%
2013	217	12.8%	6,035	16.4%	3.6%
2014	333	19.7%	7,097	19.3%	4.7%
2015	563	33.3%	6,879	18.7%	8.2%
2016	292	17.3%	3,799	10.3%	7.7%
Total	1,690	100.0%	36,769	100.0%	4.6%
<b>Panel B: Target industry</b>					
Year	R&W Insurance Sample		SDC Sample		Difference
	N	%	N	%	%
Manufacturing	273	16.20%	4,583	12.50%	3.7%***
Consumer	263	15.60%	3,187	8.70%	6.9%***
Technology	212	12.50%	1,155	3.10%	9.4%***
Real Estate	199	11.80%	5,551	15.10%	-3.3%***
Other	157	9.30%	2,346	6.40%	2.9%***
Healthcare	155	9.20%	2,318	6.30%	2.9%***
Financial Services	122	7.20%	3,303	9.00%	-1.8%***
Natural Resources	90	5.30%	3,068	8.30%	-3.0%***
Transportation	57	3.40%	1,000	2.70%	0.7%***
Media	52	3.10%	753	2.10%	1.0%***
Retail	41	2.40%	2,290	6.20%	-3.8%***
Telecomm	39	2.30%	761	2.10%	0.2%***
Services	30	1.80%	6,454	17.60%	-15.8%***
Total	1,690	100.0%	36,769	100.0%	
<b>Panel C: Target region</b>					
Region	R&W Insurance Sample		SDC Sample		Difference
	N	%	N	%	%
US	784	46.40%	11,296	30.70%	15.7%***
Europe	326	19.30%	6,765	18.40%	0.9%***
UK	248	14.70%	3,316	9.00%	5.7%***
Australia	207	12.30%	2,061	5.60%	6.7%***
Asia	73	4.30%	9,091	24.70%	-20.4%***
Canada	18	1.10%	2,438	6.60%	-5.5%***
Africa	17	1.00%	546	1.50%	-0.5%***
Middle East	13	0.80%	293	0.80%	0.0%***
South America	4	0.20%	963	2.60%	-2.4%***
Total	1,690	100.0%	36,769	100.0%	

**Table 1** (continued)

<b>Panel D: Deal characteristics</b>					
<b>Mean (median), \$ in thousands</b>	<b>R&amp;W Insurance Sample</b>		<b>SDC Sample</b>		<b>Difference p value</b>
Deal size	278,332 (120,000)		174,990 (22,594)		0.000 (0.000)
Acquirer type	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	
Private equity	691	40.9%	7,390	20.1%	0.000

This table reports descriptive statistics for our sample of 1,690 mergers and acquisitions (“R&W Insurance Sample”) between January 1, 2011, and December 31, 2016, and compares them to the SDC population of 36,769 mergers and acquisitions (“SDC Sample”). Panel A presents an annual time profile for our sample and for the SDC sample. Panels B and C present target industry and region, respectively, for our sample and for the SDC’s. Reported significant levels of differences are obtained using bootstrapping with 1,000 repetitions. Panel D shows the deal size and the percentage of acquisitions in our sample where the acquirer is a private equity firm and compares them with the SDC population. Reported *p* values are from two-sided *t*-tests (for means) or the Wilcoxon signed-rank test (for medians).

sample period. These figures highlight the significant number of alleged breaches of reps in acquisition deals *and* provide evidence of the importance of R&W insurance. While most claims are generally reported within two years of the acquisition, some—e.g., those that are tax-related—may take six or more years to be filed after the applicable tax audit window expires. In our regression analysis, we add year fixed effects to account for this claims development pattern. Panel B of Fig. 1 indicates that approximately 95.9% of total claims are filed within 24 months, meaning that the discovery of the breach occurs during this time period. However, the value of the claim may not be known for some time thereafter.

The insurance company that provided our sample classifies claims into 10 different categories. Panel C of Fig. 1 illustrates the distribution of breach by type. The four largest categories account for 65.2% of all breaches: financial statement errors (21.3%), material contract issues (15.1%), tax issues (14.4%), and regulatory compliance issues (14.4%).<sup>7</sup> The remaining breaches stem from intellectual property, employment, fundamental, operational, litigation, and environmental issues.<sup>8,9</sup> The insurance company further classifies financial statement claims into five subcategories, which, in an untabulated analysis, we find to be roughly evenly distributed. These subcategories include accounting rules breach, misstatement of accounts receivable/payable, undisclosed liabilities,

<sup>7</sup> Of the 448 claims submitted, 143 have yet to be fully investigated and categorized; thus, we omit these when tabulating the distribution of claim types.

<sup>8</sup> It is important to know that not all R&W insurance policies will cover environmental reps and warranties—especially if the environmental liabilities are potentially significant. In such cases, the parties would be better off obtaining an environmental insurance policy. However, even where a buyer insists on an escrow or indemnity for environmental liability, an R&W insurance policy can still be utilized to reduce valuation risk. By covering claims for breaches of other reps and warranties, an R&W insurance policy could enhance the chances that the escrow will not be exhausted by non-environmental claims. Moreover, in some cases, R&W insurance may be more cost efficient in addressing environmental liabilities than an environmental risk policy would be (Gallozi and Phillips 2002).

<sup>9</sup> According to the insurance company, many regulatory compliance claims are filed by third parties. These claims include allegations of violations of employment, consumer protection, and competition laws. Typical employee-related breach cases involve claims by employees with respect to harassment or contractual obligations.

**Table 2** Deal and R&W insurance policy characteristics

Variable	Mean	Median	Standard Deviation	25th percentile	75th percentile
Panel A: Deal descriptive statistics					
Target industry Tobin's Q	1.40	1.34	0.41	1.14	1.56
Target industry STD returns	235%	225%	65.5%	187%	267%
Target Industry R&D to sales	6.1%	2.0%	11.0%	0.0%	10.0%
Target Industry ICW	16.6%	16.8%	6.1%	11.9%	20.9%
Acquirer PE	40.9%	0.0%	49.2%	0.0%	100.0%
Seller PE	29.3%	0.0%	45.6%	0.0%	100.0%
Seller individual	22.9%	0.0%	42.0%	0.0%	0.0%
Common law	74.37%	100%	43.66%	0.0	100%
Deal Size (\$000's)	278,332	120,000	493,317	47,672	292,757
Panel B: R&W insurance policy descriptive statistics					
Premium (\$000's)	545	380	555	208	730
Premium-to-limit	2.6%	2.5%	1.2%	1.4%	3.6%
Acquirer policy	87.2%	100.0%	33.4%	100.0%	100.0%
Claim incidence	18.6%	0.0%	38.9%	0.0%	0.0%

This table reports descriptive statistics for our sample of 1,690 mergers and acquisitions ("R&W Insurance Sample") between January 1, 2011, and December 31, 2016. All variables are defined in [Appendix A Table 7](#). Panels A and B provide descriptive statistics for the deals and policies in our sample, respectively.

