What Private Equity Does Differently:

Evidence from Life Insurance

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Abstract

How do private equity firms impact their portfolio companies? We study this question using comprehensive data on their investments in the life insurance industry, which grew ten-fold—from $23 billion to $250 billion—between 2009 and 2014. Private-equity-backed insurers are more profitable. But there is no evidence that this is a consequence of general partners' investment skill. Rather, private equity firms increase the asset risk of their subsidiaries without incurring commensurate capital charges and decrease tax liabilities. Results based on high-frequency event studies and matching techniques support a causal interpretation. Indeed, private equity firms deliver these changes to their subsidiaries within days of taking over. This improves insurers' performance, but also introduces risks that rating agencies appear to ignore.

JEL Codes: G22, G24, G11, G28, G32

1 Introduction

Early work on the buyout industry argued that private equity (PE) is superior to public corporate structures (Jensen 1986, Jensen 1989), emphasizing its ability to apply value-enhancing financial, governance, and operational changes to portfolio companies (Kaplan 1989a, Kaplan 1989b, Kaplan & Strömberg 2009). Since then, much academic work has considered the extent to which PE firms deliver such benefits (Kaplan & Strömberg 2009, Phalippou 2009). This debate has also played out in the public sphere, as policymakers have repeatedly weighed heavier restrictions on PE buyouts.[1] A key piece of evidence needed to inform this debate is: what kind of changes do PE owners bring about?

In this paper, we offer new evidence on what impact private equity firms have on their subsidiaries through an in-depth analysis of the insurance industry. Insurance is a natural industry for such an inquiry. First, PE investments in the insurance industry are substantial. Following the financial crisis, PE firms stood ready to acquire financial institutions with stable liabilities, often available at a discount. Consequently, PE investments in the life insurance industry grew ten-fold, from \$23 billion in 2009 to \$250 billion in 2014.[2] In addition, detailed regulatory data allows for a careful examination of the changes PE firms bring about at their portfolio companies. Reporting of daily changes in portfolios assists our causal identification of the role that PE firms play in changing subsidiary behavior.

We have four main findings. First, private equity firms appear deliberate about targeting specific sub-markets in the insurance industry where opportunities are most pronounced. Over our sample period, they focus on the fixed-annuity industry, a segment of life insurance especially hard-hit by low interest rates. Second, PE firms act quickly: within days of taking over, PE firms substantially change the portfolio composition of their subsidiaries' assets. There are no pre-period differences between PE-owned insurers and their non-PE-owned counterparts that could explain this result. Third, PE firms take advantage of opportunities for tax and capital arbitrage, increasing returns by decreasing tax liabilities and increasing leverage. Fourth, we find no evidence that PE parents bring superior investment skill to the management of insurers' portfolios, or efficiency-improving cost reduction.

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[1]Early popular commentaries focused on the behavior of buyout specialists helped fuel a political debate on the desirability of legislation to limit takeovers (Jensen 1989, Anders 1992, Burrough & Helyar 1989). This debate continues today: for example, Sen. Elizabeth Warren's presidential campaign included calls for much stricter oversight of the private equity industry in order to "stop legalized looting" (Warren 2019).

[2]PE firms have stepped in as providers of capital to failing banks, but these acquisitions are complicated by regulatory requirements that subject bank owners (above a certain ownership threshold) to regulation as bank holding companies themselves (Johnston-Ross, Ma & Puri 2020). No such regulatory restrictions exist in the insurance industry.

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We begin by collecting a novel sample of private equity acquisitions of life insurance companies between 2005-2014. This requires hand-collecting data on the ownership structure of 1,021 life insurers, including matching firm names and individuals who work at PE firms to those who appear on organizational charts provided in regulatory filings. Over our sample period, we document 57 PE acquisitions of life insurance subsidiaries.

We then examine the substantial growth of private equity ownership in the insurance industry following the financial crisis. We study which insurer characteristics drive PE entry and find that PE owners are focused on the acquisition of providers of fixed annuities (32 percent of the life insurance industry in 2009), rather than life policies (24 percent) or pass-through variable annuities (43 percent). Over our sample period, private equity's share of the fixed annuities industry grows from 3 percent of sales to 20 percent of the market.[3]

To assess the impact of private equity ownership, we employ a variety of empirical approaches, including difference-in-difference specifications, matching estimators, and high-frequency visual event studies. While PE ownership is not randomly assigned, these approaches paint a similar picture of the dynamic changes that PE firms deliver, bolstering our causal interpretation.

On the asset side, we show that PE parents make immediate and substantial changes to their subsidiaries' bond portfolios. PE-backed insurance firms take on greater asset risk by moving out of highly rated corporate bonds and into poorly rated private-label asset-backed securities (ABS), increasing their holdings of private-label ABS by two-thirds of the industry average. Our data allows us to precisely pinpoint when these changes occur, and we show that PE parents modify their subsidiaries' portfolios within days of ownership changes.

In the past, such shifts would have led to higher capital requirements. However, a post-crisis regulatory change decoupled capital charges for private-label ABS from credit ratings. Hanley & Nikolova (forthcoming) caution that this change creates an incentive to purchase low-rated securities to boost yields without commensurate capital charges. Becker, Opp & Saidi (2020) point out that it discouraged insurers from selling poorly-rated legacy assets that would have incurred higher capital requirements due to crisis-era downgrades, all but eliminating capital requirements for private-label ABS.

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[3]This focus can be explained by several dynamics: first, from the PE firms' perspective, the fixed annuities industry is safe, because payouts are known. Second, from the subsidiaries' perspective, plain-vanilla insurers who have committed to fixed-rate payments are especially in need of capital and investment expertise in a low-rate environment. Our focus is on PE firms' acquisitions of entire insurers. But the pressures of a low-interest rate environment also explain why insurers are keen to offload the fixed annuities portion of their business, often to PE buyers (Gottfried 2019).

We highlight two new facts: First, PE-owned insurers disproportionately take advantage of this regulatory change; and second, for these insurance subsidiaries, the decrease in capital requirements arises from actively purchasing poorly rated ABS, often within days of PE acquisition. Skepticism about the desirability of continued capital relief is thus well placed, as sophisticated PE firms exploit the opportunity to increase their subsidiaries' junk ABS holdings without simultaneous increases in their capital charges. On average, PE-owned insurers' capital charges across all bond holdings are 20 percent lower than they would have been absent the crisis-era regulatory change. For subsidiaries of two of the largest PE groups in our sample, capital charges are only half the level that would have been previously required. Were capital charges still assigned based on underlying bond risk, government intervention to address capital deficiencies could have been triggered for a quarter of PE-backed insurers. This risk appears to be missed by rating agencies: Many PE-backed insurers are rated A- to B++; ratings that fully accounted for their junk bond holdings would be several notches lower and among the lowest in the industry.

We test for time-series differences between PE-owned insurers and our control group (non-PE-owned insurers), and find no evidence of differential trends pre-acquisition. This helps us exclude the possibility that PE firms target insurers already aggressively moving into ABS to take advantage of capital arbitrage opportunities. Instead, PE firms actively deliver changes to their subsidiaries' portfolios.

Beyond pure capital arbitrage, PE parents' investment decisions may reflect superior skill in asset allocation (Kaplan & Schoar 2005). They may choose to tilt their subsidiaries' portfolios away from poorly performing bonds to make room for higher-returning assets. If this were the case, we would expect that PE-backed insurers' corporate bond portfolios would outperform the corporate bond portfolios of non-PE-backed insurers. We follow Becker & Ivashina (2015) in examining realized bond returns and find no evidence for PE subsidiaries' subsequent superior performance. Private equity firms profit by charging their insurance subsidiaries high fees for asset management—sometimes twice what an unaffiliated asset manager would charge.[4] They also increase their subsidiaries' investments in risky alternative asset classes, including affiliated investments like stakes in their PE owners' funds or other portfolio companies. Our results raise the question of whether subsidiaries are being exploited, rather than being benefited, by these arrangements.[5]

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[4] These fee arrangements have resulted in lawsuits by pension funds demanding that PE firms return profits earned from "extravagantly expensive" fee arrangements that can total up to one-third of total revenues (Indap & Vandevelde 2019).

[5] This insight is closely related to Phalippou, Rauch & Umber (2018), who point out that the PE structure introduces

On the liability side, we find that PE-backed insurers achieve lower tax rates through reinsurance with foreign affiliates. These sorts of reinsurance transactions are what Koijen & Yogo (2016) refer to as "shadow insurance." We demonstrate that, post-crisis, as much as 60 percent of the growth in shadow reinsurance that Koijen & Yogo (2016) document is attributable to the insurance subsidiaries of a single PE firm. These subsidiaries reinsure their premiums with an affiliate that faces a zero percent corporate tax rate in its foreign domicile.

The idea that large buyout firms create value through tax management is well understood, albeit difficult to quantify (Kaplan 1989b, Kaplan & Strömberg 2009). Much of the past literature discusses how PE firms' use of leverage in buyout transactions decreases tax liabilities given that interest expenses are deductible. We add to the literature by providing evidence of a different kind of tax management: PE firms are most attuned to opportunities to book their subsidiaries' profits in jurisdictions with low tax rates. Incidentally, at least nominally, reinsurance for the sole purpose of tax savings is disallowed in the United States (Koijen & Yogo 2016).

The evidence we assemble suggests that private equity acquisitions result in significant changes at the insurer level. A natural question is whether these changes increase the profitability of these subsidiaries. We document that PE-owned insurers do indeed exhibit superior returns as a result of the capital and tax management we observe. We then explore who benefits from this superior performance. In the short run, the beneficiaries are shareholders, who own more profitable insurers, and to a certain extent policyholders, who receive better rates on annuities. In the long run, the result may be insurers more prone to financial distress. The impact of PE investments on financial stability is an important area for future research.

Related literature

We interpret our results as evidence that private equity firms deliver sizeable and immediate changes to their subsidiaries. In this regard, this paper is related to a long literature that seeks to understand the changes that PE firms apply to their portfolio companies upon investment (see Kaplan & Strömberg (2009) and Metrick & Yasuda (2011) for detailed overviews of this literature). Much work describes how PE firms exhibit superior management practices (Jensen 1989, Kaplan 1989a, Kaplan 1989b, Muscarella

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new agency conflicts between general and limited partners, since PE firms divert cash from limited partners by setting high fees that investors ignore. We provide evidence of a parallel conflict between PE firms and their portfolio companies.

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& Vetsuypens 1990, Bloom, Sadun & Van Reenen 2015, Cohn, Nestoriak & Wardlaw 2019): For example, PE firms tie executive compensation tightly to firm performance, use leverage to limit free cashflows that managers can divert, are quick to replace poor performers (Acharya, Gottschalg, Hahn & Kehoe 2013), and play an active role in corporate governance (Cornelli & Karakaş 2008, Gertner & Kaplan 1996, Acharya et al. 2013). Additionally, there is substantial evidence on operating improvements that private equity firms deliver (Acharya et al. 2013, Davis, Haltiwanger, Handley, Jarmin, Lerner & Miranda 2014, Bernstein & Sheen 2016).

Importantly, a relatively recent strand of the literature considers the ways in which value creation in the PE industry has changed over time (Strömberg 2008, Boucly, Sraer & Thesmar 2011). Indeed, work by Eaton, Howell & Yannelis (forthcoming) suggests that recent changes that PE parents bring about may be somewhat nefarious: Focusing on the higher-education industry, they find PE firms increase subsidiaries' profits by taking advantage of government subsidies, at the expense of consumers. We extend this insight to show that PE firms are also especially attuned to opportunities for regulatory and tax arbitrage, potentially at the expense of financial stability.

We also add to a nascent literature on the growing role that PE investments play in the financial services industry since the financial crisis, including Johnston-Ross et al. (2020), who study PE acquisitions of failed banks during the crisis. Taken together, our evidence informs the policy debate about whether acquisition by PE firms of financial services providers, like insurers and banks, should be more heavily regulated.

The paper proceeds as follows. In Section 2, we describe the institutional setting. In Section 3 we describe the novel data we collect and provide some summary statistics; and Section 4 describes our empirical framework. In Section 5 we discuss the impact of PE ownership on insurance subsidiaries' assets. In Section 6, we turn to the impact on insurers' liabilities. Section 7 links these results to show how PE ownership impacts insurers' returns. Section 8 concludes.

2   Institutional setting

Life insurers' assets are substantial: Collectively, they represent almost half of the assets of the banking industry, but they have historically received much less academic attention than banks. Life insurers' liabilities are increasingly likely to be annuities contracts—either fixed-rate annuities that pay a fixed

coupon for a specific term, or variable-rate annuities, whose coupon varies over time (Poterba 1997, Becker & Ivashina 2015, Chodorow-Reich, Ghent & Haddad 2019, Berends, McMenamin, Plestis & Rosen 2013). By 2014, the annuities share of the life insurance market had grown to over 70 percent, with fixed annuities representing around 25 percent of this total. Private equity investments during our sample period primarily involve purchases of fixed annuities providers.[6]

2.1 Key changes

Two major changes to the life and annuities insurance business in recent years are particularly relevant for our analysis: (i) change in the capital treatment of private-label ABS; and (ii) the regulatory and tax impetus for shadow insurance.

2.1.1 Change in the capital treatment of private-label ABS

Prior to the financial crisis, capital requirements set by the NAIC (National Association of Insurance Commissioners) depended entirely on the credit ratings of insurers' bond holdings. Using the Moody's classification, NAIC-1 included bonds rated Aaa to A2 (described as prime and high-investment-grade), and NAIC-6 included bonds rated Caa3 and below (described as default imminent with little prospect of recovery and in default).

During the financial crisis, rating agencies dramatically downgraded structured bonds: By July 2009, only 36 percent of pre-crisis AAA-rated CDO tranches remained AAA (Coval, Jurek & Stafford 2009). In the insurance industry, capital requirements would have risen drastically in response to these downgrades, with destabilizing fire sales the likely result (Ellul, Jotikasthira & Lundblad 2011). To provide some capital relief, the NAIC changed the risk-classification methodology for structured securities, which represented nearly 20 percent of insurers' assets, second only to corporate bonds. It selected PIMCO and BlackRock to perform "expected loss" assessments to determine the intrinsic value of insurance companies' structured securities holdings. The NAIC would then assess capital charges based on the difference between the book value the insurer held on a security and the intrinsic value computed by PIMCO and BlackRock. Thus, below-investment-grade ABS can (and often does) have an NAIC-1 rating if held at sufficient discount on an insurers' balance sheet (reducing the risk weight

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[6]Fixed annuities products have become more attractive to investors in the aftermath of market volatility in the financial crisis. Many insurers also pulled back from variable annuities markets after the crisis (Koijen & Yogo 2020).

from as high as 30 percent to below 1 percent).

