How the insurance industry's asset portfolio responds to regulation

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ABSTRACT. Insurance companies in the US have very large asset portfolios dominated by fixed income assets. They face regulation based on the risk of their portfolios. The current implementation of risk measurement, using either broad categories of credit ratings or specially designed risk measures, allows insurers considerable leeway in risk-taking without changing capital requirements.

1. US insurers' fixed income holdings

The US insurance industry holds large quantities of fixed income assets. In 2012, the industry reported fixed income holdings of $3.63 trillion (at book values; $3.97 trillion at market values). The largest categories, in order, were corporate bonds, structured securities, treasuries, and municipal bonds. Life insurance generates around three quarters of the assets. Because of the size of these holdings, the insurance industry is of critical importance to fixed income markets in the United States.[1] Most of the assets are investment grade, meaning that risk is generally limited.

In this chapter, we discuss how insurance regulation depends on the composition of the large fixed income portfolios owned by insurers, and some of the (unintended) consequences of these regulations. We begin by a brief overview of insurance regulation, and in particular how capital requirements depend on the composition of insurers' asset portfolios.

1.1 Why insurers invest in risky assets

Before considering what limits insurance risk taking, it is worth stopping to consider why insurers may like to take risk. A standard concern is risk shifting, i.e. firms acting on an incentive to take on such large risks that the firm will default in adverse scenarios, leaving someone beside the firm's owners to absorb losses (see, e.g. Allen and Gale 2000). Equity-holders get the upside, but don't worry about downside. Risk shifting is only in the interest of owners if there is default risk, and the value created is related to the magnitude of the default risk. In other words, risk shifting can only motivate risk taking in distressed insurers.

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[1] One sign of the industry's importance is the impact on pricing of insurance industry trades; see Ellul, Jotikasthira, Lundblad (2011, and this volume).

Additionally, insurers are likely interested in taking risk outside of distress, as a part of their regular investment operations, in order to receive higher expected returns. This means taking on priced risk (other priced features, such as illiquidity, may also be attractive to insurers). The risk premium motivation may be more general than risk shifting, since it does not depend on insurer distress. Tax-payers should be concerned about risk taking motivated by risk premia as well as that motivated by risk shifting, since either can affect insurers' insolvency risk.

1.2 Regulation of insurance companies' assets

Insurance companies in the US face regulation requiring minimum capital levels. Insurance companies are a concern for tax payers because of the risk that a failure will result in the use of public resources. Just as for banks, whose deposits are insured, and who as a result face regulation limiting the risks they can take, insurers' risk exposures are regulated.[2] Insurance industry regulation is aimed at reducing the likelihood that a state fund or tax-payers will have to bail out insurance policies, and also the expected shortfall in case of a state take-over.

One key feature of these regulations is that regulators (state insurance commissioners) are meant to intervene before an insurer is insolvent. Regulators get some oversight rights already if reported capital is below two times the regulatory minimum capital. As solvency declines (measured by book value of capital relative to the requirement), the regulatory oversight is gradually tightened. When capital is below the required minimum, the insurer can be taken over.

Another key feature of capital regulation of US insurers is that the amount of capital depends on both assets and liabilities. For property and casualty insurers, who may face large undiversified risks in the policies they write (for example is natural disasters cause large scale property damage), and which hold relatively small asset portfolios relative to the size of annual premium revenue, capital requirements are largely determined by the liability side. On the other hand, life insurers face much lower risk of large unforeseen payout on policies, but they do hold very large asset portfolios (relative to annual premium revenue). Therefore, their capital requirements depend heavily on risk in asset portfolios. Equities are risky, but make up a small share of portfolios, while treasuries have no capital requirement. Thus, life insurers effectively face capital requirements that are in large part driven by the risk profile of their holdings of corporates, munis and structured assets.[3]

[2] The tax payers' exposure to insurers is more indirect than that to banks, because a first line of defense if an insurance company is unable to meet its liabilities is a state insurance fund, financed by fees levied on the insurers of that state. Only as a backstop to that fund are the state tax-payers exposed to industry losses.