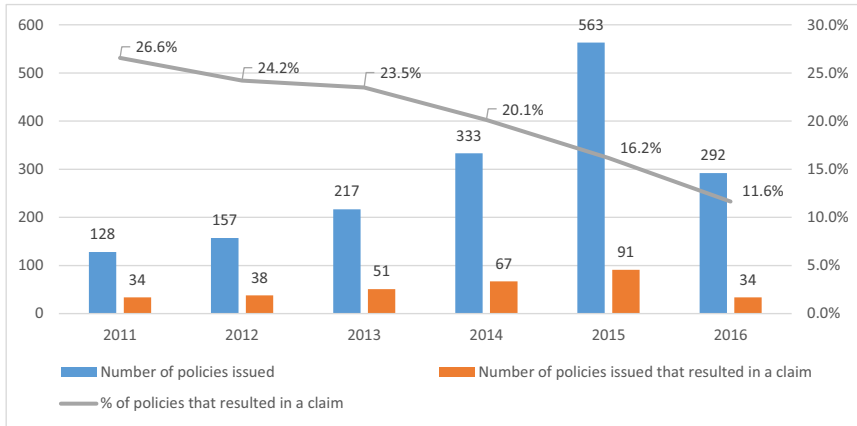
misstatement of inventory, and overstatement of cash holdings or profit. In [Appendix D Table 10](#), we list the reps and provisions associated with each of the 10 main breach types.

Table 3 presents the frequency of the different types of claims by industry and by region. Panel A shows how the incidence of claims varies with the industry classification of the target. For example, in technology industry acquisitions, the most common breaches are of intellectual property reps. This is consistent with the fact that companies in this industry likely rely heavily on intangible assets, such as patents, to propel future growth. Additionally, in both the consumer and healthcare industries, the most common breaches are of compliance with laws reps. This is consistent with the fact that companies in these industries likely rely heavily on legal compliance and regulation issues. Lastly, in the financial industry, the most common breaches are of financial statements. In this industry there are 10 financial statement breaches, consisting of four accounting rule breaches, four misstatements of accounts receivables/payable breaches, one undisclosed liability breach, and one misstatement of inventory breach.

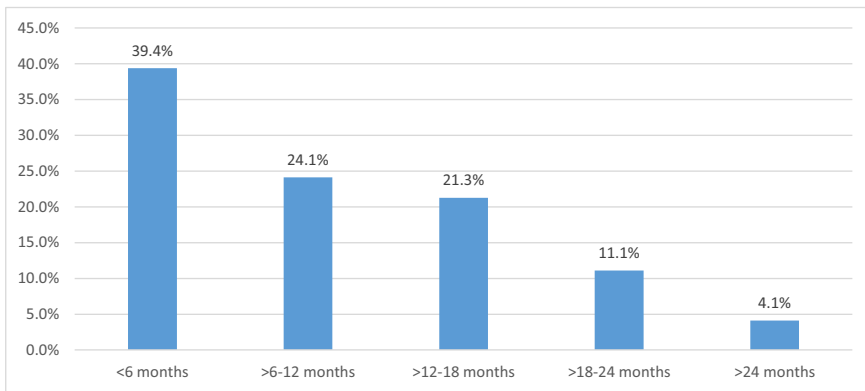
Panel B of Table 3 shows how the incidence of claims varies with the geographical region in which the target is located. Most claims are concentrated in the areas where

**Fig. 1** Breach of representations and warranties: frequency and type. The following figures provide information on the frequency and types of claims for R&W breaches in our sample. Our sample includes 1,690 mergers and acquisitions involving R&W insurance policies procured between January 1, 2011, and December 31, 2016. Panel A shows the number of deals by year and the number of deals with a breach claim submitted by September 30, 2017. Panel B shows the number of claims by type and Panel C enumerates their distribution. Panel A: Claim for breach of representations and warranties: frequency by year. Panel B: Distribution of average time to claim for breach of representations and warranties. Panel C: Frequency of representation and warranty claims by type.

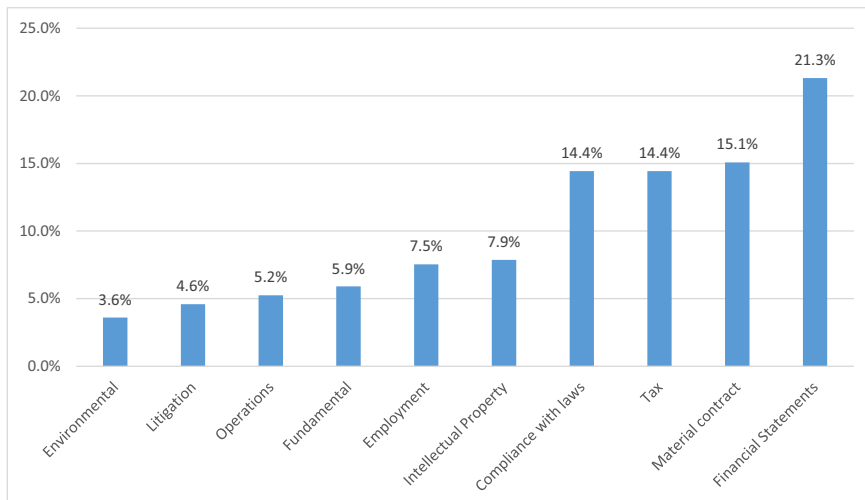
**A Claim for breach of representations and warranties: frequency by year**



**B Distribution of average time to claim for breach of representations and warranties**



**C Frequency of representation and warranty claims by type**



**Table 3** Descriptive statistics of type of claim for breach of representation and warranties by industry and region of target