As Hanley & Nikolova (forthcoming) highlight, during the financial crisis, the effect of this change was to encourage insurers to realize losses on their existing portfolios. During a time of market stress, this was likely preferable to costly asset liquidations that would amplify fire sale dynamics. But, as they point out, it is a "mystery" why the regulatory change persists and applies to new purchases of ABS, thus creating an incentive to load up on high-yielding junk bonds while avoiding commensurate capital charges—an opportunity PE firms exploit. The implications for regulatory capital requirements are substantial. Becker et al. (2020) show that the design effectively eliminated capital requirements for non-agency MBS, resulting in greater asset risk exposure for insurers.[7]

We add two new facts to this discussion: First, PE-backed insurers disproportionately take advantage of this regulatory change. Second, for these subsidiaries, the decrease in capital requirements arises from acquisition of poorly rated MBS, rather than a reduced propensity to sell low-rated bonds. These new purchases occur within days of PE acquisition, as we document below.

2.1.2 Increased use of shadow insurance

Reinsurance is essentially insurance for an insurance provider. The basic motives for reinsurance in the life and annuities business are four-fold: risk transfer, underwriting assistance, capital management, and tax management (Koijen & Yogo 2016).

Koijen & Yogo (2016) focus on the rise of what they term "shadow insurance," where liabilities are ceded to an unrated affiliate outside the scope of U.S. insurance regulation. They document a large rise in shadow reinsurance since 2002, which they attribute to insurers' successful avoidance of heightened capital requirements by reinsurance to a less-regulated affiliate.

Importantly, this opportunity for capital arbitrage does not exist in the annuities business, and yet reinsurance in annuities has grown significantly since the crisis—growth that coincides with the advent of PE ownership of annuities providers.

An alternative rationale for shadow insurance is tax management. According to Credit Suisse (2017), some insurers use reinsurance to achieve effective tax rates as low as 7 percent—well below the statutory rate in our sample period of 35 percent. Recently, reinsurance has been ceded primarily to a non-US

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[7]A simple example is illustrative. A $100 ABS with a 5% change of default that is held on an insurers' balance sheet at $95 has an expected loss of zero. In the expected loss framework, it will have the same capital requirement as a $95 bond with a 0% probability of default—despite the former having risk; and the latter none.

domicile that currently has a zero corporate tax rate, and PE-backed insurers have reached agreements with foreign domiciles to retain zero or near-zero tax rates for the foreseeable future. Tax avoidance may be a growing motivation for reinsurance, even though reinsurance for the pure purpose of tax management is disallowed in the United States (Koijen & Yogo 2016).

2.2 Understanding the growth of private equity in insurance

Between 2009 and 2014, PE investments in the life insurance industry grew ten-fold (Figure 1). What explains this rise? Plagued by capital losses that accumulated during the financial crisis, many life insurers needed capital. Important work by Boucly et al. (2011) points out the role PE firms can play in relaxing targets' capital constraints. This is exactly what they did in the insurance industry following the crisis: PE firms stood as ready investors, interested because insurers provide long-term, stable investment capital that is insulated from market fluctuations (Chodorow-Reich et al. 2019). Life insurers also generate a steady stream of revenues and fee income for management of insurers' investment portfolios.[8] This is not a new business model—Warren Buffet's Berkshire Hathaway has been investing its insurance premiums for decades—however, it has spread broadly throughout the PE industry since the crisis. Between 2009 and 2014, purchases of life insurance subsidiaries represented about 10 percent of all PE transactions (by assets).

The presence of PE in the insurance industry significantly expanded following the financial crisis. To study the drivers of PE interest in insurance, we examine which insurer characteristics in the pre-crisis period (2007) predict subsequent PE acquisition at any point from 2009-2014. We focus on a linear probability model, based on size, business mix, and extent of capitalization.

Table 1 shows that the primary predictor of subsequent acquisition by a PE firm is presence in the fixed-annuity business. The unconditional probability of acquisition in this sample is 3.6 percentage points. A one-standard-deviation rise in the share of fixed annuities relative to life insurance increases the probability of acquisition by 2.6 percentage points, or three quarters of the unconditional average. Presence in the variable annuities business does not help predict subsequent PE acquisition.

Private equity firms therefore very deliberately target a specific slice of the life insurance indus-try: fixed annuities.[9] This is understandable. In a low-interest-rate environment, insurers that have

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[8]Industry observers criticize this model, suggesting that PE firms exploit their insurance subsidiaries by over-charging for investment advice (Indap & Vandevelde 2018b) and lawsuits allege "looting" by PE parents (Indap & Vandevelde 2019).

[9]This observation builds on a literature that studies the ways in which PE firms choose targets (Morck, Shleifer &

committed to making fixed payments to policyholders need capital and investment expertise. PE firms describe their role in the industry as synergistic, because they stand as ready providers of both.[10]

Our empirical methodology accounts for this targeted approach from PE firms: We present results based on a matched sample of non-PE insurers, matching based on business mix, size, and capitalization. In addition to results using within-insurer variation and high-frequency event studies, this increases our confidence that our results can be attributed to the presence of PE firms.

3 Data

3.1 Private equity ownership

Using SNL Financial's "Insurance Statutory Financial" (ISF) database, we identify life and annuities insurance firms with a registered NAIC code that operated between 2005-2014. We construct an original panel dataset of these firms by ownership structure. Our dataset designates each firm as either "PE-owned" or "non-PE-owned" in each quarter of existence during this period.

Although SNL identifies firms that have PE investors, this classification system is imprecise: It often fails to correctly identify the transition to PE ownership and does not provide complete data on ownership shares.

Therefore, rather than rely on this data, we manually collect data on PE ownership using quarterly NAIC LIFE-QS and LIFE-AS regulatory filings. These filings provide often-complex organizational charts disclosing ownership stakes of all large investors (Appendix Figure B.1 shows an example). PE ownership is not always straightforward to detect, as principals at PE firms, rather than the firms themselves, are occasionally listed as owners. In these cases, we supplement regulatory filings by searching for relationships between the individuals listed and PE firms and transaction announcements. For insurers we determine are PE-owned, we use Form A applications to seek approval for acquisitions of control or mergers to determine the precise date of the PE transaction, and whether the acquired insurer is merged or renamed. In cases when SNL is missing data, we search through news reports related to the insurers in our sample.

Vishny 1988, Dittmar, Li & Nain 2012).

[10]Senior managers at PE firms suggest they have "broad-ranging partnership[s]" with their insurance subsidiaries, providing capital at a time when many other sources were unavailable and making investment decisions that allow these firms to outperform relative to their peers (Indap & Vandevelde 2018*b*, Wilkie Farr & Gallagher 2014).

Individual insurance firms are often subsidiaries of multi-level holding companies. We consider an insurance subsidiary to be PE-owned if it is a subsidiary of a holding company with either a single PE investor or a consortium of PE investors owning a majority of the holding company's stock. We exclude from our sample firms with PE investors that collectively own less than 50 percent of the company.[11]

Our panel structure allows us to track individual insurance subsidiaries both pre- and post-PE ownership, with two limitations. First, when an insurance subsidiary is closed or merged into another insurer acquired by the PE acquirer, it is no longer a standalone observation in our sample. Second, when PE-backed insurers purchase a "book of business" from a non-PE-backed insurer—a portfolio of assets and annuities liabilities—we do not label this transaction as a PE transaction. That is, PE transactions in our sample involve the transfer of an entire insurance subsidiary to a PE acquirer.

We limit our analysis to the 1,021 life and annuities insurance firms that report their assets between 2005-2014. We require data on general account bond holdings to exist for the duration of our sample period. We also drop from our analysis six insurers that are PE-owned for our entire sample. After applying these criteria and excluding insurers with minority PE stakes, we are left with 960 insurers, of which 57 are PE-owned for at least one quarter, but not all quarters, between 2005-2014. Our sample coincides with rapid growth of PE ownership in the life insurance industry. Private equity grew from representing just 0.5 percent of assets in 2010 to 4 percent of assets by 2014. By the end of 2014, PE-owned insurers accounted for 20 percent of new underwriting in the fixed-annuities business.[12]

These investments are part of a PE shift toward longer-lived, or "permanent" sources of capital. About 21 percent of the transactions in our sample see PE firms exit within five years. PE exit rates are close to twice as large, 39 percent, outside the insurance industry (Strömberg 2007).[13]

In the last several years, PE attention has shifted from largely focusing on fixed-annuities providers to a broader swath of the insurance industry, including variable annuities, long-term care insurance, and insurers outside of the United States.[14] Additional work that considers recent transactions and the nascent impact of PE in other insurance markets is warranted.

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[11]Our data set is hand-collected from insurers' regulatory filings (available from the NAIC as well as private data providers). As part of its internal review process, one of our institutions requested that we anonymize the insurers and PE firms in our sample. Our definition of private equity includes hedge funds, business development companies, and other private investment vehicles that are not necessarily conventional limited partnerships.

[12]This trend has continued in recent years, as documented by Foley-Fisher, Heinrich & Verani (2020). These authors focus on the growing role of life insurers in private debt markets, often supported by PE owners.

[13]We exclude traditional PE exits after which PE firms retain significant control, or continue to derive capital through agreements to continue investing premia and receiving management fees for these services.

[14]See Segal (2018) and Indap & Vandevelde (2018a).

3.2 Asset side of insurer balance sheet

We focus primarily on insurers' general account bonds, which represent on average over two-thirds of their total assets. General account assets support liabilities with guaranteed returns—like term life insurance and fixed-rate annuities. Products with investment losses/gains passed through to consumers, like variable annuities and variable life insurance, are separate account products (Berends et al. 2013, Chodorow-Reich et al. 2019).

We obtain data on bond holdings (Schedule D) from SNL's "Insurance Investment Holdings" database. We select only bond holdings with non-negative fair values. This search yields a total of about 973,000 firm-quarter bond observations. We also obtain data on transactions (reported quarterly with acquisition and disposal dates). For private-label ABS, we obtain information on bond credit rating history from Moody's. Beyond the bond portfolio, we collect data on the extent to which PE-owned insurers increase shares of "alternative investments" like joint ventures and limited partnerships. We also obtain data on expense ratios to assets.

We classify each observation into NAIC risk category (NAIC 1 through NAIC 6) and asset class (corporate bonds, federal government bonds, state and public utilities bonds, foreign government bonds, private-label ABS, federal government ABS, and hybrid securities).[15]

Table 2 summarizes the bond portfolio composition of firms in our sample as of year-end 2014. We report summary statistics for the average PE-owned and non-PE-owned firms. Corporate bonds and private-label ABS are the first and second most common bond types for PE-backed insurers, representing on average 48.1 percent and 22.3 percent of all bond types, respectively. It is striking—and relevant for our forthcoming analysis—that PE-owned firms tend to have a much larger share of their assets invested in private-label ABS than non-PE-owned firms (whose share in private-label ABS averages only 7.4 percent). By bond risk category, nearly all bonds (over 97 percent for both PE-backed and non-PE-backed firms) are within the first two NAIC categories.

To test whether PE firms exhibit superior investment skill, we also collect credit ratings and bond characteristics for corporate bonds and ABS from Mergent FISD, and data on transaction dates and prices from the Trade Reporting and Compliance Engine (TRACE) database.

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[15]We exclude relatively insignificant bond categories like credit tenant leases, state and public utilities ABS, and foreign government ABS.

3.3 Liability side of insurer balance sheet

On the liability side, we focus on reinsurance agreements for U.S. life insurers from Schedule S filings provided by A.M. Best Company for 2005-2014. These statements are filed annually by individual insurance companies. We also acquire ratings information for insurance firms from A.M. Best.[16] We follow work by Koijen & Yogo (2016) on insurers' reinsurance agreements. As in their study, we focus on Schedule S Part 1 Section 1 (Reinsurance Assumed), Part 3 Section 1 (Reinsurance Ceded) and Part 4 (Reinsurance Ceded to Unauthorized Companies).

Schedule S includes detailed information on all reinsurance agreements, with records of both reinsurance ceded from insurers to reinsurers and reinsurance assumed by reinsurers, at year-end for all authorized insurers and reinsurers that report to the NAIC. The data also contains details on reinsurance ceded by an operating company to an unauthorized reinsurer that itself does not report to the NAIC—like a domestic or foreign captive (a subsidiary whose primary function is to assume reinsurance from its affiliates). Unauthorized reinsurers are insurers not subject to the same reporting and capital requirements as reinsurers covered by U.S. insurance regulation (Koijen & Yogo 2016).

Following Koijen & Yogo (2016), we collect information on the identity of the reinsurer; its domicile; whether it (1) is affiliated with the ceding company, (2) is authorized by U.S. insurance regulators, and (3) has received an A.M. Best rating, and if so, the rating; the type of reinsurance; the effective date; reserve credit taken (which can be thought of as the amount of reinsurance); and type of life reinsurance agreement. Shadow reinsurers are defined as those that are affiliated (captives of the ceding insurer), not authorized by U.S. insurance regulators, and without an A.M. Best rating.

3.4 Annuities rates

To ascertain the impact of PE investments on annuities rates, we use data from Annuity Rate Watch (ARW). ARW began providing data on fixed-annuity offerings, primarily for use by insurance brokers, over two decades ago. It maintains comprehensive information on fixed annuities and monitors over 1400 products from over 80 different carriers, including many in our sample of PE-backed insurers. Because annuities products differ substantially in specific terms, we focus on five-year multi-year guaranteed rate annuities (MYGAs), a relatively homogeneous product, currently offered by most carriers in the

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[16]A.M. Best is a rating agency—much like Moody's, S&P, and Fitch—which focuses on the insurance industry.

ARW database. A MYGA is a fixed-rate annuity contract that functions essentially as a CD, with a penalty for early withdrawal. We can gather specific details about the MYGAs in our sample, including their minimum value, "yield-to-surrender," whether the annuity has a market value adjustment, and what the penalty-free withdrawal limits are. Granularity about the annuity offering terms allows us to determine which products are most comparable.

4   Empirical framework

To assess the impact of PE ownership on various measures of risk and returns, we follow Eaton et al. (forthcoming) in using three main empirical approaches: (1) difference-in-differences regressions exploiting within-insurer variation, (2) matching estimators, and (3) a high-frequency visual event study. While PE ownership is not randomly assigned, these approaches draw on our data in very different ways: comparing insurers that experience a change in ownership to those that do not, comparing insurers that are observably similar, and studying how insurers' risk-taking changes in the days around PE acquisition. All three approaches yield similar results, providing compelling support for the interpretation that the involvement of PE parents drives our results rather than sample selection.