[3] Obviously, the shares of various asset classes in the aggregate industry asset portfolio will in part be determined by capital requirements. The low equity share, for example, may reflect both high capital

1.3 Capital requirements by category

Capital requirements for all fixed income assets except treasuries have historically depended on the credit ratings. Under this system, bonds are grouped into broad buckets based on ratings, and a capital requirement is calculated for each bond based on the category it belongs to. The details of capital requirements are set by the National Association of Insurance Commissioners (NAIC). As an example, in 2008, structured securities rated between A- and AAA faced requirements of 0.40% of face value (an insurance company needed 40 cents of equity for every $100 of book value of bonds in this range of ratings) if held by a life insurer, and 0.30%, if held by a nonlife insurer. For bonds rated BBB, the capital requirement was 1.3% (1% for non-life) of book value; for BB, 4.6% (2%); for B 10% (4.5%); for CCC 23% (10%); for with a rating below CCC, the capital requirement was 30%. This system still applies to municipal bonds, corporate bonds, and non-MBS (mortgage backed securities) structured assets. The new system for MBS is discussed below in Section 2.2.[4]

2. The impact of capital regulation on insurers' asset portfolios

How does the capital requirement of an asset affect investment choices? In particular, does the system effectively limit risk taking? Several features of the current system are important for understanding insurer incentives.

First, capital requirements are based on the risk of individual assets, not the entire portfolio. Since covariance is a fundamental feature of asset risks, this means that the system appears flawed by design. However, rating agencies may compensate for this, by considering systematic risk when assigning rating (see Hilscher and Wilson 2013). Also, there are rules aside from the rating-dependence of capital requirements penalize concentration (for example, the ten largest holdings face a multiplier on their capital requirements). Finally, idiosyncratic risks are presumably rewarded less than exposures to broad risk factors in fixed income markets.[5] This means that there is a stronger incentive to take on systematic (priced) risks in solvent insurance companies, and we expect diversification based on insurers own interests. For insolvent companies, which would like to risk shift, risk premia may matter less. However, the ability to risk shift may be limited by the regulatory powers granted over non-insolvent but stressed insurers.

Second, capital requirements are imposed infrequently, only at year-end. There is therefore ample room to vary risk taking over the year in order to "window dress" measured risks at year end.

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requirements for shares, and the good match between fixed income assets and the large fixed long-term liabilities of the industry.

[4] The capital requirement for an insurance company is not a linear combination of the requirements for individual assets. See Becker and Opp (2014) for a more detailed discussion. Note also that while the ratings cutoffs have remained unchanged, the exact requirements are adjusted over time.

[5] However, see Campbell and Taksler (2003).

Third, current capital regulation is also short-term in that any shortfall must be addressed immediately. The system does not have any "shock absorbers" when asset markets move, apart from those provided by traditional accounting rules (see Ellul et. al. 2014). When a shortfall has to be addressed quickly, it is not possible to use operating profits to replenish equity, or even to issue new equity over a drawn-out period. It is not clear that it is optimal to force such a short cycle in solvency regulation.

Fourth, because the system uses broad categories for defining asset risk (e.g., bonds rated A- through AAA are treated the same way), there is leeway to vary risk: within each bucket of assets facing the same capital requirement, there is a range of assets of varying risk and expected returns.

Several recent studies examine some of the implications of these features of insurance regulation on asset portfolios. We discuss some of these in the following sections.

2.1. Corporate bonds through the recent cycle

Given capital requirement rules that treat broad groups of bonds equally, insurers could reach for yield by selectively buying the riskiest bonds within a given category, thus increasing the risk of the portfolio without raising capital requirements. Becker and Ivashina (2015a) study such reaching for yield in the corporate bond market in a sample period covering the pre-crisis period of low rates and compressed spreads, the financial crisis itself, and the beginning of the recovery.