Panel A: Claims for breach by type and industry		Panel B: Claims for breach by type and industry										Total
Industry	Financial Statements	Compliance with Laws	Tax	Intellectual Property	Employment	Fundamental	Environmental	Litigation	Operations	Material Contract		
Manufacturing	13	7	8	2	6	2	5	2	6	9	60	
	21.67%	11.67%	13.33%	3.33%	10.00%	3.33%	8.33%	3.33%	10.00%	15.00%		
Technology	7	6	8	13	4	5	1	4	1	6	55	
	12.73%	10.91%	14.55%	23.64%	7.27%	9.09%	1.82%	7.27%	1.82%	10.91%		
Consumer	7	12	4	3	6	2	1	3	1	5	44	
	15.91%	27.27%	9.09%	6.82%	13.64%	4.55%	2.27%	6.82%	2.27%	11.36%		
Financial	10	5	2	1	4	2	2	0	2	8	36	
	27.78%	13.89%	5.56%	2.78%	11.11%	5.56%	5.56%	0.00%	5.56%	22.22%		
Healthcare	4	6	4	0	0	2	1	1	1	1	20	
	20.00%	30.00%	20.00%	0.00%	0.00%	10.00%	5.00%	5.00%	5.00%	5.00%		
Media	2	0	4	2	1	2	1	1	1	2	16	
	12.50%	0.00%	25.00%	12.50%	6.25%	12.50%	6.25%	6.25%	6.25%	12.50%		
Real Estate	2	3	3	1	0	0	0	0	0	5	14	
	14.29%	21.43%	21.43%	7.14%	0.00%	0.00%	0.00%	0.00%	0.00%	35.71%		
Natural Resources	3	2	1	0	0	1	0	1	0	4	12	
	25.00%	16.67%	8.33%	0.00%	0.00%	8.33%	0.00%	8.33%	0.00%	33.33%		
Retail	1	0	2	1	0	1	0	0	1	0	6	
	16.67%	0.00%	33.33%	16.67%	0.00%	16.67%	0.00%	0.00%	16.67%	0.00%		
Transportation	2	1	1	0	0	0	0	0	1	0	5	
	40.00%	20.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.00%	0.00%		
Telecomm	2	0	0	0	0	0	0	0	0	0	2	

Table 3 (continued)

Region	Financial Statements	Compliance with Laws	Tax	Intellectual Property	Employment	Fundamental	Environmental	Litigation	Operations	Material Contract	Total
Services	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	0	0	0	0	0	0	0	0	0	1	1
Other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
	12	2	7	1	2	1	0	2	2	5	34
	35.29%	5.88%	20.59%	2.94%	5.88%	2.94%	0.00%	5.88%	5.88%	14.71%	14.71%
Panel B: Claims for breach by type and region											
US	39	37	25	22	17	17	8	5	10	27	207
	18.84%	17.87%	12.08%	10.63%	8.21%	8.21%	3.86%	2.42%	4.83%	13.04%	13.04%
Europe	9	4	10	0	1	1	2	5	3	5	40
	22.50%	10.00%	25.00%	0.00%	2.50%	2.50%	5.00%	12.50%	7.50%	12.50%	12.50%
Australia	11	2	4	2	3	0	0	3	2	10	37
	29.73%	5.41%	10.81%	5.41%	8.11%	0.00%	0.00%	8.11%	5.41%	27.03%	27.03%
UK	4	1	5	0	2	0	1	1	1	2	17
	23.53%	5.88%	29.41%	0.00%	11.76%	0.00%	5.88%	5.88%	5.88%	11.76%	11.76%
Asia	1	0	0	0	0	0	0	0	0	1	2
	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%	50.00%
Canada	0	0	0	0	0	0	0	0	0	1	1
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Other	1	0	0	0	0	0	0	0	0	0	1
	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

This table reports descriptive statistics for the sample of 305 claims for R&W breaches between January 1, 2011, and September 30, 2017. Panel A presents the frequency of claims by type and industry. Panel B presents the frequency of claims by type and region. Percentages are calculated by the frequency of claims by type and industry divided by the total number of claims per industry.

R&W insurance is common (the US, Europe, Australia, and the UK). Among these four regions, tax breaches are the biggest driver of reported claims in Europe (28.57%) and the UK (33.33%), which reflects the greater frequency of cross-border deals among European acquisitions and the complexity of Europe's multi-jurisdictional tax system (e.g., Erel et al. 2012). Almost all intellectual property claims take place in the US, consistent with untabulated evidence, in our sample, that most of the R&W insurance policies for technology companies are concentrated in the US (about 64%). Lastly, similar to Panel A, in all industries, one of the most common breaches is of financial statements.

## 5 Risk allocation and demand for R&W insurance

We begin our analysis by examining the determinants of the decision to purchase R&W insurance. As mentioned earlier, we explore two sets of variables to assess the demand for reps. Our first set of demand variables are industry metrics for valuation uncertainty and follow along the lines of Datar et al. (2001) and Cain et al. (2011), who examine the role of earnouts in valuation uncertainty in private firms. The first proxy reflects the target's growth prospects using the target industry median Tobin's Q ratio (*target industry Tobin's Q*). The second is an indicator variable equal to one if the target's industry has above-median standard deviation of daily returns over the prior year (*target industry STD returns*). The third is the industry ratio of R&D to sales (*target industry R&D to Sales*). We use an indicator variable equal to one if the target's industry has an above-median ratio, which reflects both uncertainty about future prospects (Officer et al. 2009) and the extent to which there are unrecorded assets on the balance sheet (Lev and Sougiannis 1996). The financial statement reps signal the value of a firm's *recorded* assets and liabilities, but most internal research-related assets are not recorded on financial statements. Therefore, these reps are a less likely source of breach for R&D-intensive firms. We add a fourth proxy, for target riskiness—the target's industry mean rate of internal control weakness prevalence (*target industry ICW*). Inferences about internal control weakness are likely to signal other aspects of general management and target quality. This is consistent with prior findings that show a correlation between internal control deficiencies and information uncertainty, higher audit fees, lower financial reporting quality, and fraud (e.g., Amiram et al. 2018; Beneish et al. 2008; Doyle et al. 2007; Hogan and Wilkins 2008; Hoitash et al. 2009).