Our first approach relies on difference-in-differences regressions that exploit changes in insurers' ownership structures. We compare insurers that transition from non-PE-owned to PE-owned to insurers that never experience a PE investment. These regressions use the following structure:

$$\text{Outcome}_{i,q} = \beta \underbrace{PE \times After_{i,q}}_{=\mathbf{1}_{q \geq t_i}} + a_i + g_q + \epsilon_{i,q} \tag{1}$$

where i and q denote the insurer and year-quarter, t_i denotes the year-quarter in which insurer i is acquired by a PE firm (or infinity if insurer i is not acquired), and a_i and g_q represent firm and year-quarter fixed effects respectively. PE × After ($\mathbf{1}_{q \geq t_i}$) is therefore a dummy with value one if the firm is PE-owned in a given year-quarter and zero otherwise. We include firm fixed effects to control for time invariant characteristics, addressing concerns that PE firms may be acquiring firms that follow different asset-allocation strategies ex ante. We include year-quarter fixed effects to control for possible time trends impacting insurers' portfolios, and double-cluster standard errors by insurer and year-quarter. We winsorize dependent variables for our regressions within type (PE-backed firm vs. non-PE-backed

firm) at the 5th and 95th percentiles to ensure that outliers do not drive our results. Our results are broadly similar without winsorizing.[17] We also test for, and do not find evidence for, differential pre-trends for PE-owned insurers prior to acquisition.

Our second approach matches PE-owned insurers to insurers that do not experience a PE investment but have similar business models and characteristics. We focus on three key dimensions on which insurers may differ that we can observe: business mix, size, and capitalization strategy.[18] Panel A of Appendix Table A.2 shows that PE-owned insurers are more focused on fixed annuities, tend to be smaller, and are marginally more aggressive in their capitalization strategy than insurers that do not experience a PE investment on average. We employ propensity score matching to match PE-owned insurers to non-PE-owned insurers, in the year prior to acquisition. Panel B of Appendix Table A.2 shows that our sample of matched non-PE-owned insurers closely resembles our sample of PE-owned insurers on observables.

Our third approach draws on daily bond-trading data to conduct a high-frequency visual event study. We observe large changes in PE-owned insurers' investments and risk taking within days of the transition to PE ownership. We do not find systematic changes prior to PE ownership, nor do non-PE-owned insurers make any noticeable adjustments on the same days. This timing leads us to ascribe our results to changes delivered by PE parents.

5 Asset-side results and discussion

5.1 Substitution towards private-label ABS

Table 3 displays the point estimates, following Equation 1, for PE × After for each major asset class. We observe that PE-backed insurance subsidiaries substitute away from corporate bonds in favor of private-label ABS holdings. Specifically, they decrease their share of corporate bonds by over 7 percentage points and increase their private-label ABS holdings by over 6 percentage points. This change corresponds to a 16 percent decrease in these insurers' share of corporate bonds (relative to the industry average of 46 percent) and around a 66 percent increase in the share of the bond portfolio that is private-label ABS

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[17]In Appendix Table A.1, key results are reproduced and similar without winsorizing. Results are also similar for other tables without winsorizing and are available on request.

[18]As we can only observe insurers' RBC ratios and liability mix at an annual frequency, we conduct our matching analysis at the insurer-year level. Standard errors are double clustered by insurer and year. We match within insurers that hold private-label ABS in at least one year following the change in their regulatory treatment.

Electronic copy available at: https://ssrn.com/abstract=3538443

(relative to the industry average of 9.5 percent).

As we control for year-quarter fixed effects, the changes in PE × After are above and beyond general industry trends. Table 3 also includes a dummy for quarters in years 2010-2014 to illustrate these trends. The life insurance industry as a whole is moving toward corporate bonds but only marginally away from private-label ABS during this period.

5.2   Substitution towards high-yielding junk bonds

Although these regression results point to a clear change in the bond portfolios of PE-backed insurers, they say nothing about *why* PE firms shifted so substantially into private-label ABS holdings, nor do they allow us to comment on whether substitution away from corporate bonds in favor of private-label ABS is associated with an increase in risk.[19]

To examine the effect on risk, we first look at whether there were changes in the NAIC classifications of PE-owned-firm bond portfolios. In particular, we ask whether the shift out of corporate bonds led to a reduction in holdings of relatively safe corporate bonds (NAIC-1) and an increase in holdings of relatively risky securities (NAIC 4, 5, or 6). In Table 4, we see that there is no statistically significant difference in bond portfolio composition by NAIC category for PE-owned and non-PE-owned insurers. Panel A of Table 5 shows that even within private-label ABS, PE-backed insurers do not hold riskier securities. So, at first glance it does not appear that PE-backed insurers are taking on additional risk, at least as measured by NAIC category, relative to non-PE-owned firms.

Like Becker et al. (2020) and Becker & Ivashina (2015), we explore whether insurers increase risk within groups of assets that require the same capital charge, a strategy that could increase portfolio yield without incurring a corresponding increase in capital charges. Becker et al. (2020) and Hanley & Nikolova (forthcoming) show that private-label ABS became attractive investments for insurers after the regulatory change that decoupled the NAIC risk assessment from a bond's credit rating. Low-rated ABS whose default is imminent (rated CCC and below) can now be assigned a NAIC-1 (safest) rating if they are held on insurers' balance sheets at a deep enough discount.

In Table 5, Panel B, we examine whether PE-backed insurers' substitution away from corporate

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[19]Some industry observers speculate that greater investment in structured securities is driven by investment expertise offered by PE owners. For example, Deutsche Bank (2017) suggests that one PE-owned insurer relies on the PE firm "to achieve an enhanced investment yield by investing in illiquid assets and taking on complexity risk ... Management estimates that this allocation increases the earned rate by nearly 130 bps over similarly rated corporate [bonds]."

bonds in favor of ABS that we document in Table 2 is related to this regulatory change. We restrict our sample to Q4 2007-Q4 2014, as the regulatory change was implemented during the financial crisis—in 2008 for residential MBS, and 2009 for commercial MBS. We construct an "alternate NAIC category" for each bond by matching the ABS to Moody's historical bond ratings. We construct a counterfactual NAIC rating system to see whether PE-backed insurers are substituting toward ABS with low credit ratings and no corresponding increase in capital charge because of the new "expected loss" NAIC framework.

We see that PE-backed firms take greater advantage of this regulatory change. Although PE-backed and non-PE-backed insurers hold bond portfolios with similar NAIC ratings, PE-backed insurers appear significantly riskier if we focus instead on underlying bond ratings. PE-backed insurers have shifted away from corporate bonds in favor of below-investment-grade private-label ABS bonds. Using the old NAIC rating system (where NAIC ratings were tied to bond credit ratings) the ABS held by PE-owned insurers would have 11.2 percentage points less NAIC-1 bonds (safest) and 7.4 percentage points more NAIC-6 bonds (riskiest bonds, credit rating of D and below). This increase in NAIC-6 bonds is more than 200 percent of the industry average of 3.3 percentage points.

We note in Table 6 that both PE-owned and non-PE-owned firms took advantage of the opportunity to load up on risky high-yielding private-label ABS without incurring correspondingly high capital charges. Within their private-label ABS holdings, PE-backed insurers increased their share of junk private-label ABS even more than their non-PE-owned counterparts, as demonstrated by the statistically significant coefficients on our PE × After indicator.

In Appendix Tables A.3-A.5, we repeat our analysis in Tables 3-5, this time using as a control a matched sample of non-PE-owned firms with similar observables. Our results are broadly unchanged when we use the matched sample.

Three PE-owned insurance groups together account for a significant share of the total PE dollars invested into life insurance firms. We use the letters A, B, and C to refer to these PE groups.[20] Table 7 shows that insurance firms controlled by each of the three largest PE-backed insurers in our sample tilt their portfolios toward private-label ABS holdings. In fact, these increases, ranging from 17 to 27 percentage points, are substantial, even relative to other PE-backed insurers. Appendix Table A.6 shows that two of the PE groups in our sample hold around 40 percent fewer investment-grade bonds than

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[20]To ensure anonymity, letters do not necessarily refer to the same PE group across figures and tables.

their non-PE-backed counterparts. This means these PE-backed insurers are holding between eight and ten times more bonds rated D or below than the average insurance firm in our sample.

5.3 Time series evidence supporting causal interpretation

One may be concerned that our results stem from reverse causality: PE firms may identify the insurers in question as attractive investments precisely because they were already most attuned to the implications of regulatory changes. For example, suppose some insurers are always conservative, holding safe, low-yielding assets, while others are more aggressive, actively managing their portfolios in light of developments like changes in capital charges assessed for structured securities. Perhaps PE firms identify aggressive insurers as desirable targets, rather than changing their behavior after taking over.

5.3.1 No differences in pre-trends

To separate between selection of targets from the treatment effect of PE ownership, in Figure 2, we follow a generalized difference-in-differences approach. Specifically, we estimate

$$\text{Outcome}_{i,q} = \sum_{k=-4}^{4} \left(\beta_k \, \mathbf{1}_{q=t_i+k}\right) + \beta_5 \, \mathbf{1}_{q \geq t_i+5} + a_i + g_q + \epsilon_{i,q} \tag{2}$$

for quarterly changes in the share of private-label ABS in insurers' bond portfolios (Panel A), as well as the share of junk bonds within private-label ABS holdings (Panel B). The figure plots the coefficients β_k, showing differences in shares in insurers' portfolios relative to non-PE-owned insurers, along with 95 percent confidence intervals, in event time.

If aggressive insurers take advantage of the opportunity for regulatory arbitrage and are targeted by PE firms as a result, we should see differences between PE- and non-PE-owned insurers pre-acquisition. This is not the case: There are no separate trends before buyouts (β_k is not statistically different from 0 for $k < 0$), and PE ownership delivers quick changes. Within a quarter of taking over, PE firms increase their subsidiaries' private-label ABS share (junk bond share within private-label ABS) by an average of 4 (4.5) percentage points per quarter. These are very meaningful changes, at the 98th percentile (92nd percentile) of all quarterly changes for non-PE-owned insurers in our sample. PE-owned firms continue to increase their subsidiaries' private-label ABS share (junk bond share within private-label ABS) in the quarters following acquisition, with cumulative terminal increase of 11 (14.5) percentage

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points post-acquisition.

5.3.2 PE firms deliver immediate changes

Insurers are required to report transactions in their bond portfolios at a daily frequency. This data permits a high-frequency visual event study that allows us to precisely pinpoint the timing of changes in PE-backed insurers' bond holdings. Panel A of Figure 3 shows average transaction patterns for PE-backed insurers in event time in the months and days around acquisition by PE-owned firms. Panel B of Figure 3 shows average transaction patterns for all non-PE-owned firms on the same set of days. We separate the transactions into four categories: (1) those that are rated NAIC-1 in the new system, but would have been NAIC-4 or below in the old system (non-investment-grade); (2) those that would be rated the same in the two systems; (3) those rated worse in the new ratings system than they would have been previously; and (4) those for which Moody's ratings are not available (around 30 percent of our sample). We scale bond acquisitions by total insurer assets at the time of acquisition.

For PE-owned firms, almost immediately following acquisition there is a dramatic increase in non-investment-grade bond holdings assessed NAIC-1 capital charges under the new ratings system. On average, purchases of such bonds within the month immediately after acquisition amount to 1 percent of pre-acquisition assets. There is no systematic shift in PE-owned firms' trading behavior prior to acquisition. Non-PE-owned firms do not make any discernible changes on the same set of days where PE-owned firms dramatically move into private-label ABS. The bonds purchased by PE-owned firms are rated Ba1 and below, and yet incur the lowest possible capital charge (risk-based capital charge of 0.4 percent), an opportunity PE parents in our sample exploit aggressively.

5.4 Impact on capital requirements and credit ratings

Capital requirements for insurers are determined using a composite measure, with different components of risk entering different R_i in the formula below.

$$\text{Authorized Control Level (ACL) RBC} = R_0 + \sqrt{\sum_{i=1}^{5} R_i^2} \tag{3}$$

The asset risk component, R_1, is determined as a risk-weighted average based on the share of assets held in different NAIC risk categories.

PE-backed insurers' holdings of private-label ABS holdings attract much lower capital requirements under the new system. Risk weights vary considerably by NAIC category. Under the old system, a bond that would have been rated as NAIC-6 would have faced a risk weight of 30 percent. In the new system, if held at a sufficiently low book value and hence treated as an NAIC-1 bond, this risk weight falls to just 0.4 percent.

Table 8 shows that for PE-backed firms, the asset risk component of capital, R_1, *overall* (not just for structured securities) is 20 percent lower than it would have been in the previous system. For the largest PE-owned firms in our sample, these numbers are exceptionally high—subsidiaries of two of these groups are required to hold 50 percent less capital overall than they would have been forced to hold had their RBC ratios been calculated with the old NAIC rating system. PE-backed insurers are responsible for over 20 percent of the reduction in risk-based capital documented by Becker et al. (2020), despite representing less than 5 percent of the total life insurance assets under management.

Does less capital translate to lower ratings? Although the primary rating agency, A.M. Best, is not a regulator, its ratings are important to insurers because they are used by both retail and institutional customers. In general, PE-backed insurers have lower ratings than non-PE-backed insurers. The median rating for insurers of comparable size to the larger PE-owned insurers is A+. Subsidiaries of large PE groups in our sample are rated A- or B++, or two to three notches below median. These relatively low ratings are likely related to PE-backed firms' tendency to make more PE-style investments. Examples of the latter include the purchase of sports teams with funds from insurance subsidiaries and insurers purchasing stakes in PE owners' portfolio companies.[21] However, it seems unlikely that A.M. Best ratings reflect the regulatory arbitrage that is our primary focus, because A.M. Best ratings explicitly rely on NAIC risk categorizations (A.M. Best 2016).

Next, we investigate what would likely have happened to ratings for PE-backed insurers if their required capital ratios reflected the credit ratings of their bond portfolios rather than the new "expected loss" framework. We use our estimates of the change in the asset risk component, R_1, to calculate bounds for the overall impact on required capital. If R_1 increases by Δ_{R_1}, $2\Delta_{R_1}$ is an upper bound for the change in the overall requirement. To calculate a lower bound, we assume that R_0 is 0, and back out

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[21]See Ablan & Stempel (2018) and Basak & Perlberg (2018).

the largest possible sum of squares for R_2 to R_5 that matches ACL RBC, given our estimate of R_1.

$$\sum_{i=2}^{5} R_i^2 \leq \Omega = \text{ACL RBC}^2 - R_1^2 \tag{4}$$

As the square root is a concave function, ACL RBC increases by at least

$$\Delta_{\text{ACL RBC}} = \sqrt{(R_1 + \Delta_{R_1})^2 + \Omega} - \sqrt{R_1^2 + \Omega} \tag{5}$$

Recall that the RBC ratio is TAC/($2 \times$ ACL RBC). We use our lower-bound-estimate to calculate an adjusted RBC ratio, increasing the denominator of the RBC ratio by $2\Delta_{\text{ACL RBC}}$.