Insurers mostly buy investment grade bonds. Becker and Ivashina examine acquisitions of investment grade bonds at issue within this universe. Mutual funds and pension funds which are not subject to capital requirements, serve as benchmark. In the thirteen quarters preceding the financial crisis (2004:Q2 to 2007:Q2), insurers exhibit a preference for investment grade bonds, dominating pension funds and mutual funds in this category. This is plotted in **Figure 1**. That is, across risk categories, insurers exhibit the risk aversion that capital requirements are meant to induce. Yet, *within* capital requirement buckets, risk preferences are reversed, as shown by **Figure 2**. The share of newly-issued corporate bonds acquired by insurers in the same time frame *increases* in risk (as measured by yield to maturity at issue, or the CDS spread) within the AAA to A category.[6] Thus, insurers appear to reach for yield in a way that is invisible to the standard metric on which they are evaluated. The pattern is robust to inclusion of duration and liquidity controls. Importantly, the risk-taking does not generate "alpha," i.e., excess returns relative to other assets with similar risk. The reaching for yield pattern is stronger in firms where the regulatory capital requirement is more binding, supporting the conclusion that tension between regulatory capital requirements and risk appetite can explain this type of reaching for yield.

[6] The same is true for BBB, but for high-yield bonds, there is insufficient data to estimate a preference with any precision. See Becker and Ivashina (2015) for details.

Becker and Ivashina (2015a) also document that reaching for yield disappears in the crisis period. To examine the time patterns of reaching for yield in more detail, they calculate changes in holdings of each outstanding bond are related to the bond's yield, with a coefficient allowed to vary by quarter. The pattern, shown in **Figure 3**, demonstrates not only that the crisis appears to have reduced the risk appetite of insurers, but that this was temporary: reaching for yield recommenced after the crisis. One interpretation of these patterns is as follows: insurers primarily search for risk in order to gain risk premia, not for risk shifting purposes (since the pattern only exists during favorable periods). When they are under stress, insurers invest more carefully, to the point where capital requirements are not constraining their risk exposures.

2.2. The "high yield premium"

Becker (2015) follows up the Becker Ivashina (2015a) results by looking for signs of price impact on high yield corporate bonds. If insurers' reaching for yield is large enough to have price impact, we would expect the safest investment grade bonds to see artificially reduced expected returns, while the safest high yield bonds should see correspondingly inflated expected returns (see Frazzini and Pedersen 2015 for more details).

Whether BB+ bonds receive low returns relative to BBB- bonds, given the difference in risk is hard to decide because both risk and expected returns are hard to estimate. Two indirect implications may be easier to test, based on the nature of capital requirements. Insurers should care more about capital requirements in periods of financial stress, and only at year ends, when requirements are imposed. There is evidence of both in the pricing of new corporate bond issues.

First, as **Figure 3** shows, the difference in yields between BBB- and BB+ is high at times when financial industry stock prices are low, and vice versa. This is consistent with avoidance of the high yield label specifically when the industry is troubled, such as in the wake of recessions.

Second, there should be seasonality in the high yield premium if it is driven by insurers. Capital requirements are imposed at calendar year ends. Since portfolios can be adjusted over time, high yield bonds might be bought in the Spring and sold in the summer. Becker (2015) uses yields to maturity of newly issued bonds to look for such seasonality. As **Figure 5** shows, the difference in yields between BBB- and BB+ is high around year-ends, but low in the summer. It is highest in December but insignificantly different from zero in May. These seasonal patterns suggest that credit pricing is indeed affected by insurers who avoid assets with the high yield label around the year end.

These results confirm that the desire of insurers to take risks without increasing regulatory capital requirements is large enough to impact pricing in the corporate bond market.

2.3. The 2009-2010 regulatory experiment in capital requirements for mortgage-backed securities

The credit ratings-based system used for fixed income assets was replaced in 2009 and 2010 for mortgage-backed securities (first residential MBS, then commercial MBS). Becker and Opp (2014) analyze this shift. The new system relies on measures of credit risk called expected loss, ELOSS; these are produced by Blackrock (previously also by PIMCO). ELOSS represents the present value of expected future losses of principal, based on macro-economic scenarios defined by the regulator. ELOSS is correlated with credit ratings, but somewhat more positive. Most importantly, the new system adjusts for book values, so that if an asset is held at a book value which is equal to par value less expected losses, no capital is needed. Becker and Opp show that this new rule has had a dramatic effect on capital requirements. For both MBS classes, ELOSS was stable during the period, whereas credit ratings deteriorated substantially. All told, by 2012, aggregate capital requirements for mortgage-backed securities had been reduced from $19.4 billion to $3.7 billion.