To examine the effects of target industry characteristics on R&W insurance demand, we use the following logit regression specification, where the dependent variable is an indicator variable equal to one if R&W insurance has been purchased:

$$\begin{aligned}
 I(\text{Purchase})_i = & \alpha_0 + B_1 \text{Target industry Tobin's } Q_i \\
 & + B_2 \text{Target industry STD returns}_i \\
 & + B_3 \text{Target industry R\&D to Sales}_i + B_4 \text{Target Industry ICW}_i \\
 & + B_5 \text{Log(Deal size)}_i + B_6 \text{Common law}_i + \text{Year FE} + e_i. \quad (1)
 \end{aligned}$$



We include two control variables. The first is deal size ( $\text{Log}(\text{Deal Size})$ ). We expect this variable to be positively associated with R&W insurance demand since the complexity and difficulty of conducting adequate due diligence during the acquisition timeline for larger deals may generate more breach claims. The second control variable is the target's legal environment. We create an indicator variable (*common law*) that takes the value of one if the target is in a predominantly common law jurisdiction, and zero otherwise (La Porta et al. 1997). We predict that common law will be positively associated with the demand for R&W insurance, consistent with prior research that shows greater levels of investor protection and property rights in common law countries and that indicates that the enforcement of these rights often involves costly litigation efforts (e.g., La Porta et al. 2008). Since our R&W insurance data lists the target country for the US and the UK and the region for targets located in other countries, we consider a region to be common law if the majority of its acquisition activity by deal volume occurs in common law countries, using the SDC sample as a guide. In Appendix C Table 9, we provide further detail about each region's common law classification.

Our second set of variables are the type of acquirer and seller, since these parties may assess target riskiness and the need for reps differently. While our sample includes an indicator variable if the seller is an individual, the SDC database does not record this category. Therefore, our purchase decision analysis is limited to examining PE and non-PE deal participants, wherein the non-PE participants consist of both individuals and corporate entities.<sup>10</sup> To examine the relationship between PE firm involvement and R&W insurance purchase, we include an indicator variable equal to one if the acquirer is a PE firm (*acquirer PE*), and zero otherwise; and an indicator variable equal to one if the seller is a PE firm (*seller PE*), and zero otherwise. We examine the effects of seller and acquirer identity on R&W insurance demand by using the following logit regression specification, where the dependent variable is an indicator variable equal to 1 if R&W insurance has been acquired:

$$I(\text{Purchase})_i = \alpha_0 + B_1 \text{Acquirer PE}_i + B_2 \text{Seller PE}_i + B_3 \text{Log}(\text{Deal size})_i + B_4 \text{Common law}_i + \text{Industry FE} + \text{Year FE} + e_i. \quad (2)$$

To account for industry-invariant factors, we also include industry fixed effects (based on the industry classification described in Appendix B Table 8). Table 4 presents the results of different specifications of the regressions described in Eqs. (1) and (2). For this test, we merge the SDC acquisition data used in Table 1 with our R&W insurance sample, and each observation,  $i$ , represents an acquisition in the combined sample. The SDC sample comprises 33,442 observations with the required control variables. Note that some of the acquisitions in the SDC sample may also have R&W insurance policy coverage; this will only serve to weaken our results.<sup>11</sup>

<sup>10</sup> In the R&W insurance sample, the seller type is 47.8% strategic (corporate) entities, 29.3% PE, and 22.9% individuals.

<sup>11</sup> While our sample includes an indicator variable if the seller is an individual, the SDC database does not record this category. Therefore, our purchase decision analysis is limited to examining PE and non-PE deal participants, wherein the non-PE participants consist of both individuals and corporate entities.

**Table 4** Determinants of R&W insurance sample

	Dependent Variable= $I(Purchase)$				
	(1)	(2)	(3)	(4)	(5)
Target Industry Tobin's Q	-0.160** (-2.26)				-0.261*** (-3.48)
Target Industry STD Returns	0.165** (2.29)				0.398*** (4.93)
Target Industry R&D to Sales	-0.031 (-0.46)				0.109 (1.45)
Target Industry ICW	0.248 (0.51)				1.334** (2.52)
Acquirer PE		1.111*** (19.24)		0.875*** (13.63)	0.886*** (14.93)
Seller PE			4.155*** (31.48)	3.983*** (29.98)	3.013*** (37.14)
Log(Deal Size)	0.380*** (27.64)	0.360*** (24.60)	0.350*** (21.87)	0.346*** (21.75)	0.381*** (26.15)
Common Law	0.964*** (16.57)	1.065*** (17.30)	1.080*** (16.18)	1.118*** (16.59)	1.173*** (18.23)
Constant	-10.972*** (-40.00)	-24.817 (-0.15)	-24.199 (-0.14)	-25.357 (-0.09)	-11.762*** (-40.73)
Industry FEs	No	Yes	Yes	Yes	No
Year FEs	Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>	0.118	0.247	0.333	0.346	0.242
Observations	35,132	35,132	35,132	35,132	35,132

This table presents the estimated coefficients from logit regressions of the decision to purchase R&W insurance on target industry characteristics and acquirer and seller cuts. The dependent variable,  $I(Purchase)$ , is an indicator variable equal to one if the deal is in the R&W insurance sample, and zero otherwise. All other variables are defined in [Appendix A Table 7](#). Our total sample of 35,132 observations is taken from 1,690 mergers and acquisitions represented in R&W insurance policies written between January 1, 2011, and December 31, 2016, and from 33,442 acquisitions in the SDC database over the same period.  $t$ -statistics adjusted for heteroscedasticity are shown underneath the coefficient estimates. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively

As shown in Column (1) of [Table 4](#), firms in industries with more growth opportunities (labeled by *target industry Tobin's Q*) are less likely to purchase R&W insurance, consistent with the fact that the value of high-growth firms is predicated more on future prospects than on existing assets and liabilities, making R&W insurance less valuable. The coefficient on *target industry STD returns* is positive and significant for targets in industries with greater market volatility. The coefficients on R&D intensity (*target industry R&D to Sales*) and financial reporting risk (represented by *target industry ICW*) are not significantly associated with the purchase of R&W insurance.