Figure 4 shows how PE-owned insurers' actual and adjusted RBC ratios compare with non-PE-owned insurers as of 2014. The first three bars show the distribution of RBC ratios for non-PE-owned insurers, broken out by rating. As the best-rated PE-owned insurers are rated A- or B++, we exclude non-PE-owned insurers rated A or higher. RBC ratios are an important input into A.M. Best ratings. The median non-PE-owned insurer rated A- or B++ has an RBC ratio above 500 percent, while the median non-PE-owned insurer rated B- or worse has an RBC ratio close to 250 percent (about 360 and 110 percent at the 25th percentile, respectively).

PE-owned insurers' reported RBC ratios (shown in the fourth bar) are 480 percent at the median and 400 percent at the 25th percentile – comparable to non-PE-owned insurers rated A- or B++. However, adjusted for the rating composition of private-label ABS, the median RBC ratio for PE-owned insurers (final bar) would be 330 percent, with the 25th percentile only at 150 percent – more in line with non-PE-owned insurers rated B- or worse and a level at which corrective action plans to address capital deficiencies are required if the RBC ratio has a negative trend.[22] Ratings that fully accounted for PE-owned insurers' private-label ABS holdings could therefore be among the lowest in the A.M. Best universe. The fact that ratings miss this risk is significant; for example, institutional investors only do business with insurers that are highly rated.

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[22]Insurers often quote RBC ratios defined as Total Adjusted Capital/($2 \times$ ACL RBC) in percentage points. With this scaling, insurers must submit corrective action plans if their RBC ratio is below 150 percent and has a negative trend, or breaches 100 percent, and can be placed under regulatory control if their RBC ratio falls below 50 percent (NAIC 2012).

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5.5 Subsequent returns and investment skill

PE-backed insurers tilt their bond portfolios away from corporate bonds towards low-rated private-label ABS. Beyond the opportunity for capital arbitrage this presents, it is also possible that PE firms are better able to identify underpriced bonds and hence move away from bonds for which returns only reflect systematic risk. Put differently, perhaps PE-backed insurers retain underpriced corporate bonds and use freed-up balance-sheet space for high-return ABS assets. We examine this possibility by directly evaluating subsequent performance for corporate bond portfolios. If PE firms possess superior skill, the corporate bonds their subsidiaries retain should outperform the portfolios of non-PE-owned insurers.

We focus on investment-grade corporate bonds issued between 2009 and 2014, the period in which PE significantly entered insurance and PE-backed insurers moved away from corporate bonds.[23] Following Becker & Ivashina (2015), for each month we sort all newly issued corporate bonds based on the fraction acquired by PE-backed insurers, relative to all life insurers. We divide bonds into two portfolios. Bonds with above-median PE shares enter the "High-PE" portfolio while bonds with below-median PE shares enter the "Low-PE" portfolio. Bonds remain in their portfolios for a 12-month holding period. We present regressions for which the dependent variable is monthly returns in excess of the risk-free rate, controlling for both risk and liquidity factors. Excess returns for portfolio p in month m are

$$R_{p,m} - R_m^f = \alpha_p + \beta_j^R f_m^R + \beta_j^L f_m^L + \epsilon_{p,m} \tag{6}$$

We use coupon rates from Mergent FISD and end-of-month prices from transactions reported in TRACE to calculate these returns at the bond level, which are equally weighted to produce portfolio returns.

Table 9 shows the results of this analysis. We find no evidence that PE firms have superior investment skill. The first and fourth specifications use the Fama & French (1989) model. The second and fifth specifications and the third and sixth specifications, respectively, control for market returns and liquidity factors. Corporate bonds in the High-PE portfolio had sizeable monthly alphas of about 60-70 basis points. However, corporate bonds in the Low-PE portfolio also had comparable alphas: Corporate bonds were more broadly an attractive asset class during this period. The additional return in the

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[23]Illiquidity of ABS makes the corresponding exercise for these securities challenging. While the typical corporate bond sees about 20-40 institutional trades each month, the typical ABS only sees a handful of trades each month. High-yield corporate bonds are a small share of life insurer holdings. We find little evidence that PE-backed insurers move towards junk bonds outside of private-label ABS.

High-PE portfolio, ranging from 3-9 basis points, cannot be statistically distinguished from zero.

5.6 Increases in alternative investments

Anecdotal evidence suggests that PE firms direct premiums from their insurance subsidiaries toward risky alternative investments, like ownership stakes in other portfolio companies.[24] We examine this possibility by collecting data on insurers' reported assets by asset class, separating out standard investments (e.g., bonds and equities) from alternative investments (e.g., joint ventures and limited partnerships).

Table 10 presents our results. We see that PE-backed insurance subsidiaries substitute away from standard asset classes in favor of alternative investments, decreasing their shares of standard assets by more than 5 percentage points and increasing their alternative investment shares by a comparable 4.5 percentage points. To provide a sense of magnitude, this corresponds to a 6 percent decrease in PE-backed insurers' share of standard investments (relative to the industry average of 84 percent), and an 88 percent increase in the share of alternative investments (relative to an industry average of 5 percent). These changes are therefore both highly economically significant as well as statistically significant at the 5 percent level.

In Column 3, we also observe that PE-backed insurance subsidiaries make more affiliated investments, increasing their affiliate share by 1.4 percentage points (a 54 percentage increase). It is generally believed that large affiliate stakes signal heightened risk, which is why many states explicitly limit the affiliated investment share.[25]

6 Liability-side reinsurance results

To enhance returns, in the last few decades, insurance companies have increasingly used "shadow insurance," or reinsurance to an affiliated (captive) reinsurer not authorized by U.S. insurance regulators. Koijen & Yogo (2016) suggest that because regulatory changes in the early 2000s increased capital requirements for NAIC-filing life insurers relative to their GAAP counterparts, the rise in reinsurance is related to NAIC filers ceding liabilities to affiliated GAAP insurers to avoid heightened capital charges. While this is a compelling explanation for reinsurance in the pre-crisis period, it fails to explain the

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[24]See Ablan & Stempel (2018). Analysts estimate that the share of alternative investments for some large PE-backed insurers is more than five times the industry average (Deutsche Bank 2017).

[25]See Maremont & Scism (2019).

continued rise in shadow insurance in the aftermath of the financial crisis primarily in the annuities business, where the NAIC/GAAP capital distinction does not exist.

Interestingly, in more recent years, shadow insurance contracts have overwhelmingly been initiated by PE-backed insurers. Specifically, in Figure 5, we see that between 2011-2014, PE-backed insurers accounted for more than 90 percent of new shadow insurance for fixed annuities, and nearly 60 percent of total new shadow insurance. Less than half of the rise in shadow insurance since 2011 is in life insurance; instead, a significant fraction of recent reinsurance is in the annuities business, where there is no opportunity for capital arbitrage, as Koijen & Yogo (2016) discuss. While some portion of the growth in annuities reinsurance may be motivated by potential capital savings, another motivation is tax savings. It appears that the increase in shadow insurance contracts in the latter part of our sample period is related primarily to reinsurance with a non-U.S. domiciled captive by subsidiaries of one of the PE groups in our sample. As a result of this reinsurance, this insurer likely has a substantially lower tax burden.

While it is possible that the capital requirements outside of the United States are less stringent than domestic ones, it appears unlikely that this is the sole motive for reinsurance. A subsidiary of one PE group in our sample, domiciled in a jurisdiction that does not impose income or capital gains taxes, has negotiated tax exemptions through 2035 even if such taxes are applied to other companies.[26]

7 Impact on insurer performance

7.1 Profitability

Given their tax and capital savings, we expect that PE-backed insurers increase their ROE relative to their non-PE-backed counterparts. This is for several reasons: First, we anticipate that PE-backed insurers' investments in risky junk bonds precipitate higher-yielding securities portfolios. These firms should also be more levered, as they are able to hold these risky bonds with relatively low capital charges. Additionally, we expect that allocating larger shares of their portfolio to alternative investments would also increase risk and boost yield. Also, because of increased shadow insurance, PE-backed insurers bear lower tax burdens.

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[26]Relatedly, per Gray (2017), Fidelity and Guaranty Life, recently acquired by Blackstone, plans to transfer some of its business to jurisdictions outside the U.S. through reinsurance to take advantage of more generous tax treatment.

In Table 11, we verify that this is indeed the case: Average ROE for PE-backed insurers is 11.7 percent, compared to an ROE for non-PE-backed insurers of only 6.6 percent. This difference is statistically significant at the 5 percent level. Average ROEs in 2014 for subsidiaries of some PE groups in our sample range as high as 12-20 percent. Unsurprisingly, if we estimate a counterfactual ROE that reflects the extra capital insurers would have to hold on their structured security portfolios, ROE for PE-backed insurers falls by 30 percent (to 8 percent) whereas ROE for non-PE-backed firms is basically unchanged, and the difference between the two is no longer statistically significant.

In Appendix Figure A.1, we attempt to assess the impact of PE ownership on leverage and ROE. We illustrate this effect by considering the largest insurance subsidiary of one PE group in our sample. As expected, leverage and ROE rise in the aftermath of PE ownership and, as for the broader sample, we see that leverage would have been reduced drastically if capital requirements were assessed based on underlying bond risk. Book leverage (assets/book equity) would have been nearly 50 percent lower in 2014 than the reported ratio. Leverage would have been even more dramatically curtailed if the RBC ratio were to be held constant. ROE at year-end 2014 was about 18 percent for this insurance subsidiary. In the counterfactual world with capital charges assigned based on credit ratings alone, ROE would have still increased, but the increase would have been smaller (from around 5 percent to 10 percent).[27]

7.2   Operational efficiency

Outside of the insurance context, there is evidence that PE firms boost profitability through improvements in efficiency and cost-cutting (Kaplan & Strömberg 2009, Acharya et al. 2013). In Table 12, we test whether this is the case in this setting, estimating Equation 1 with expense ratios to assets as dependent variables at an annual frequency.

We observe no differences in expense ratios for PE-owned insurers relative to their non-PE-owned counterparts. This is the case for both employee compensation and non-salary expenses: Differences post-PE ownership are near-zero and not statistically significant. Overall, our evidence suggests that the superior performance of PE-owned insurers that we document is related to regulatory arbitrage and tax management rather than operational engineering.

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[27]In Appendix Table A.5, we look at the reduction in capital requirement, increase in leverage, and impact on ROE for PE-backed firms relative to a matched sample of non-PE-backed firms.

7.3 Annuities pricing

It is possible that some of the benefits from capital and tax savings that PE-backed insurers receive enable them to price more aggressively relative to their competitors and capture greater market share. Their growth in recent years provides suggestive evidence on this front: PE-backed insurers' share of new annuity sales jumped from below 3 percent in 2009 to nearly 20 percent in 2017 (LIMRA 2008, LIMRA 2013, LIMRA 2017).

In Figure 6, we compare the pricing of multi-year guaranteed annuities for subsidiaries of two of the PE groups in our sample to the non-PE-owned insurers in our database.[28] We look at rates on five-year MYGAs (multi-year guaranteed annuities), which function essentially like five-year CDs with a penalty assessed for early withdrawal. We see that the yield guaranteed by PE-owned insurers is higher than that of other insurers. While there is high variance in yield offerings for different carriers with different terms, the average five-year MYGA rates for the PE-backed insurers in the ARW sample are above the 75th percentile for the non-PE-backed firms.

One issue in comparing annuities pricing by PE-owned-firms relative to non-PE-owned firms is that it is difficult to find two insurance products with identical terms (minimum balances, penalties for early withdrawal, amount that can be withdrawn without penalty, commission terms, etc.). To facilitate comparison, in Panel B we focus on high-band or mid-band (with minimum values of over $100K) MYGAs with market-value adjustments that can transfer some interest rate risk to consumers. For this subsample, only one PE-backed insurer remains in the ARW sample. It offers a five-year MYGA at 2.75 percent, which is higher than the 90th percentile of the remaining sample.

8 Conclusion

This paper studies the changes that PE firms apply to their portfolio companies in the life insurance industry. PE investments in the life insurance industry have grown ten-fold since the financial crisis, primarily in fixed-annuities business—the segment with the most certain liabilities, hardest hit by a low-interest rate environment, and most attractive to consumers in search of safe investments.

Using detailed data that tracks daily changes in insurers' portfolios, we are able to disentangle PE

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[28]We obtain data for a single date (April 2017) and restrict our analysis to insurers with an A.M. Best rating of A- or higher, creating a comparable sample.

firms' selection of targets for acquisition from the changes they effectuate. There are no differences between PE-backed and non-PE-backed insurers prior to buyouts; however, once PE firms take over, they deliver immediate and sizable changes.

On the asset side of the business, PE firms tilt bond investments away from corporate bonds and toward ABS. This allows them to take advantage of a crisis-era regulatory change that decouples capital requirements from credit ratings for ABS holdings. During the financial crisis, this change helped insurers meet capital requirements by realizing their ABS losses without fire sales; however, post-crisis, it creates an incentive to purchase low-rated, high-yielding securities while avoiding commensurate capital charges—an opportunity that PE firms aggressively exploit. Beyond this capital arbitrage, we find no evidence that PE firms display any specialized investment skill in portfolio allocation, nor is there evidence that they deliver operational improvements. They do, however, tilt their subsidiaries' portfolios towards alternative and affiliated investments, often thought of as bearing greater risk.

On the liability side of insurers' balance sheets, we find that much of the post-crisis growth in shadow reinsurance documented by Koijen & Yogo (2016) is attributable to the subsidiaries of a single PE firm in our sample. These subsidiaries cede their premiums to a foreign affiliate that faces a zero percent corporate tax rate in its foreign domicile. Prior literature focuses on how PE firms use leverage to lower tax liabilities, given that interest is deductible. We provide evidence of another dimension of PE firms' tax management—profit-shifting to decrease domestic tax liabilities.

Overall, these changes increase insurers' profitability: Average ROE for PE-backed insurers is 1.6 times that of non-PE-backed insurers. A third of the difference is attributable to higher-yielding junk ABS investments and the implications for portfolio risk appear to be ignored by rating agencies. The short-term beneficiaries of higher profits are insurance company shareholders and, to a certain extent, consumers, given that PE-backed insurers offer annuities with higher rates. The longer-term consequences of these investments, especially in moments of financial distress, are yet unknown, and an important area for future research.

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Notes: This figure shows the dollar value of PE activity in life insurance by year. Acquisitions are shown as positive numbers, in the year of the transaction. Subsequent exits are shown as negative numbers, also in the year of the initial transaction. We exclude exits after which PE firms retain significant control or continue to derive capital via investment management agreements.