Did the lower capital requirements affect portfolio decisions of insurers? Exploiting that the change did not affect other asset classes, Becker and Opp compare the patterns in new asset acquisitions by insurers around the time of the changes. Indeed, there was a large change. In the two years leading up to the new rules, purchases of newly issued CMBS by insurance companies were 7.5% speculative grade (value weighted), but in the two years following the shift, investment was only 53.0% in investment speculative grade assets.[7] For comparison, corporate bond purchases, which were unaffected by the regulatory change, were 8.7% investment grade before the change, and 10.9% after. Municipal bonds showed patterns similar to corporates.

The fact that only the asset class with a change in capital requirements shows evidence of increased risk appetite in 2009-2010 suggests that the new, low capital requirements were indeed the driver. Becker and Opp conclude that insurers' risk taking was distorted and increased by the new regulation.

4. Conclusions for future regulation of the insurance industry

The capital regulation system used for insurance U.S. companies has had several important effects on long-term asset allocations.

First, insurance companies accumulate more risk than intended. In good times, they reach for yield in choosing their fixed income investments, both across asset classes and within. Because they are evaluated with imperfect risk metrics they face an incentive to buy assets that comply with a set benchmark but have "hidden risk." This leads to higher risks than what may have been expected. And when risk is easier to take on (requires less capital) in a certain market, insurers load up on risk in that market. The extra risk may destabilize

[7] Interestingly, this confirms trade rumors at the time (Morgan Stanley 2014).

credit markets and the broader financial system, and may in an adverse scenario impose large costs on tax payers.

Second, regulation-driven investment practices may distort investment. Assets or issuers who happen to fit into low capital requirement categories will be able to raise funds at lower cost. This may distort the capital allocation in the economy. Indeed, Becker and Ivashina detect issuance patterns in corporate bonds which may be driven by reaching for yield. Similarly, the large increase in risk-taking by insurers buying commercial mortgage-backed securities documented by Becker and Opp may also drive issuance volumes.

It is worth pointing out that it is the imperfect measurement of risk which makes it inevitable that there will be some scope for risk taking in financial intermediaries. This is a principal-agent problem. The party desiring to control risks (the "principal") does not observe perfectly what risks are taken by the manager (the "agent"). Thus, the prevalence of ratings as a sorting device in credit markets means that they may impact asset pricing even in the absence of regulation.[8]

While the regulation of risks is inherently imperfect, recent experience points to several lessons for the design regulation. Rules that treat asset classes differently can have a large impact on investment flows. The recent MBS experience in the US, like the favorable treatment of sovereign debt under Basel rules for banks, points to large potential consequences when the financial sector faces strong regulatory incentive. Additionally, changes in regulation are subject to various political pressures including lobbying by industry and special interests, and the political economy when time pressure is added is complex. Hurried implementation of new rules may lead to oversights and shortcuts. A case can be made for moving slowly.

Speculating about the reasons behind the problematic change in capital requirements for MBS, Becker and Opp suggest that that the introduction of the new rules was (partially) motivated by a desire to reduce the need for insurers to issue equity and perhaps sell distressed MBS into a poor market. The financial crisis has depleted financial resilience of the insurance industry, and mortgage backed securities represented a large chunk of unrealized losses. As ratings were downgraded, there was pressure to reduce capital requirements in order to avoid a large squeeze on insurers, potentially even a wave of forced state takeovers. If this is accurate, the new system was a success in avoiding some of the short term pressures. However, the new system also dramatically reduced the capital requirements for new acquisitions of MBS, and the industry took advantage in the reviving MBS market. The long term scenario if insurers can take credit risk with impunity in this particular area is

[8] For example, Chernenko and Sunderam (2012) document that issuance volumes respond to the availability of funds to different institutional investors. Becker and Ivashina (2015b) show that contracting (covenants) also depend on such flows.

ominous. Not only is the allocation of capital in US financial markets disturbed, but the overall risk in insurers may rise considerably over time.