The results in columns (2) and (4) show that PE acquirers are more likely to purchase insurance (*acquirer PE*). This result is consistent with the notion that an acquisition by a private-equity buyer exposes the buyer to more firm-specific financial risk than would a similar acquisition by a large diversified public acquirer. This is because PE buyers' fund structure usually consists of a concentrated set of portfolio companies, held over a relatively short period of time. The coefficient on *seller PE* is positive and significant, consistent with PE sellers' greater desire, relative to strategic sellers, to limit their post-closing indemnification liabilities on the sale of a portfolio company. Doing so allows them to fully distribute sales proceeds to the PE funds' limited partners and show higher internal rates of return to investors (Griffith 2020). In Column 5, we pool all variables of interest from Eqs. (1) and (2) into one regression and find results similar to those in columns (1) through (4). Moreover, when we add the type of acquirer and seller, the coefficient on *target industry ICW* becomes positively and significantly associated with R&W insurance purchase, which suggests that the addition of these independent variables is important and is consistent with the significantly higher adjusted  $R^2$ .

Finally, in all columns, we find positive and significant coefficients on *Log(Deal Size)* and *Common Law*, consistent with our expectations. Overall, we find that R&W insurance demand is correlated with both target industry characteristics and type of acquirer and seller.

## 6 Third party assessment of potential breaches of representations and warranties

In this section, we examine the variables that are associated with the premium charged by the insurance company. This premium is based on the insurance company's expectation of breach-related losses, plus administrative overhead and profits. Therefore, we expect premiums to be higher in industries with greater valuation uncertainty. Our R&W insurance sample allows us to add two additional variables that were made available to us by the insurance company but were not included in the previous analysis because they are not available in the SDC database. The first is an indicator variable (*Seller Individual*) that takes the value of one if the seller is an individual, and zero otherwise. The second is an indicator variable equal to one if the acquirer is the named insured (a buy-side policy), and zero if the seller is the named insured (a sell-side policy). We expect higher premiums to be charged on acquirer policies, as buyers suffer from a greater information disadvantage and more valuation uncertainty compared to sellers.

In order to draw clearer inferences regarding the association between the R&W insurance premium and target industry metrics and the type of acquirers and sellers, we follow prior studies and also control for the abnormal amounts of insurance coverage purchased (*Abnormal Limit*), defined as the residual coverage limit (Lin et al. 2013; Cao and Narayanamoorthy 2014; Chalmers et al. 2002). The residual coverage limit is obtained from a limit prediction model similar to Core (2000), in which the dependent variable is the logged policy limit and the explanatory variables include target industry characteristics, acquirer and seller type, an indicator variable for acquirer policy, an indicator variable for seller

individual, logged deal size, and legal environment.<sup>12</sup> We then estimate the following two regressions:

$$\begin{aligned}
 \text{Log(Premium)}_i = & \alpha_0 + B_1 \text{Target Industry Tobin's } Q_i \\
 & + B_2 \text{Target Industry STD Returns}_i \\
 & + B_3 \text{Target Industry R\&D to Sales}_i \\
 & + B_4 \text{Target Industry ICW}_i + B_5 \text{Log(deal size)}_i \\
 & + B_6 \text{Acquirer Policy}_i + B_7 \text{Abnormal Limit}_i \\
 & + B_8 \text{Common Law}_i + \text{Year FE} + e_i
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 \text{Log(Premium)}_i = & \alpha_0 + B_1 \text{Acquirer PE}_i + B_2 \text{Seller PE}_i + B_3 \text{Seller Individual}_i \\
 & + B_4 \text{Log(deal size)}_i + B_5 \text{Acquirer Policy}_i \\
 & + B_6 \text{Abnormal Limit}_i + B_7 \text{Common Law}_i + \text{Industry FE} \\
 & + \text{Year FE} + e_i
 \end{aligned} \tag{4}$$

Table 5 reports the results of estimating Eqs. (3) and (4), where the dependent variable is the logarithm of the policy premium. Focusing on target industry characteristics in Column (1), we find that the coefficient on *target industry Tobin's Q* is negative and marginally significant. This result is consistent with that of the previous section, where it was shown that there is a lower likelihood of purchasing R&W insurance for high-growth firms, given their reliance on future prospects. The positive and significant coefficient on *target industry R&D to Sales* indicates that the insurance company expects unrecognized intangible assets to have a greater risk of future claims and takes that into account in determining the premium.<sup>13</sup> The coefficient on *target industry ICW* is positive and significantly associated with premiums, indicating that industries with poor financial statement quality are perceived to have a greater risk of loss. This inference is supported by Panel C of Fig. 1, which illustrates that financial statement breaches are the main source of R&W insurance claims, accounting for more than 21% of all claims. Focusing on acquirer and seller type in Columns (2) to (4), we find positive and significant coefficients on *seller PE* and *seller individual*, relative to a strategic seller. In comparison, the coefficient on the acquirer's identity, represented by *acquirer PE*, is not significantly associated with the premium. Our results remain qualitatively unchanged when we pool all variables of interest from Eqs. (3) and (4) into one regression (Column 5).

<sup>12</sup> In untabulated results, we find that higher coverage limits are selected in buyer-purchased policies, when deals are larger, and when the buyer is a strategic acquirer.

<sup>13</sup> This inference is supported by Panel A of Table 3, which shows that IP-related claims represent a major source of R&W insurance losses, accounting for more than 23% of claims for targets in the technology industry.

**Table 5** Third party assessment of potential breaches of representations and warranties

	Dependent Variable= $\text{Log}(\text{Premium})$				
	(1)	(2)	(3)	(4)	(5)
Target Industry Tobin's Q	-0.052*				-0.050*
	(-1.82)				(-1.77)
Target Industry STD Returns	0.036				0.045
	(1.17)				(1.47)
Target Industry R&D to Sales	0.089***				0.084***
	(3.26)				(3.09)
Target Industry ICW	0.984***				0.865***
	(3.79)				(3.33)
Acquirer PE		0.021		0.007	0.016
		(0.83)		(0.28)	(0.61)
Seller PE			0.076***	0.075***	0.085***
			(2.68)	(2.60)	(2.93)
Seller Individual			0.105***	0.104***	0.110***
			(3.33)	(3.28)	(3.45)
Log(Deal Size)	0.423***	0.422***	0.422***	0.422***	0.423***
	(47.172)	(47.72)	(47.01)	(46.98)	(46.48)
Acquirer Policy	0.088**	0.091**	0.090**	0.089**	0.083**
	(2.45)	(2.55)	(2.53)	(2.50)	(2.31)
Abnormal Limit	0.562***	0.561***	0.561***	0.561***	0.561***
	(28.23)	(28.61)	(28.70)	(28.69)	(28.32)
Common Law	0.267***	0.241***	0.228***	0.227***	0.249***
	(9.68)	(8.66)	(8.13)	(8.12)	(8.93)
Constant	4.419***	4.520***	4.521***	4.520***	4.449***
	(25.99)	(26.47)	(26.27)	(26.25)	(25.91)
Industry FEs	No	Yes	Yes	Yes	No
Year FEs	Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>	0.462	0.477	0.479	0.480	0.466
Observations	1,690	1,690	1,690	1,690	1,690