30
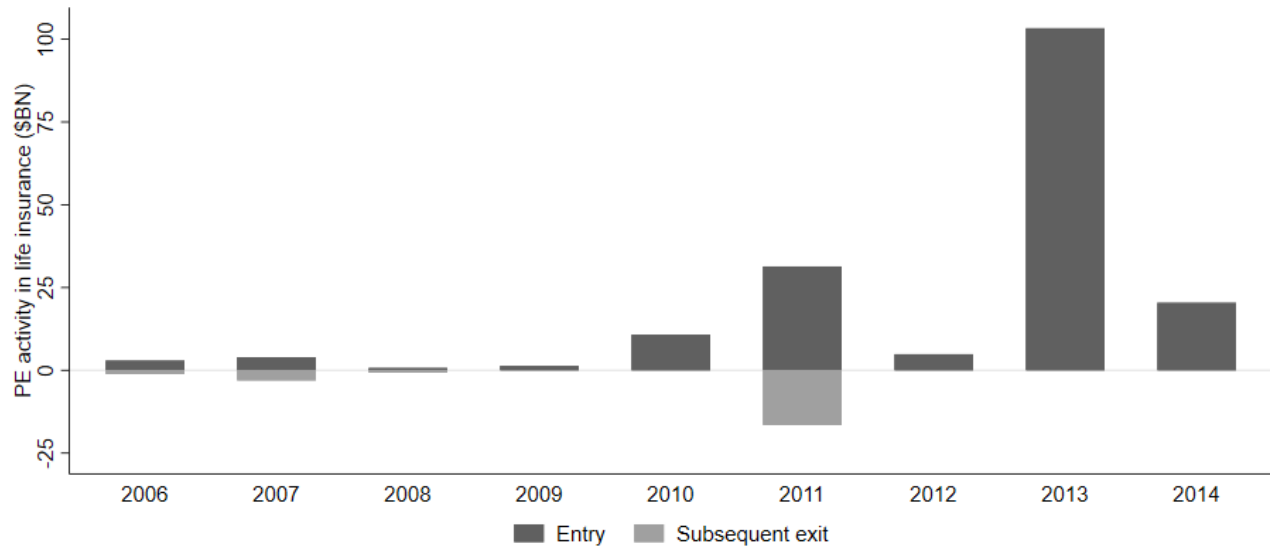
Figure 2: *Quarterly portfolio composition in event time*

Notes: This figure shows PE-backed insurers' portfolio composition relative to non-PE-backed insurers at a quarterly frequency in event time. Both panels are based on regressions using observations at the insurer-quarter level for 2007Q4-2014Q4 (capital treatment of private-label ABS changed starting 2008Q4), dropping insurers that are always PE-owned in this period, and restricting to insurer-quarters with positive private-label ABS holdings (same sample as Table 5). Dependent variables are asset class shares (Private-label ABS/General account bonds for Panel A, and Alternative NAIC categories 3-6/Private-label ABS for Panel B). These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Regressions include quarter and insurer fixed effects. Standard errors are double-clustered by insurer (NAIC Code) and quarter. The figure shows point estimates as well as 95 percent confidence intervals.

Panel A: Private-label ABS/General account bonds (percent)
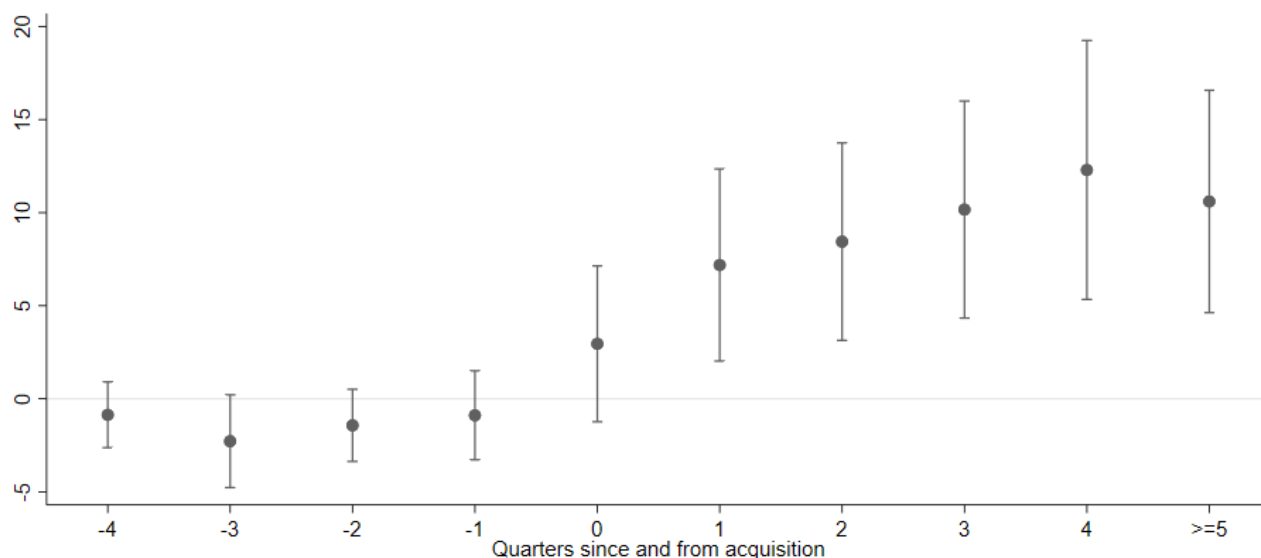
Panel B: Alternative NAIC Categories 3-6/Private-label ABS (percent)

31
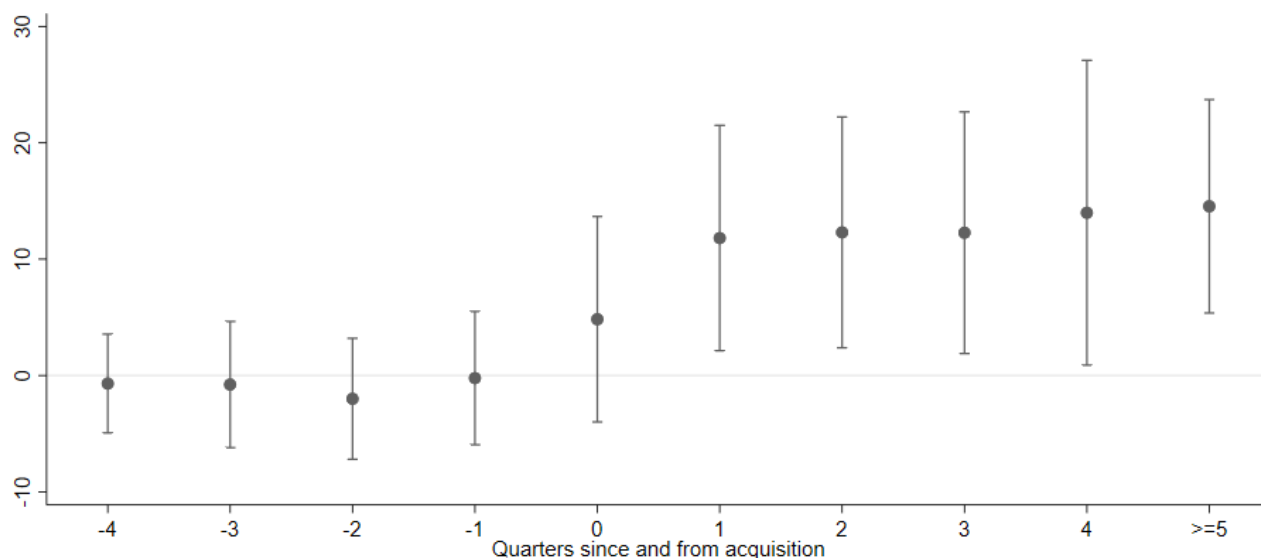
Figure 3: *Daily private-label ABS transactions in event time*

Notes: This figure shows daily transactions in private-label ABS for PE firms and non-PE firms in event time. Acquisition dates are marked with dashed lines. The horizontal axis shows the number of days to and since acquisition. For non-PE firms we use transactions by all-non PE firms on the same dates. For each date in event time, we plot averages across PE firms and non-PE firms after winsorizing at the 10th and 90th percentiles. We impute an alternate NAIC category for private-label ABS based on ratings for Moody's. Private-labelABS are separated into four categories. First, private-label ABS reported as NAIC 1, with an alternate NAIC category from 4-6. Second, all other private-label ABS where the alternate NAIC category is higher than the reported NAIC category. Third, private-label ABS where we are unable to match ratings from Moody's. Fourth, all other private-label ABS, where the alternate NAIC category is either the same as or lower than the reported NAIC category. For each category, cumulative net purchases are shown as a fraction of all general account bonds held as of the quarter-end prior to acquisition in percentage points.

Panel A: PE transactions (average)
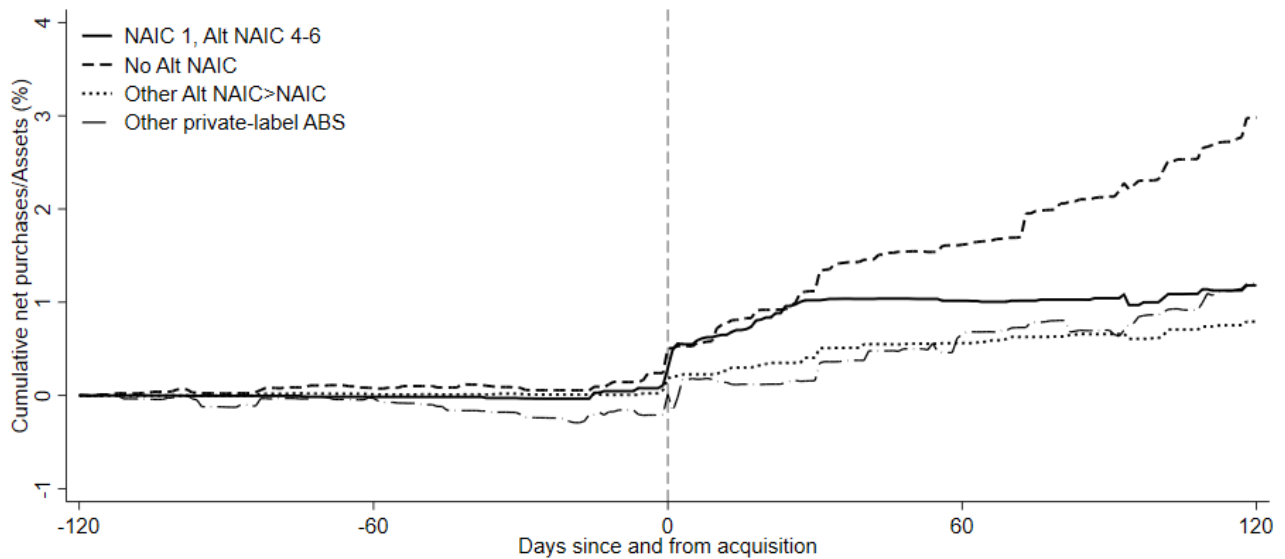
Panel B: Non-PE transactions (average)

32
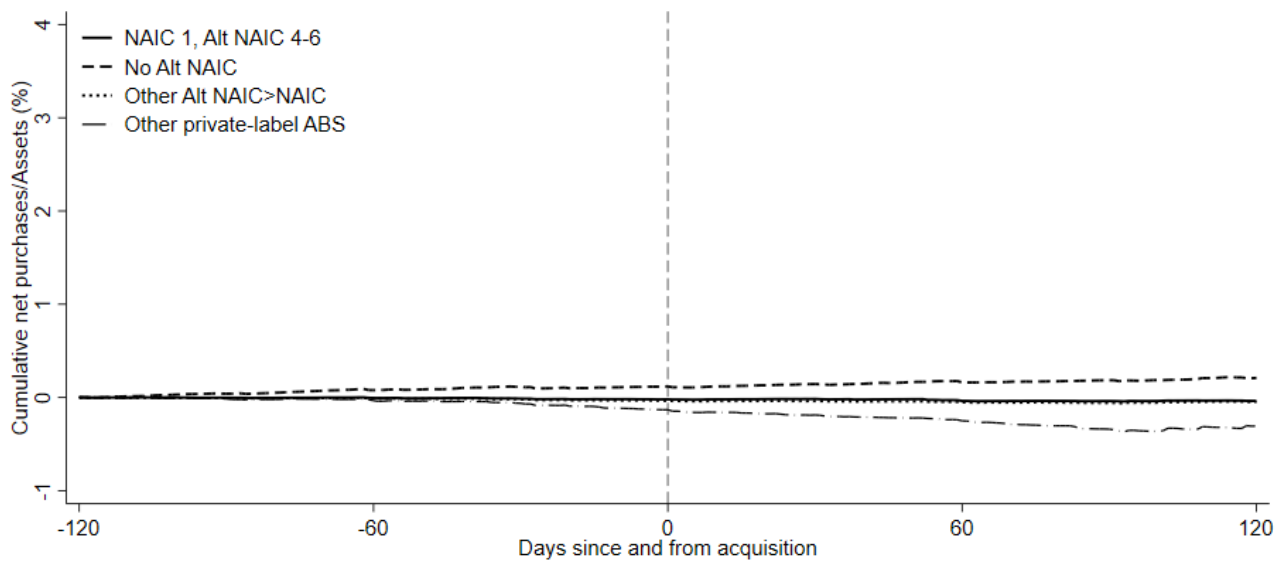
Figure 4: *RBC ratios (2014)*

Notes: The RBC ratio is statutory capital (total adjusted capital) scaled by required capital ($2 \times$ ACL RBC). Insurers with an RBC ratio below 100 percent can be required to take corrective action, while at an RBC ratio below 50 percent regulators are authorized to take control. See main text for more details. This figure shows RBC ratios in percentage points, capped above at 600 and below at 10, as of 2014. It excludes insurers rated A or higher, as all PE insurers are rated A- or lower. Non-PE insurers are broken out by A.M. Best rating. Only PE insurers rated A- or B++ by A.M. Best are shown. For PE insurers, adjusted RBC ratios are also shown. Adjusted RBC ratios use a lower-bound estimate of the level of capital that would have been required under the old rating-based treatment of private-label ABS as the denominator. Insurers must submit corrective action plans if their RBC ratio is below 150 percent and has a negative trend, or breaches 100 percent. The 150 percent threshold is marked with a dashed line.
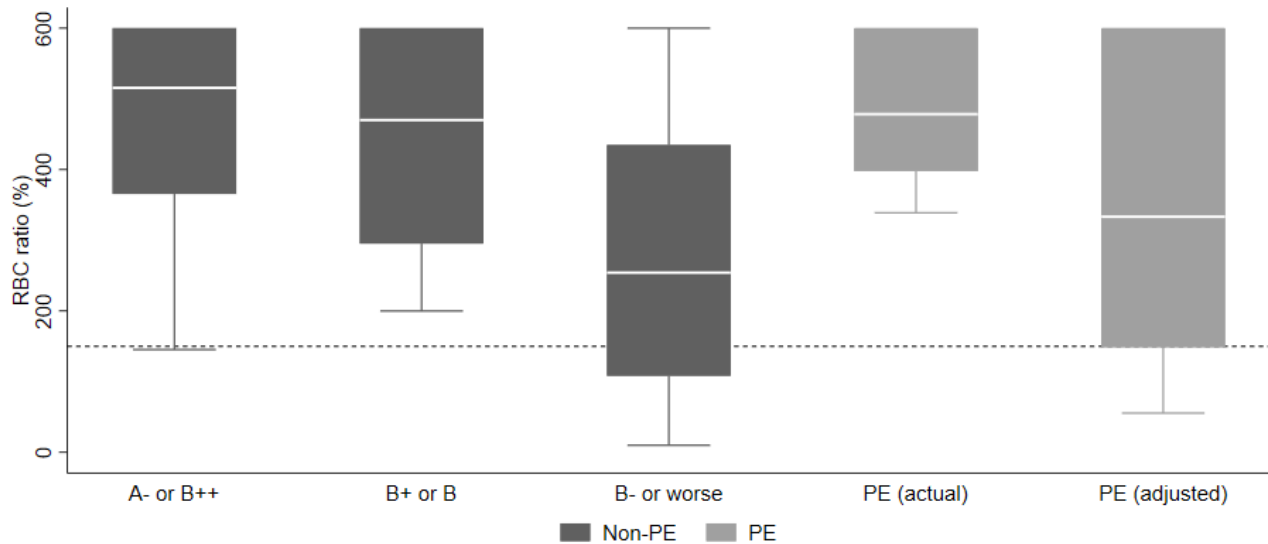
Figure 5: *New shadow reinsurance contracts*

Notes: This figure shows new shadow reinsurance contracts using data from A.M. Best. Shadow reinsurance contracts are with affiliated entities not rated by A.M. Best and not authorized by U.S. insurance regulators. We separate shadow insurance by whether it covers life insurance or annuities, and further break out annuity shadow reinsurance by whether it is reported as general account (fixed) or not (variable). Panel A shows all new shadow reinsurance by type. Panel B shows new fixed annuity reinsurance based on whether the insurer is owned by PE Group A, owned by a different PE firm, or not PE owned.