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Figure 1. Insurance companies' holdings of newly issued corporate bonds, 2004:Q2-2007:Q2, by rating category

This figure is based on Becker Ivashina (2015), Figure 1A. The figure plots the (equal-weighted) fraction of institutional purchases of newly issued bonds that are acquired by insurance companies between 2004:Q2-2007:Q2, sorted by NAIC risk category. The fraction of holdings is computed with respect to the total acquisitions of insurance companies, pension and mutual funds. We report equally-weighted averages across bonds. Bars correspond to 95% confidence intervals (based on the standard deviation across individual bonds).

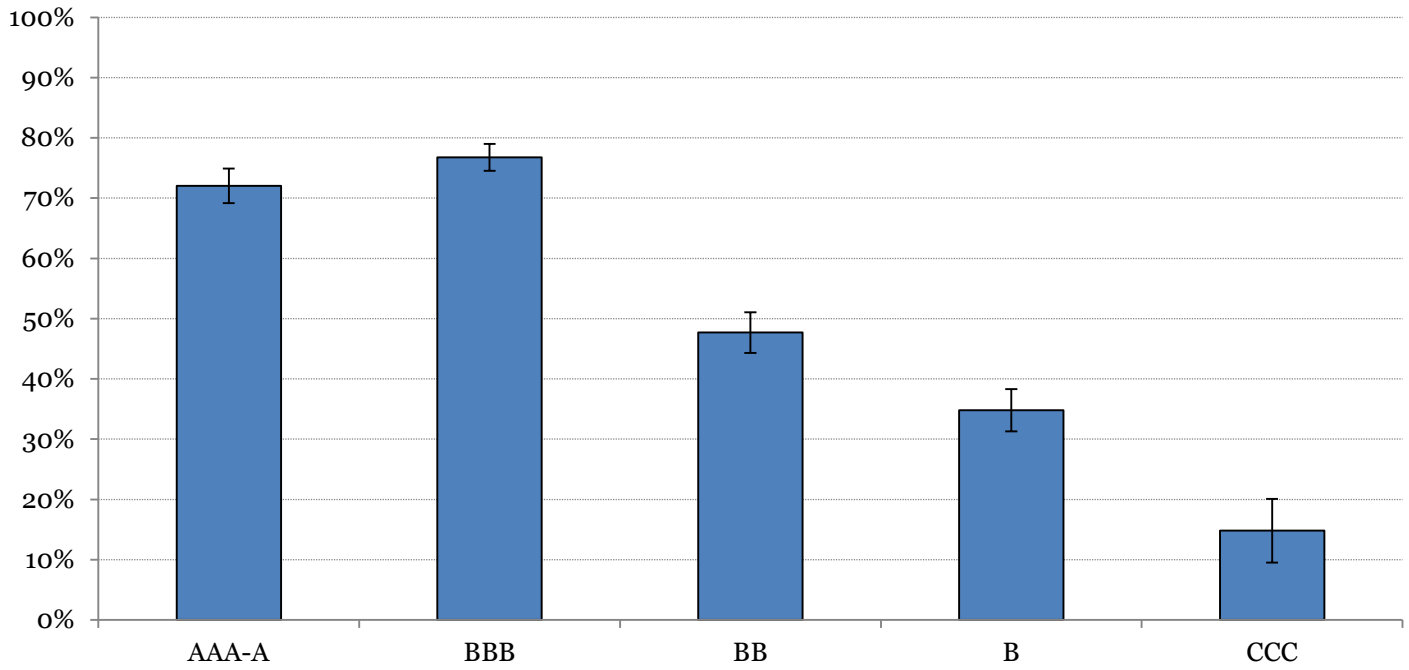

Figure 2. Insurance companies' holdings of newly issued highly rated corporate bonds, 2004:Q2-2007:Q2

This Figure is based on Becker and Ivashina (2015), Figure 1B. The figure plots the (equal-weighted) fraction of newly issued bonds acquired by insurance companies out of total institutional purchases (insurance, mutual funds, pension funds), for the period 2004:Q2-2007:Q2. Bonds are sorted by promised yields and by issuer CDS spreads. Bars correspond to 95% confidence intervals (based on the standard deviation across individual bonds. Investment grade bonds (NAIC 1 and 2) are sorted into quartiles of offering yield or CDS Spread.