This table presents the estimated coefficients from OLS regressions of the insurer's pricing of breach costs on target industry characteristics and acquirer and seller cuts. The dependent variable,  $\text{Log}(\text{Premium})$ , is the natural log of the R&W insurance policy premium. All other variables are defined in [Appendix A Table 7](#). Our sample is taken from 1,690 mergers and acquisitions represented in R&W insurance policies secured between January 1, 2011, and December 31, 2016. *t*-statistics adjusted for heteroscedasticity are shown underneath the coefficient estimates. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively

Across all columns, we find that the coefficient on *acquirer policy* is positive and significant, illustrating the insurer's perception of heightened risk of losses for buy-side policies, consistent with buyers' information asymmetry and the exclusion of fraud claims if the seller is the policyholder. The coefficient on *abnormal limit* is also positive and significant in all regressions, indicating that the insurer recognizes and charges

increased premiums when the insured demands abnormally high limits, thereby countering potential adverse selection. The coefficient on *common law* is positive and significant, consistent with those regions' higher levels and costs of litigation, which affects both expected losses and R&W insurance contracting costs. In all columns, larger deals result in higher premiums, given their greater degree of overall complexity and valuation uncertainty. Overall, we conclude that the insurance underwriting process takes into consideration valuation uncertainty measures as well as the type of the seller.

## 7 Breaches of reps

In this section, we investigate the factors that are correlated with the likelihood of a claim, which reflects the realized risk incurred by the insurance company. We do so by estimating the following logit regressions:

$$\begin{aligned}
 I(\text{Breach})_i = & \alpha_0 + B_1 \text{Target Industry Tobin's } Q_i \\
 & + B_2 \text{Target Industry STD Returns}_i \\
 & + B_3 \text{Target Industry R\&D to Sales}_i + B_4 \text{Target Industry ICW}_i \\
 & + B_5 \text{Premium-to-Limit}_i + B_6 \text{Log(deal size)}_i + B_7 \text{Acquirer Policy}_i \\
 & + B_8 \text{Abnormal Limit}_i + B_9 \text{Common Law}_i + \text{Year FE} + e_i \quad (5)
 \end{aligned}$$

$$\begin{aligned}
 I(\text{Breach})_i = & \alpha_0 + B_1 \text{Acquirer PE}_i + B_2 \text{Seller PE}_i + B_3 \text{Seller Individual}_i \\
 & + B_4 \text{Premium-to-Limit}_i + B_5 \text{Log(deal size)}_i + B_6 \text{Acquirer Policy}_i \\
 & + B_7 \text{Abnormal Limit}_i + B_8 \text{Common Law}_i + \text{Industry FE} \\
 & + \text{Year FE} + e_i \quad (6)
 \end{aligned}$$

The variable *Premium-to-Limit* captures the insurance company's ability to predict the likelihood of a claim being filed that is not controlled for by our other variables. Table 6 reports the results of estimating Eqs. (5) and (6), where the dependent variable is an indicator variable equal to 1 if an R&W insurance policy resulted in a breach claim.<sup>14</sup> Focusing on target industry characteristics in Column (1), we find that only the coefficient on R&D intensity (*target industry R&D to Sales*) is positive and significant, a result that is in line with our earlier documentation that the insurance company charges higher premiums to firms in R&D-intensive industries (Table 5). Additionally, whereas the insurance company charges higher premiums to firms in industries with more internal control weaknesses and lower premiums to firms in industries with higher Tobin's Q, we do not find any association between these factors and the probability of a claim for breach of reps.

<sup>14</sup> Our results are qualitatively unchanged when we use the number of claims as our outcome variable instead of as an indicator variable.

**Table 6** Determinants of breaches

	Dependent Variable= $I(Breach)$				
	(1)	(2)	(3)	(4)	(5)
Target Industry Tobin's Q	0.028 (0.14)				0.086 (0.43)
Target Industry STD Returns	-0.227 (-1.03)				-0.258 (-1.15)
Target Industry R&D to Sales	0.354* (1.84)				0.343* (1.77)
Target Industry ICW	-0.344 (-0.17)				-0.588 (-0.29)
Acquirer PE		-0.551*** (-2.68)		-0.612*** (-2.95)	-0.663*** (-3.24)
Seller PE			0.404* (1.80)	0.499** (2.19)	0.532** (2.40)
Seller Individual			0.174 (0.74)	0.259 (1.09)	0.302 (1.29)
Premium-to-Limit	0.256*** (3.12)	0.217*** (3.41)	0.229*** (2.68)	0.285*** (3.27)	0.297*** (3.51)
Log(Deal Size)	0.219*** (3.41)	0.217*** (3.37)	0.207*** (3.12)	0.196*** (2.97)	0.195*** (3.00)
Acquirer Policy	-0.285 (-1.29)	-0.201 (-0.88)	-0.284 (-1.25)	-0.186 (-0.81)	-0.176 (-0.78)
Abnormal Limit	0.211 (1.33)	0.263 (1.61)	0.212 (1.30)	0.248 (1.52)	0.23 (1.44)
Common Law	0.478** (2.16)	0.449** (1.97)	0.461** (2.01)	0.442* (1.93)	0.453** (2.03)
Constant	-5.838*** (-4.77)	-6.203*** (-5.07)	-5.964*** (-4.77)	-5.892*** (-4.74)	-5.569*** (-4.50)
Industry FEs	No	Yes	Yes	Yes	No
Year FEs	Yes	Yes	Yes	Yes	Yes
Pseudo R <sup>2</sup>	0.118	0.144	0.141	0.149	0.131
Observations	1,690	1,690	1,690	1,690	1,690

This table presents the estimated coefficients from logit regressions of the breach incidence on target industry characteristics and acquirer and seller cuts. The dependent variable,  $I(Breach)$ , is an indicator variable equal to one if at least one breach occurs, and zero otherwise. All other variables are defined in [Appendix A Table 7](#). Our sample is taken from 1,690 mergers and acquisitions represented in R&W insurance policies written between January 1, 2011, and December 31, 2016. *t*-statistics adjusted for heteroscedasticity are shown underneath the coefficient estimates. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively



Focusing on the type of acquirer (columns 2 and 4), we find that, compared to strategic buyers, private equity buyers are less likely to submit a breach-related claim. A reason offered by Griffith (2020) as to why the insurance company might not charge lower premiums to PE buyers even though they are less likely to submit a claim is that the insurance company may not have enough historical information to realize that this is the case.<sup>15</sup> In columns 3 and 4, we document that the coefficient on *Seller PE* is positive and significant. In column (5), when we pool all measures into one regression, the coefficient on *Seller PE* remains positive and significant. This result is consistent with our previous finding that the demand for insurance and the premium charged are higher when the seller is a PE firm, compared to a strategic seller.