Panel A: All new shadow reinsurance
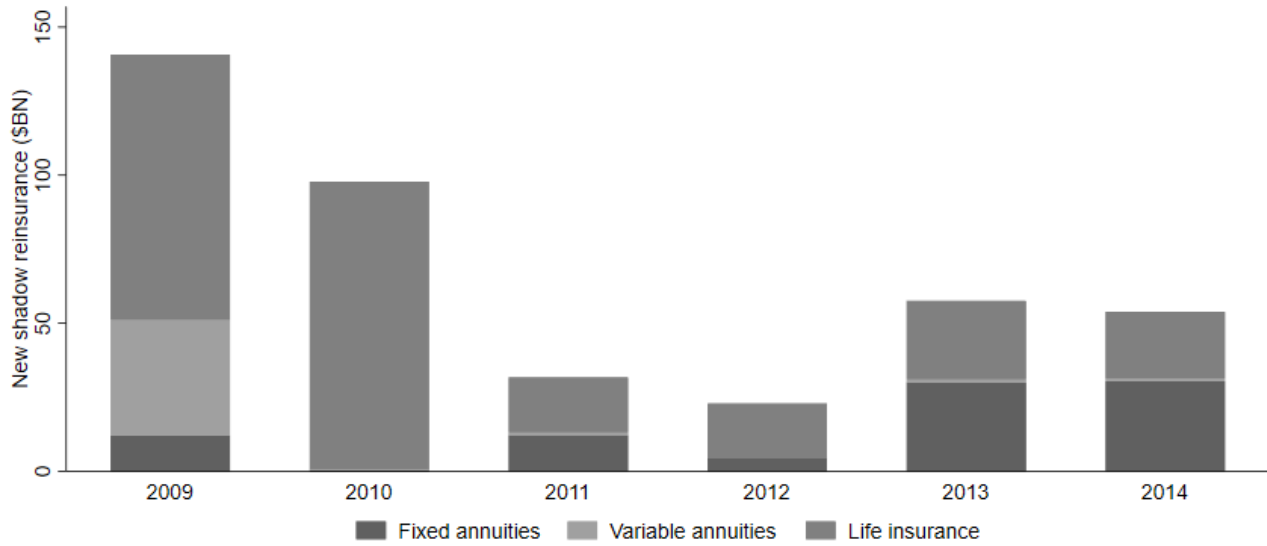
Panel B: New fixed annuity shadow reinsurance

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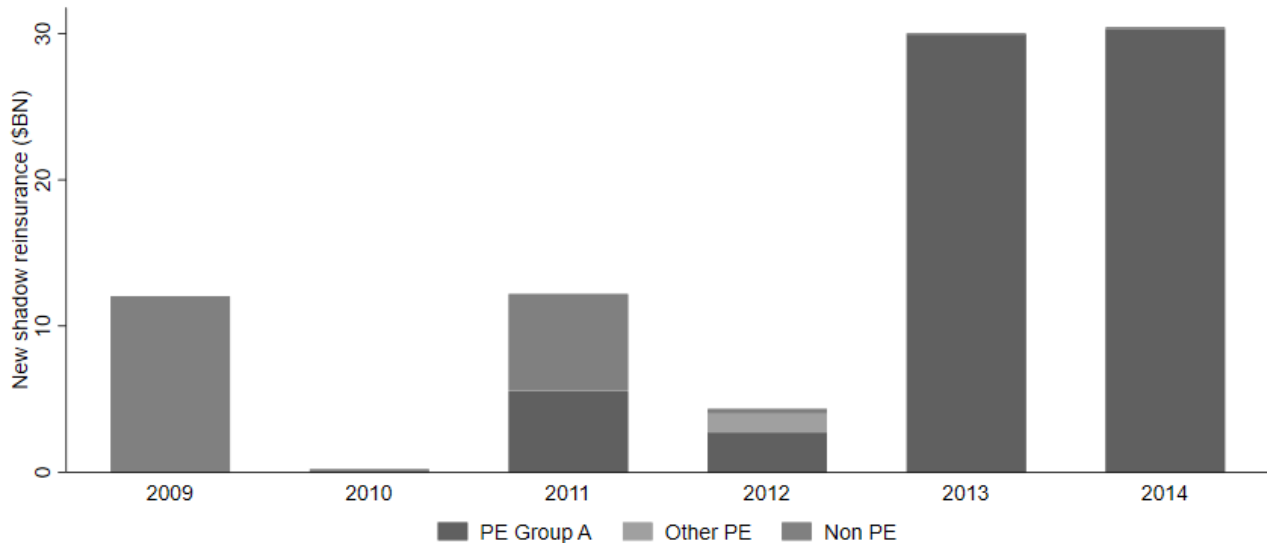
Figure 6: *Pricing of 5 year guaranteed annuities*

Notes: This figure shows quotes for multi-year guaranteed annuities (MYGAs) with guarantees for 5 years. It uses a single cross-section as of April 7 2017, from Annuity Rate Watch. The sample is restricted to insurers with A.M. Best rating of A- or better (144 quotes). Observations are at the quote level (e.g. one PE group subsidiary quotes 8 5Y MYGAs with different conditions). The guaranteed yield is winsorized at 5th and 95th percentile. Panel A shows the distribution of all of these quotes, separately showing quotes by PE insurers. Panel B shows only high-band or mid-band MYGAs with market value adjustments (MVAs).

Panel A: Quotes from insurers rated A- or better
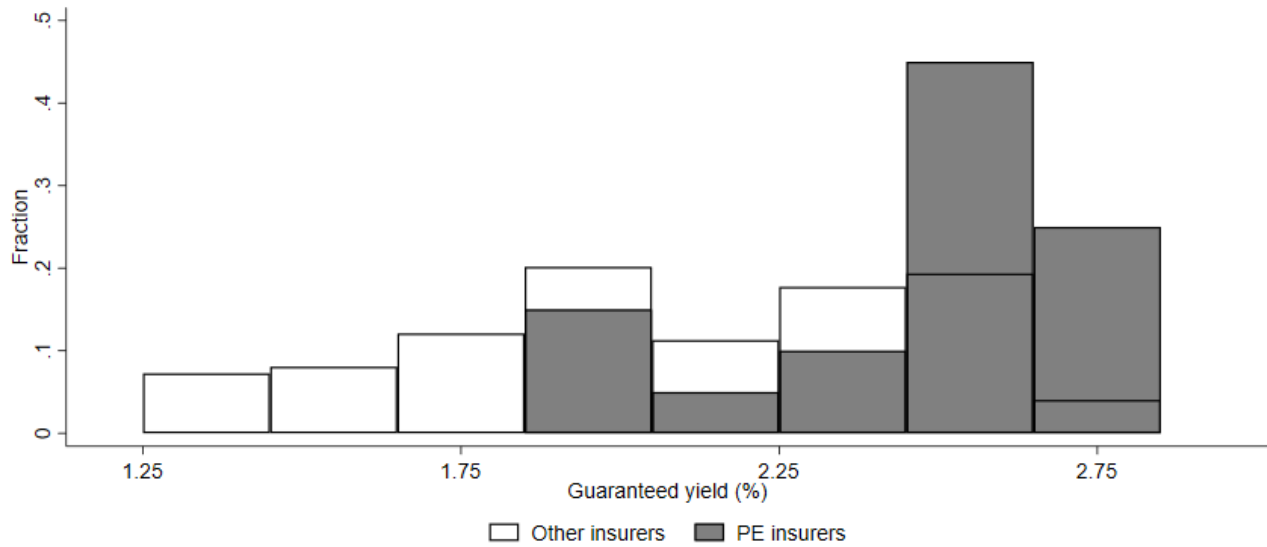
Panel B: High-Band or Mid-Band MYGAs with MVAs

35
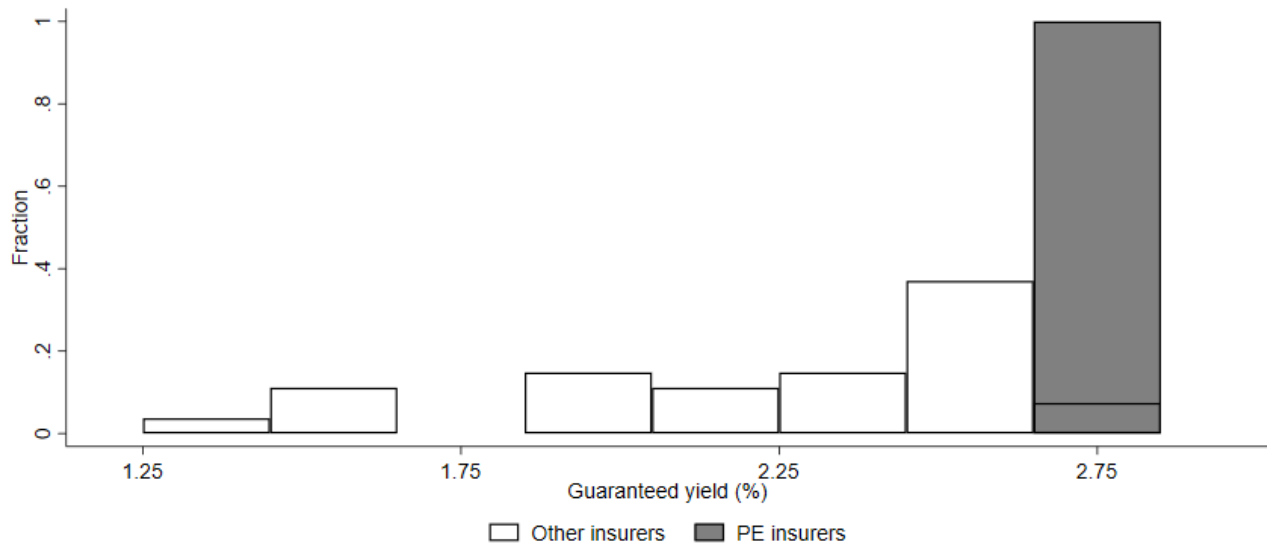
Table 1: *Probability of subsequent PE acquisition*

Notes: This table shows linear regressions where the dependent variable is a dummy variable indicating acquisition by a PE firm between 2009-2014. The dummy takes a value of 100 in the case of acquisition, so that coefficients can be read in percentage points. Insurer characteristics are as of 2007, scaled to have unit variance, and winsorized at the 5th and 95th percentiles. Robust standard errors are shown in parentheses.

	PE Target	PE Target	PE Target	PE Target	PE Target
Assets	0.3				-0.8
	(0.5)				(0.7)
Annuity share		2.6**			2.7**
		(0.9)			(1.0)
Surplus ratio			-1.0*		-0.9
			(0.5)		(0.5)
General account share				-1.1	-0.3
				(0.8)	(1.0)
Mean of dep var	3.6	3.6	3.6	3.6	3.6
R^2	0.00	0.02	0.00	0.00	0.02
Insurers	791	791	791	791	791

Table 2: *Bond portfolio by asset class (2014)*

Notes: This table shows summary statistics regarding insurers' assets as of 2014. The data is based on regulatory reporting obtained from SNL. General account bond/Total assets is the reported fair value of general account bonds (excluding hybrid securities) with bond level reporting, as a share of total assets, in percentage points. Asset class shares (Corporate-Agency ABS) and NAIC category shares (NAIC 1-6) are within general account bonds, also in percentage points. Corporate bonds include bonds issued by financials and utilities. State government bonds include bonds issued by local governments. NAIC categories are reported by insurers, and may be different for the same bond across insurers. The table shows the mean of all variables separately for PE-owned insurers and non-PE-owned insurers, as well as the *t*-statistic for the difference between these groups. All variables are winsorized at the 5th and 95th percentiles within type (PE, non-PE).