We also find that claims are more likely to be filed in larger deals, supporting our earlier finding that higher R&W insurance premiums are charged in larger deals. Moreover, we find that the coefficient on *Premium-to-Limit* is positive and significant, meaning that claims are more likely when the insurance company charges higher premiums. This finding suggests that the insurance company is able to identify other areas of potential risk not captured by the other independent variables. Last, we find that claims are more likely under common law, consistent with these regions' higher levels and costs of litigation (e.g., La Porta et al. 2008), which affect both expected losses and contracting costs and are thus more associated with the frequency of breaches in the reps (Ramseyer and Rasmusen 2010; Browne et al. 2000). Overall, the results suggest that the ex ante risks perceived by the demand and premium charges are, to a large extent, not consistent with the realized incidence of breaches.

## 8 Conclusion

Drawing from a large and unique sample of R&W insurance policies, we document that industry measures of valuation uncertainty, as well as the type of acquirers and sellers, play a role in the demand for R&W insurance, the premium charged by the insurance company, and the likelihood of filing a claim. While the reps and indemnities are an effective mechanism to encourage information production to facilitate M&A, the significant contracting costs associated with seller indemnities have bolstered the purchase of R&W insurance policies in recent years. Our evidence shows that the demand for R&W insurance is increasing in proxies for indemnity contracting costs, including those associated with valuation uncertainty, risk aversion, litigation costs, and institutional features that do not favor seller indemnities. Given the rising trend in transferring indemnity risk to an insurer, there is concern that R&W insurance reduces the incentives for acquirers to perform due diligence and for sellers to produce efficient information about the state of the target, which should be a topic for future research.

<sup>15</sup> An interesting example provided in Griffith (2020): "One insurer illustrated this point with an analogy to the sale of worker's compensation insurance to contractors during the Iraq war. There was no actuarial data available, at least at the start of the war, on the risk of worker's compensation claims in a war zone. Yet an insurance company was willing to sell the coverage, but only at a significantly higher price than ordinary policies. The contractor, who simply passed the cost on to the US government, was happy to pay the inflated price, and the insurance company made significant profits on the coverage. The moral of the story: 'you don't need a mountain of actuarial data to sell coverage profitably'."

Acquisitions involve many trillions of dollars. Our results attest to the demand for R&W insurance and extend the theoretical literature by documenting the use of R&W insurance in risk allocation, reduction of information asymmetry, and promotion of valuation certainty. Understanding the effect of private target disclosures on the demand and pricing of R&W insurance policies is an interesting topic for future research. Another potential future research question is whether there is a relation between the purchase of insurance and the success of acquisitions or the purchase price of targets.

A limitation of our empirical analysis is that we do not know the identities of the insured parties and do not have access to detailed financial information about them. We only have access to a limited set of buyer and target characteristics. These include geographic region, industry sector, type of entity (private equity, strategic, or individual), and acquisition value. We use industry-based proxies based on these observable characteristics, as reflected in prior literature (e.g., Cain et al. 2011; Datar et al. 2001), to make inferences about the acquisition participants. An additional limitation of our study is that we have a single source of R&W insurance data for our analysis. Without being able to observe the entire population of R&W insurance policies, the extent to which our results are generalizable is not clear. Even with these limitations, our paper provides a contribution to the nascent literature on the value of disclosures in private M&A transactions.

## Appendix A

**Table 7** Variable definitions

Variable	Definition
Abnormal Limit	The fitted residuals from the regression specified in Eq. 2, reported in Table 4;
Acquirer PE	An indicator variable equal to one if the acquirer is a private equity firm, and zero otherwise;
Acquirer policy	An indicator variable equal to one if the acquirer is the named insured (a buy-side policy), and zero if the seller is the named insured (a sell-side policy);
Claim	An indicator variable equal to one if a policy has received any claims for losses made by the insured, and zero otherwise;
Common Law	An indicator variable equal to one if the target is located in a predominantly common law jurisdiction (US, UK, Canada, Australia, Africa, and the Middle East), and zero otherwise;
Limit	The aggregate amount, in US dollars (USD), that the policy will pay to the insured for one or more losses incurred;
Premium	The amount, in USD, paid by the insured for coverage under the representations and warranties insurance policy;
Seller Individual	An indicator variable equal to one if the seller is an individual, and zero otherwise;
Seller PE	An indicator variable equal to one if the seller is a private equity firm, and zero otherwise;
Target industry Tobin's Q	An indicator equal to one if the target firm's industry is above median in the ratio of the firm's market value, measured as book value of total assets less book value of equity plus market value of equity, to the book value of total assets for firms in the same industry as the target;

**Table 7** (continued)

Variable	Definition
Target industry STD of returns	An indicator equal to one if the target firm's industry is above median in the industry's median value of the standard deviation of daily returns for firms in the same industry as the target;
Target industry R&D to Sales	An indicator equal to one if the target firm's industry is above median in the median value of R&D to sales for firms in the same industry as the target;
Target industry ICW	The mean fraction of firms in the same industry as the target firm and fiscal year equal to the deal year, with reported material weaknesses in internal control (IC_IS_EFFECTIVE not equal to 'Y'; Audit Analytics);