	PE	Non-PE	*t*-stat
General account bonds/Total assets	63.3	62.6	0.20
Corporate	48.1	52.4	-1.43
Fed Govt	16.6	25.9	-3.52
State Govt	2.7	4.7	-3.34
Foreign Govt	0.4	0.5	-0.60
Private-label ABS	22.3	7.4	4.90
Agency ABS	8.2	6.1	1.25
NAIC 1	72.5	73.4	-0.35
NAIC 2	24.6	23.2	0.65
NAIC 3	1.5	1.9	-1.57
NAIC 4	0.7	0.6	0.84
NAIC 5	0.1	0.1	0.71
NAIC 6	0.1	0.0	1.50
Insurers	709		

Table 3: *Bond portfolio by asset class*

Notes: This table uses data on insurers' general account bond holdings. It shows regressions where the observations are at the insurer-quarter level for 2005Q4-2014Q4. As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The dependent variables are asset class shares within general account bond holdings. These shares are in percentage points, and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Corporate bonds include bonds issued by financials and utilities. State government bonds include bonds issued by local governments. 2010-2014 is a dummy for quarters in these years. PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

	Corporate	Fed Govt	Private-label ABS	Agency ABS	State Govt	Foreign Govt
2010-2014	8.9***	-5.8***	-1.1***	-3.7***	2.2***	-0.1***
	(0.60)	(0.69)	(0.21)	(0.28)	(0.15)	(0.03)
PE × After	-7.2*	-2.8	6.3***	2.2	0.1	-0.1
	(2.93)	(2.87)	(1.72)	(1.63)	(0.43)	(0.22)
Mean of dep var	46.0	28.9	9.5	8.9	3.0	0.6
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.82	0.81	0.80	0.74	0.73	0.72
Insurer-Quarters	30,264	30,264	30,264	30,264	30,264	30,264
Insurers	960	960	960	960	960	960
PE insurers	57	57	57	57	57	57

Table 4: *Bond portfolio by NAIC category*

Notes: This table uses data on insurers' general account bond holdings. It shows regressions where the observations are at the insurer-quarter level for 2005Q4-2014Q4. As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The dependent variables are NAIC category shares within general account bond holdings. These shares are in percentage points, and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). NAIC categories are reported by insurers and may be different for the same bond across insurers. PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE × After	1.2	-1.6	0.3	0.1	0.1	0.0
	(1.45)	(1.37)	(0.16)	(0.08)	(0.04)	(0.01)
Mean of dep var	79.0	18.1	1.5	0.6	0.2	0.1
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.83	0.82	0.68	0.62	0.49	0.49
Insurer-Quarters	30,264	30,264	30,264	30,264	30,264	30,264
Insurers	960	960	960	960	960	960
PE Insurers	57	57	57	57	57	57

Table 5: *Private-label ABS portfolio by NAIC category*

Notes: This table uses data on insurers' private-label ABS holdings. It shows regressions where the observations are at the insurer-quarter level for 2007Q4-2014Q4 (capital treatment of private-label ABS changed starting 2008Q4). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The sample is restricted to insurer-quarters with positive private-label ABS holdings, and to private-label ABS with a matched rating from Moody's. The dependent variables are NAIC category shares within private-label ABS. Panel A shows shares based on reported NAIC categories, which can be different for the same bond across insurers. Panel B shows shares by alternate NAIC category, imputed based on ratings from Moody's. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

Panel A: Reported NAIC category

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE × After	0.5	0.1	0.4	0.3	-0.1	-0.1
	(2.59)	(1.30)	(0.52)	(0.32)	(0.11)	(0.09)
Mean of dep var	78.7	11.3	2.8	1.6	0.6	0.4
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.69	0.61	0.50	0.50	0.43	0.56
Insurer-Quarters	12,185	12,185	12,185	12,185	12,185	12,185
Insurers	579	579	579	579	579	579
PE Insurers	34	34	34	34	34	34

Panel B: Alternate NAIC category

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE × After	-11.2*	0.3	2.1*	0.7	3.1*	7.4**
	(5.61)	(2.77)	(0.83)	(0.38)	(1.35)	(2.33)
Mean of dep var	65.7	13.6	4.5	1.6	5.9	3.3
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.75	0.68	0.57	0.57	0.67	0.66
Insurer-Quarters	12,185	12,185	12,185	12,185	12,185	12,185
Insurers	579	579	579	579	579	579
PE Insurers	34	34	34	34	34	34

Table 6: *Private-label ABS portfolio by alternate NAIC category and time period*

Notes: This table uses data on insurers' private-label ABS holdings. It shows regressions where the observations are at the insurer-quarter level for 2007Q4-2014Q4 (capital treatment of private-label ABS changed starting 2008Q4). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The sample is restricted to insurer-quarters with positive private-label ABS holdings, and to private-label ABS with a matched rating from Moody's. The dependent variables are alternate NAIC category shares within private-label ABS. Alternate NAIC categories are imputed based on ratings from Moody's. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). 2010-2014 is a dummy for quarters in these years. PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
2010-2014	-22.5***	3.4***	3.1***	1.4***	5.3***	4.0***
	(0.88)	(0.57)	(0.18)	(0.05)	(0.19)	(0.16)
PE × After	-11.2*	0.3	2.1*	0.7	3.1*	7.4**
	(5.61)	(2.77)	(0.83)	(0.38)	(1.35)	(2.33)
Mean of dep var	65.7	13.6	4.5	1.6	5.9	3.3
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.75	0.68	0.57	0.57	0.67	0.66
Insurer-Quarters	12,185	12,185	12,185	12,185	12,185	12,185
Insurers	579	579	579	579	579	579
PE Insurers	34	34	34	34	34	34

Table 7: *Bond portfolio by asset class and PE group*

Notes: This table uses data on insurers' general account bond holdings. It shows regressions where the observations are at the insurer-quarter level for 2005Q4-2014Q4. As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The dependent variables are asset class shares within general account bond holdings. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Corporate bonds include bonds issued by financials and utilities. State government bonds include bonds issued by local governments. PE Group A, B, and C are dummy variables that take a value of 1 for insurer-quarters with ownership by these PE groups. Other PE is a dummy variable that takes a value of 1 for all other insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers, the number of insurers owned by PE Groups A, B, and C, and the number of insurers owned by other PE firms in the sample.

	Corporate	Fed Govt	Private-label ABS	Agency ABS	State Govt	Foreign Govt
PE Group A	-25.1***	3.9	16.9**	-5.6	-1.1	0.2
	(6.86)	(4.39)	(5.89)	(3.05)	(0.61)	(0.41)
PE Group B	-20.5***	-3.9	26.5***	-4.9***	0.1	-0.2
	(4.30)	(2.72)	(3.39)	(1.44)	(0.42)	(0.30)
PE Group C	-10.4	-6.7	23.6***	-3.2	-1.0	0.3*
	(5.32)	(5.64)	(3.67)	(3.38)	(0.56)	(0.14)
Other PE	-3.7	-2.7	0.6	4.6*	0.4	-0.2
	(3.51)	(3.65)	(0.82)	(1.83)	(0.54)	(0.28)
Mean of dep var	46.0	28.9	9.5	8.9	3.0	0.6
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.82	0.81	0.81	0.74	0.73	0.72
Insurer-Quarters	30,264	30,264	30,264	30,264	30,264	30,264
Insurers	960	960	960	960	960	960
PE Group A	6	6	6	6	6	6
PE Group B	4	4	4	4	4	4
PE Group C	7	7	7	7	7	7
Other PE Insurers	42	42	42	42	42	42

Table 8: *Reduction in capital requirement due to change in treatment of private-label ABS*

Notes: This table uses data on insurers' private-label ABS holdings. It shows regressions where the observations are at the insurer-quarter level for 2007Q4-2014Q4 (capital treatment of private-label ABS changed starting 2008Q4). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The sample is restricted to insurer-quarters with positive private-label ABS holdings, and to private-label ABS with a matched rating from Moody's. The dependent variable is the reduction in the capital requirement relative to the previous, rating based, system for determining capital charges for private-label ABS. Specifically, R_1 Reduction is $\Delta R_1/(R_1 + \Delta R_1) \times 100$, where ΔR_1 is the change in the capital requirement, and R_1 is the current capital requirement on the full general account portfolio. The dependent variable is winsorized at the 5th and 95th percentiles within type (PE, non-PE). PE status is a dummy variable that takes value 1 for insurer-quarters with PE ownership. PE Groups A, B, and C are dummy variables that take a value of 1 for insurer-quarters with ownership by these PE groups. Other PE is a dummy variable that takes a value of 1 for all other insurer-quarters with PE ownership. Both specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The first specification shows the total number of insurers and the number of insurers owned by PE firms in the sample. The second specification shows the number of insurers owned by PE Groups A, B, and C, and the number of insurers owned by other PE firms.

	R_1 Reduction	R_1 Reduction
PE × After	19.2***	
	(4.91)	
PE Group A		52.7***
		(11.07)
PE Group B		55.3***
		(9.18)
PE Group C		3.8
		(4.61)
Other PE		7.3*
		(3.19)
Mean of dep var	12.7	12.7
Quarter FE	Y	Y
Insurer FE	Y	Y
SE clustered by	I+Q	I+Q
R^2	0.72	0.73
Insurer-Quarters	12,185	12,185
Insurers	579	579
PE Insurers	34	
PE Group A		5
PE Group B		3
PE Group C		6
Other PE Insurers		20

Table 9: *Realized returns on corporate bonds*

Notes: This table shows secondary market performance for investment-grade corporate bonds issued from 2009-2014. The dependent variable is monthly returns in excess of the risk-free rate, in basis points. Returns are constructed using non-canceled transactions above $1 million in TRACE. Returns use the median end-of-month price, account for bond coupons, and are equally weighted. Bonds are split into the two portfolios based on above- and below-median purchase shares for PE-backed insurers. The risk-free rate and market return are from Ken French's website. Default premium is the difference in returns between IG and HY corporate bonds. Term spread is the return differential between five-year Treasuries and three-month Treasury bills. The liquidity factor is from Lubos Pastor's website. Robust standard errors are shown in parentheses.

	High-PE	High-PE	High-PE	Low-PE	Low-PE	Low-PE
α	74.3***	60.9**	62.8**	70.2***	51.7**	60.2***
	(16.7)	(18.2)	(18.1)	(15.1)	(16.2)	(15.9)
Stock market excess return		0.1			0.1**	
		(0.0)			(0.0)	
Default premium	0.2	0.1	0.1	0.1	0.1	0.1
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Term spread	0.7**	0.8**	0.7**	0.6**	0.8***	0.6**
	(0.2)	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)
Liquidity factor			7.9			6.9
			(5.0)			(4.2)
R^2	0.23	0.26	0.27	0.20	0.29	0.24
Months	56	56	56	56	56	56

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Table 10: *Alternative and affiliated investments*

Notes: This table uses data on insurers' reported admitted assets by asset class. It shows regressions where the observations are at the insurer-quarter level for 2005Q4-2014Q4. As identification comes from changes in ownership structure, we drop insurers that are always PE owned in this period. The dependent variables are asset class shares. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Standard investments include bonds, equities, mortgage loans, real estate, cash, and cash equivalents. Alternative investments include corporate and unincorporated joint ventures, general and limited partnerships, limited liability companies, debentures, collateral loans, and promissory notes and other short-term investments excluding cash equivalents. Affiliated investments overlap with standard asset classes and alternative investments. PE status is a dummy variable that takes a value pf1 for insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

	Standard Asset Classes	Alternative Investments	Affiliated Investments
PE Status	-5.2**	4.5**	1.4*
	(1.89)	(1.51)	(0.58)
Mean of dep var	84.2	5.1	2.6
Quarter FE	Y	Y	Y
Insurer FE	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q
R^2	0.68	0.56	0.83
Insurer-Quarters	29,953	29,953	29,953
Insurers	951	951	951
PE Insurers	57	57	57

Table 11: *Mean ROE and adjusted ROE by insurer type (2014)*

Notes: This table shows ROE and adjusted ROE as of 2014. The sample is restricted to insurer-quarters with positive private-label ABS holdings in at least one year following the change in regulatory treatment of MBS. ROE is net income as a fraction of surplus in percentage points, based on regulatory reports using statutory accounting. Ajdusted ROE shows a counterfactual calculation if capital increased by the additional capital that would have been required under the old rating-based treatment of private-label ABS. This adjustment is a lower-bound estimate of the reduction in ROE. Both ROE and adjusted ROE are winsorized at the 10th and 90th percentiles within type (PE, non-PE). The table shows the mean of both variables separately for PE-owned insurers and non-PE-owned insurers, as well as the *t*-statistic for the difference between these groups.

	PE	Non-PE	*t*-stat
ROE	11.7	6.6	2.85
Adjusted ROE	8.0	6.0	1.32
Insurers	529		

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Table 12: *Operating efficiency*

Notes: This table uses annual data on insurers' general expenses. It shows regressions where the observations are at the insurer-year level for 2005-2014. As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The dependent variables are expense ratios to assets. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Employee compensation includes contributions to benefit plans. PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include year and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and year. The table shows the total number of insurers and the number of insurers owned by PE firms in the sample.

	General Expenses	Employee Compensation	Expenses ex. Employee Compensation
PE × After	0.0	0.1	-0.1
	(0.50)	(0.22)	(0.30)
Mean of dep var	5.0	2.3	2.6
Year FE	Y	Y	Y
Insurer FE	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y
R^2	0.84	0.85	0.81
Insurer-Years	7,620	7,620	7,620
Insurers	948	948	948
PE Insurers	57	57	57

Internet Appendix

What Private Equity Does Differently:

Evidence from Life Insurance

A   Additional results

Figure A.1: *Leverage and ROE – an example*

Notes: This figure shows leverage (Panel A) and ROE (Panel B) for PE Group B's largest subsidiary. Leverage is the ratio of assets to regulatory capital, and ROE is net income as a fraction of capital in percentage points. Both are based on regulatory reports using statutory accounting. PE Group B's acquisition date is marked by a dashed line. Both panels also show adjusted versions post-acquisition. These show counterfactual leverage and ROE if capital increased by the additional capital that would have been required under the old rating-based treatment of private-label ABS. This adjustment is a lower bound estimate of the change in the statutory capital requirement.