## Appendix B

**Table 8** Industry classification

Sample Classification	Fama-French 48 Industry Classifications
1 Consumer	2 Food – food products; 3 Soda – soda & candy; 4 Beer – beer & liquor; 5 Smoke – tobacco products; 6 Toys – recreation; 9 Household – consumer goods; 10 Clothes – apparel; 43 Meals – restaurants, hotels, & motels.
2 Energy and natural resources	27 Gold – precious metal; 28 Mines – non-metallic & industrial metal mining; 29 Coal; 30 Oil – petroleum & natural gas.
3 Financial	44 Banking; 45 Insurance; 46 Finance – trading
4 Healthcare	11 Healthcare; 12 Medical equipment; 13 Drugs – pharmaceutical products
5 Manufacturing	15 Rubber – rubber & plastic products; 16 Txtls – textiles; 17 BldMt – construction materials; 19 Steel – steel works etc.; 20 FabPr – fabricated products; 21 Machinery; 22 Electrical equipment; 23 Autos – automobiles & trucks; 24 Aero – aircraft; 25 Ships – ship building & railroad equipment; 26 Guns – defense; 31 Util – utilities; 37 Labeq – measuring & control equipment; 38 Paper – business supplies; 39 Boxes – shipping containers
6 Media	7 Fun – entertainment; 8 Books – printing & publishing.
7 Real estate	46 REEst – real estate
8 Retail	41 Whsl – wholesale; Rtail – retail
9 Services	33 PerSv – personal services; 34 BusSv – business services
10 Technology	35 Comps – computers; 36 Chips – electronic equipment
11 Telecomm	32 Telcm – communication
12 Transportation	40 Trans – transportation
13 Other	14 Chems – chemical; 18 Cnstr – construction; 48 Other

The table below reports our mapping of the 13 industry classifications in our sample to the Fama-French 48 industry classifications.

## Appendix C

**Table 9** Legal system

Region	<i>Common Law</i>	Region's Countries	Legal System	Group Weighting in SDC Region
US	1	Group 1: US	Common	100%
UK	1	Group 1: UK	Common	100%
Canada	1	Group 1: Canada	Common	100%
Asia	0	Group 1: China, Japan, South Korea, Indonesia, Taiwan, Vietnam, Philippines	Civil	78%
		Group 2: India, Thailand, Hong Kong, Malaysia, Singapore, Pakistan, Sri Lanka	Common	22%
Europe	0	Group 1: Russia, French, Germany, Spain, Italy, Sweden, Poland, Netherlands, Norway, Turkey, Denmark, Switzerland, Finland, Belgium, Portugal, Austria, Greece.	Civil	89%
		Group 2: Ireland	Common	3%
Australia	1	Group 1: Australia; New Zealand	Common	98%
Africa	0	Group 1: Nigeria, Kenya, Namibia, Zimbabwe, South Africa, Tanzania,	Common	71%
		Group 2: Ethiopia, Ivory Coast, Mauritius	Civil	3%
		Group 3: Mozambique, Morocco, Tunisia, Ghana, Zambia,	Mixed	10%
Middle East	0	Group 1: Israel	Common	38%
		Group 2: Jordan; Lebanon	Civil	5%
		Group 3: UAE, Kuwait, Oman, Saudi Arabia, Qatar	Mixed	52%
South America	0	Group 1: Falkland Islands, Guyana	Common	1%
		Group 2: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela	Civil	99%

Source: Central Intelligence Agency. 2018. The World Factbook. Legal System. Retrieved 2018-04-02. <https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html>

The table below reports our mapping of the sample's regional coding, an indicator for common law legal status to the SDC's regional coding. We code an SDC region as common law when the majority of deals occur in countries with a common law legal system.

## Appendix D

**Table 10** Rep provisions

Type of Rep	Provision
1 Financial Statements	The financial statements have been audited (or unaudited) and present fairly and accurately the financial condition, including the assets and liabilities, of the target company.
2 Compliance with Laws	The target company represents that it is in compliance with applicable law.
3 Tax	All tax returns required to be filed on or before the closing date have been properly filed and the taxes duly paid. The target company is not currently being audited and is not involved in any tax disputes with a governmental authority. The buyer would be protected against losses related to unpaid taxes or tax claims.
4 Intellectual Property	The target company owns or has the appropriate rights to use the intellectual property (IP) used in the operation of the business, including: trademarks, copyrights, patents, and any other IP, including licenses, transferring with the deal. Other typical IP reps include that the IP licenses and agreements are valid and in effect, the target company has not breached its IP agreements, and the target company's use of its IP does not infringe on third party IP rights.
5 Employment	The target company's benefit plans are maintained and administered in compliance with law, all contributions and premiums have been timely paid, no governmental authority has taken adverse actions with respect to the benefit plans, there are no unions or collective bargaining agreements, service providers have been properly classified (e.g., as independent contractors or employees), etc.
6 Fundamental	There are certain fundamental reps related to the M&A transactions, which usually include seller's authority and capacity to complete the transaction; the organization and status of the seller and the target company; the enforceability of the obligations undertaken by the seller and the target company; and the capitalization of the target company.
7 Environmental	Sellers are typically required to represent that there is no contamination present at the properties being acquired, the operations of the acquired company have not caused any contamination at any other property, the assets or business are and have been in compliance with environmental laws, and there are no environmental proceedings pending or threatened concerning the assets or the business.
8 Litigation	The target company is not involved in litigation or other actions or any current litigation or other actions have been disclosed.
9 Operations	Sellers have provided requested information about the operation of the target company.
10 Material Contracts	Sellers typically include a list of the material contracts in a schedule attached to the agreement and represent that they are not in risk of termination and have not been breached or violated.

The table below reports the provisions of 10 different types of reps. Failure of the reps to be true and correct as of the agreement date or the closing date could result in a breach.

**Acknowledgements** We are grateful to the insurance company that provided us with the data used in this study and to several individuals in the company's M&A insurance group for valuable comments. We also appreciate the comments of David Aboody, Mary Barth, Matthew Cain, Brian Cadman, Keith Crocker, Kimmie George, Sean Griffith, Thomas Joraanstand, Emily Maier, Michelle Hanlon, John Hughes, Lukasz Langer, Jennifer Maxwell, Panos Patatoukas, Peter Pope, Yihan Song, Brett Trueman, Young Yoon, and seminar participants at Cass Business School and the Tilburg Winter Accounting Camp 2020. Omri Even-Tov acknowledges the support of the UC Berkeley Haas School of Business. James Ryans acknowledges the support of the London Business School Research and Materials Development fund.

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