Panel A: Leverage

Panel B: ROE

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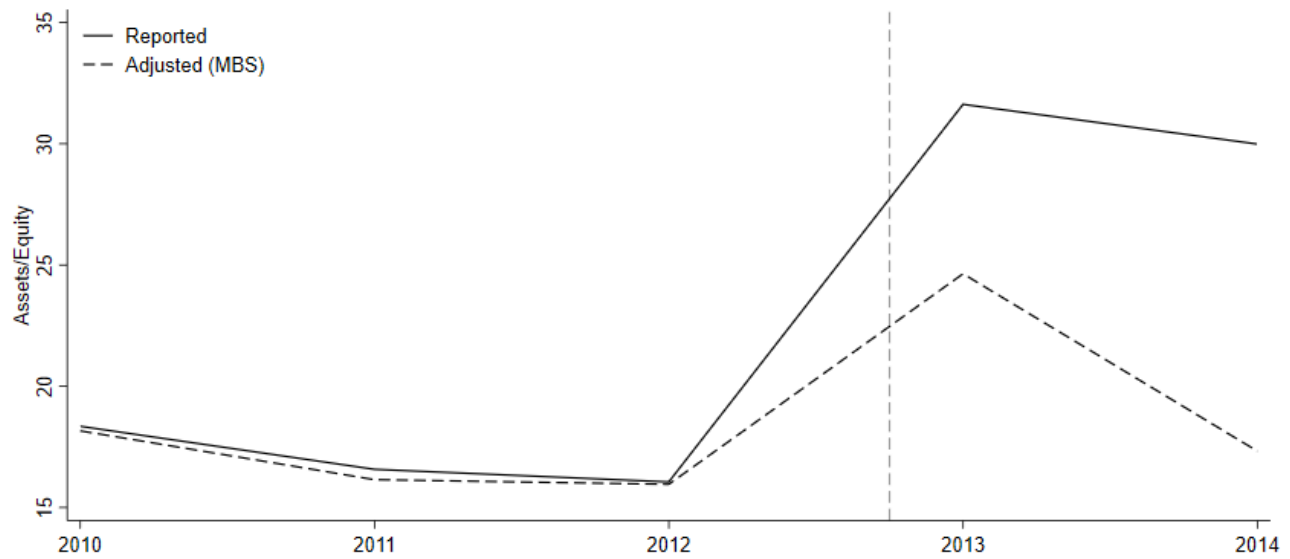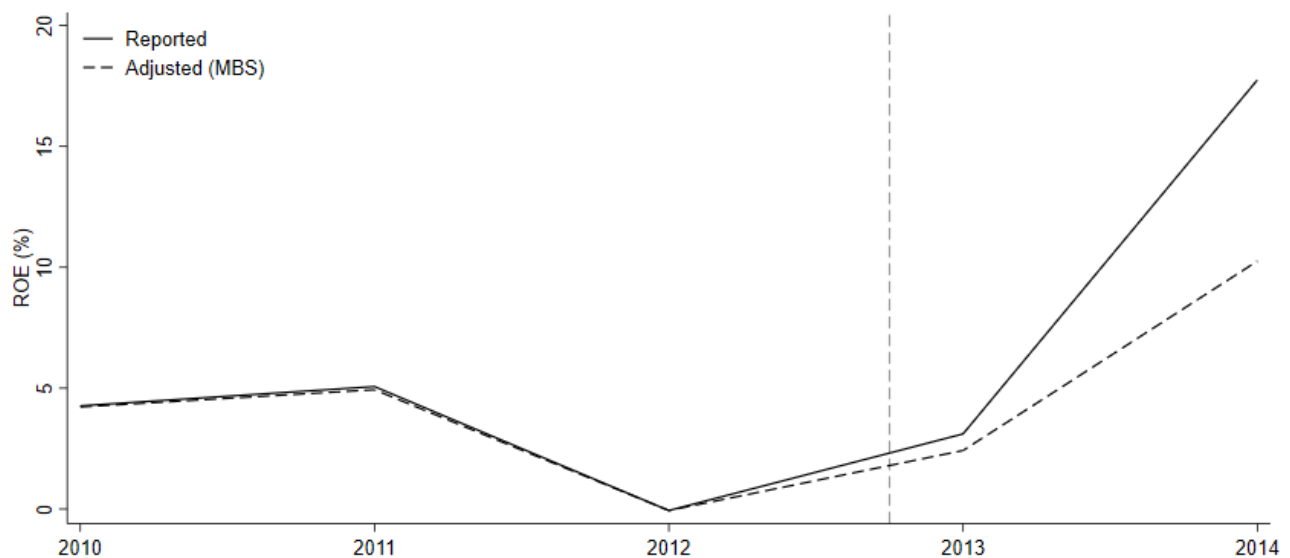
Table A.1: *Portfolio composition regressions without winsorizing*

Notes: This table repeats regressions presented in Tables 3 and 6, without winsorizing dependent variables.

Panel A: Table 3 without winsorizing

	Corporate	Fed Govt	Private-label ABS	Agency ABS	State Govt	Foreign Govt
2010-2014	9.1***	-5.8***	-1.4***	-4.3***	2.6***	-0.2
	(0.61)	(0.69)	(0.27)	(0.37)	(0.23)	(0.11)
PE × After	-6.9*	-2.8	7.4***	2.9	0.3	-0.9
	(2.92)	(2.87)	(2.07)	(2.12)	(0.66)	(0.53)
Mean of dep var	46.3	28.8	10.0	9.9	3.9	1.1
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.82	0.81	0.77	0.72	0.72	0.72
Insurer-Quarters	30,264	30,264	30,264	30,264	30,264	30,264
Insurers	960	960	960	960	960	960
PE insurers	57	57	57	57	57	57

Panel B: Table 6 without winsorizing

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
2010-2014	-22.5***	4.1***	4.3***	2.1***	6.3***	5.7***
	(0.88)	(0.77)	(0.37)	(0.17)	(0.31)	(0.37)
PE × After	-11.2*	-2.8	3.1	0.9	3.9*	6.1*
	(5.61)	(3.57)	(1.78)	(0.44)	(1.59)	(2.39)
Mean of dep var	65.7	14.8	5.9	2.1	7.1	4.3
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.75	0.67	0.57	0.41	0.66	0.66
Insurer-Quarters	12,185	12,185	12,185	12,185	12,185	12,185
Insurers	579	579	579	579	579	579
PE Insurers	34	34	34	34	34	34

Table A.2: *Summary statistics before and after matching*

Notes: This table shows summary statistics comparing PE-owned and non-PE-owned insurers before and after matching. Due to data constraints, we switch to data at an annual frequency. We use data from 2007-2014 (the rules for capital treatment of private-label ABS changed in 2008). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. We restrict the sample to insurers with positive general account reserves that hold private-label ABS at least once during the sample period. We match each PE-owned insurer to a single non-PE-owned insurer based on data as of the year prior to acquisition. The matched sample consists of 28 PE-owned insurers and 28 non-PE-owned insurers. We match via a logit propensity score constructed based on ln(Assets), general account liabilites/total liabilities (general account share, percentage points), annuity share of general account liabilities (percentage points), and regulatory capital held divided by required capital (RBC ratio, percentage points). Panel A shows the means of our matching variables separately for PE-owned insurers and non-PE-owned insurers, as well as the *t*-statistic for the difference between these groups. Panel B shows these summary statistics for the matched sample in the year matched (the year prior to acquisition for PE-owned insurers, and the year a non-PE-owned insurer is matched).

Panel A: Full sample

	PE	Non PE	*t*-stat
Assets (MM)	6,407	10,260	-3.12
General account share	88	89	-0.18
Annuity share	53	28	5.56
RBC ratio	807	757	0.63
Insurer-Years	4,166		

Panel B: Matched sample in year matched

	PE	Matched	*t*-stat
Assets (MM)	5,903	7,870	-0.42
General account share	87	91	-0.60
Annuity share	47	44	0.33
RBC ratio	622	675	-0.35
Insurer-Years	56		

Table A.3: *Bond portfolio by asset class*

Notes: This table uses data on insurers' general account bond holdings. It shows regressions where the observations are at the insurer-year level for 2007-2014. As identification comes from changes in ownership structure, we drop insurers that are always PE owned in this period. The dependent variables are asset class shares within general account bond holdings. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). Corporate bonds include bonds issued by financials and utilities. State government bonds include bonds issued by local governments. PE status is a dummy variable that takes a value of 1 for insurer-years with PE ownership. All specifications include year and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and year and do not adjust for estimated propensity scores. Panel A shows the full sample for insurer-years with all data used for matching. Panel B shows the matched sample. The panels show the total number of insurers and the number of insurers owned by PE firms in the sample.

Panel A: Full sample

	Corporate	Fed Govt	Private-label ABS	Agency ABS	State Govt	Foreign Govt
PE × After	-8.2**	-0.8	12.3***	-2.0	-0.8*	0.1
	(2.50)	(1.41)	(3.09)	(1.60)	(0.40)	(0.16)
Mean of dep var	54.2	17.7	12.0	9.5	3.2	0.7
Year FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y	I+Y	I+Y	I+Y
R^2	0.85	0.80	0.80	0.77	0.81	0.76
Insurer-Years	4,166	4,166	4,166	4,166	4,166	4,166
Insurers	564	564	564	564	564	564
PE Insurers	28	28	28	28	28	28

Panel B: Matched sample

	Corporate	Fed Govt	Private-label ABS	Agency ABS	State Govt	Foreign Govt
PE × After	-9.8**	-0.8	12.1***	-1.0	-1.0	-0.0
	(3.19)	(1.83)	(3.33)	(1.72)	(0.54)	(0.19)
Mean of dep var	52.7	15.9	16.5	8.8	3.0	0.5
Year FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y	I+Y	I+Y	I+Y
R^2	0.82	0.78	0.68	0.72	0.79	0.60
Insurer-Years	440	440	440	440	440	440
Insurers	56	56	56	56	56	56
PE Insurers	28	28	28	28	28	28

Table A.4: *Private-label ABS by alternate NAIC category*

Notes: This table uses data on insurers' private-label ABS holdings. It shows regressions where the observations are at the insurer-year level for 2007-2014 (capital treatment of private-label ABS changed starting 2008). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The sample is restricted to insurer-quarters with positive private-label ABS holdings and to private-label ABS with a matched rating from Moody's. The dependent variables are alternate NAIC category shares within private-label ABS. Alternate NAIC categories are imputed based on ratings from Moody's. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). PE status is a dummy variable that takes a value of 1 for insurer-quarters with PE ownership. All specifications include year and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and year and do not adjust for estimated propensity scores. Panel A shows the full sample for insurer-years with all data used for matching. Panel B shows the matched sample. The panels show the total number of insurers and the number of insurers owned by PE firms in the sample.

Panel A: Full sample

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE × After	-12.2*	0.3	2.2*	1.2*	4.0	7.3**
	(5.34)	(2.55)	(0.90)	(0.50)	(2.04)	(2.55)
Mean of dep var	67.3	13.4	4.2	1.5	5.4	3.1
Year FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y	I+Y	I+Y	I+Y
R^2	0.74	0.68	0.56	0.56	0.65	0.64
Insurer-Years	3,353	3,353	3,353	3,353	3,353	3,353
Insurers	558	558	558	558	558	558
PE Insurers	28	28	28	28	28	28

Panel B: Matched sample

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE × After	-10.2	0.7	2.2	1.1	3.5	6.1*
	(6.21)	(2.98)	(1.15)	(0.59)	(2.41)	(2.65)
Mean of dep var	63.8	13.8	5.0	2.1	7.5	5.0
Year FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y	I+Y	I+Y	I+Y
R^2	0.69	0.66	0.49	0.53	0.65	0.57
Insurer-Years	358	358	358	358	358	358
Insurers	56	56	56	56	56	56
PE Insurers	28	28	28	28	28	28

Table A.5: *Reduction in capital requirement, impact on leverage and ROE*

Notes: This table uses insurance regulatory data. It shows regressions where the observations are at the insurer-year level for 2007-2014. As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The first dependent variable is the reduction in the capital requirement (RBC reduction) relative to the previous rating based system for determining capital charges for private-label ABS. Specifically, RBC reduction is $\Delta R_1/(R_1 + \Delta R_1) \times 100$, where ΔR_1 is the change in the capital requirement, and R_1 is the current capital requirement on the full general account portfolio. The second dependent variable is the increase in leverage relative to the old rating-based system for capital treatment of private-label ABS, in percentage points. As leverage is the ratio of assets to equity, this increase is also how much return on equity would increase, holding return on assets fixed. The third dependent variable is ROE, the ratio of net income to regulatory surplus, in percentage points. All three dependent variables are in percentage points and are winsorized at the the 5th and 95th percentiles within type (PE, non-PE). PE status is a dummy variable that takes a value pf 1 for insurer-years with PE ownership. PE A/B/C $\times$ 2014 is a dummy for insurers owned by three of the PE groups in our sample in 2014. All specifications include year and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and year and do not adjust for estimated propensity scores. Specifications on the left use the full sample for insurer-years with all data used for matching, while specifications on the right use the matched sample. The table shows the total number of insurers and the number of insurers owned by PE firms in the samples for each specification.

	Full sample			Matched sample		
	RBC Reduction	Leverage Increase	ROE	RBC Reduction	Leverage Increase	ROE
PE $\times$ After	14.7**	17.5**	3.6	12.0*	16.6*	2.4
	(5.58)	(6.53)	(3.39)	(5.63)	(6.52)	(3.59)
PE A/B/C $\times$ 2014	16.0***	12.6*	9.0***	19.5***	15.2*	8.7***
	(4.56)	(6.19)	(2.42)	(4.58)	(6.84)	(2.46)
Mean of dep var	9.0	1.5	4.9	15.2	5.1	2.8
Year FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Y	I+Y	I+Y	I+Y	I+Y	I+Y
R^2	0.64	0.48	0.48	0.61	0.43	0.41
Insurer-Years	4,166	4,166	4,166	440	440	440
Insurers	564	564	564	56	56	56
PE Insurers	28	28	28	28	28	28

Notes: This table uses data on insurers' private-label ABS holdings. It shows regressions where the observations are at the insurer-quarter level for 2007Q4-2014Q4 (capital treatment of private-label ABS changed starting 2008Q4). As identification comes from changes in ownership structure, we drop insurers that are always PE-owned in this period. The sample is restricted to insurer-quarters with positive private-label ABS holdings, and to private-label ABS with a matched rating from Moody's. The dependent variables are alternate NAIC category shares within private-label ABS. Alternate NAIC categories are imputed based on ratings from Moody's. These shares are in percentage points and are winsorized at the 5th and 95th percentiles within type (PE, non-PE). PE Group A, B, and C are dummy variables that take a value of 1 for insurer-quarters with ownership by these PE groups. Other PE is a dummy variable that takes a value of 1 for all other insurer-quarters with PE ownership. All specifications include quarter and insurer fixed effects. Standard errors (in parentheses) are double-clustered by insurer (NAIC code) and quarter. The table shows the total number of insurers, the number of insurers owned by and PE Groups A, B, and C, and the number of insurers owned by other PE firms in the sample.

	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6
PE Group A	-46.4***	8.3*	4.1*	2.3*	10.9***	20.8***
	(7.27)	(3.87)	(1.94)	(0.91)	(3.26)	(4.90)
PE Group B	-40.8***	-1.1	1.4*	3.2*	11.2*	30.8***
	(9.77)	(3.09)	(0.74)	(1.26)	(4.61)	(2.77)
PE Group C	-1.2	1.6	3.7	-0.6	-0.9	-1.0
	(6.54)	(5.38)	(2.42)	(0.54)	(1.51)	(1.53)
Other PE	1.8	-2.3	1.0	0.1	0.5	1.8
	(6.85)	(4.25)	(0.97)	(0.27)	(1.29)	(1.28)
Mean of dep var	65.7	13.6	4.5	1.6	5.9	3.3
Quarter FE	Y	Y	Y	Y	Y	Y
Insurer FE	Y	Y	Y	Y	Y	Y
SE clustered by	I+Q	I+Q	I+Q	I+Q	I+Q	I+Q
R^2	0.76	0.68	0.57	0.57	0.67	0.70
Insurer-Quarters	12,185	12,185	12,185	12,185	12,185	12,185
Insurers	579	579	579	579	579	579
PE Group A	5	5	5	5	5	5
PE Group B	3	3	3	3	3	3
PE Group C	6	6	6	6	6	6
Other PE Insurers	20	20	20	20	20	20

B   Regulatory data on ownership structures

Figure B.1: *Sample regulatory filings*