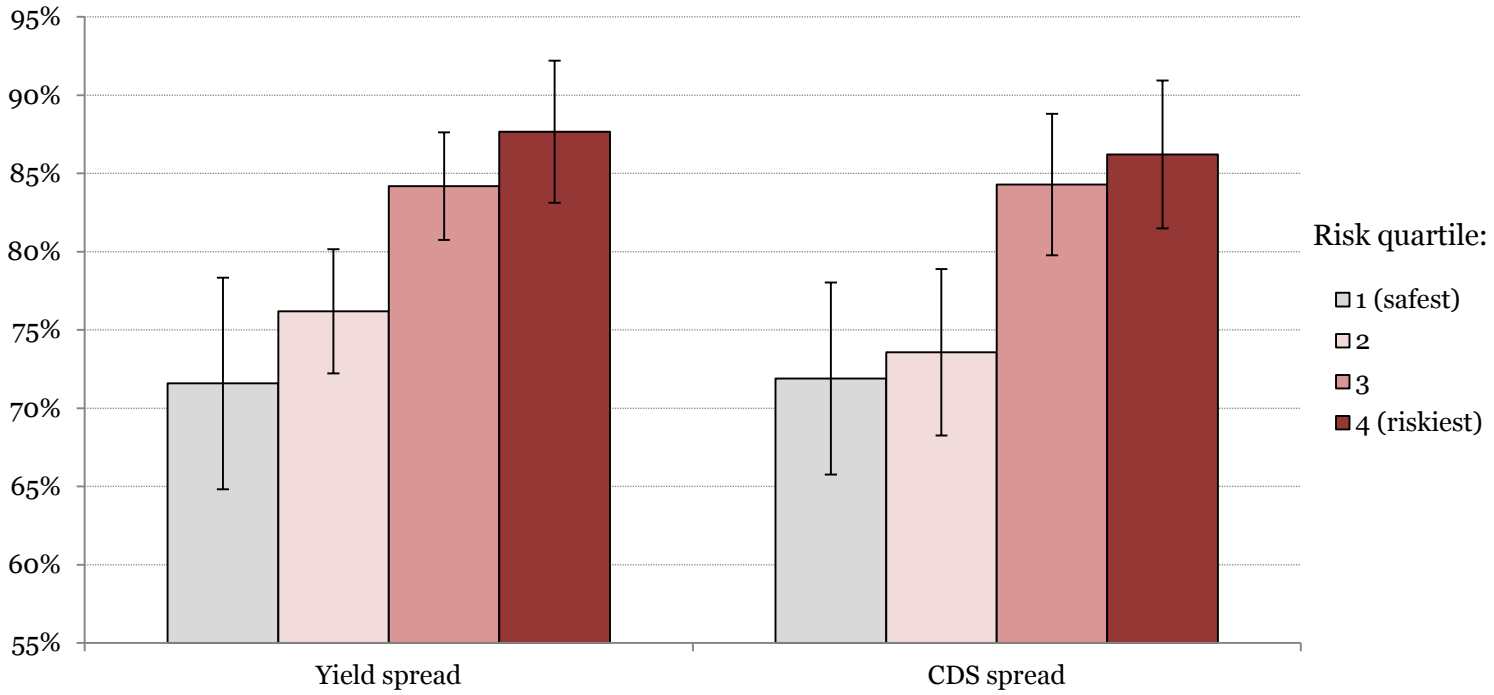

Figure 3. Reaching for yield by US insurance companies through time

This figure is based on Becker Ivashina (2015), Figure 7. The figure shows the strength of insurance companies' preference for higher-yielding investment grade bonds) by quarter. This preference is estimated from a panel regression where the quarterly change in log holdings of all non-maturing corporate bonds is regressed on yield. If the coefficient is positive, insurers accumulate higher yield bonds relative to others.

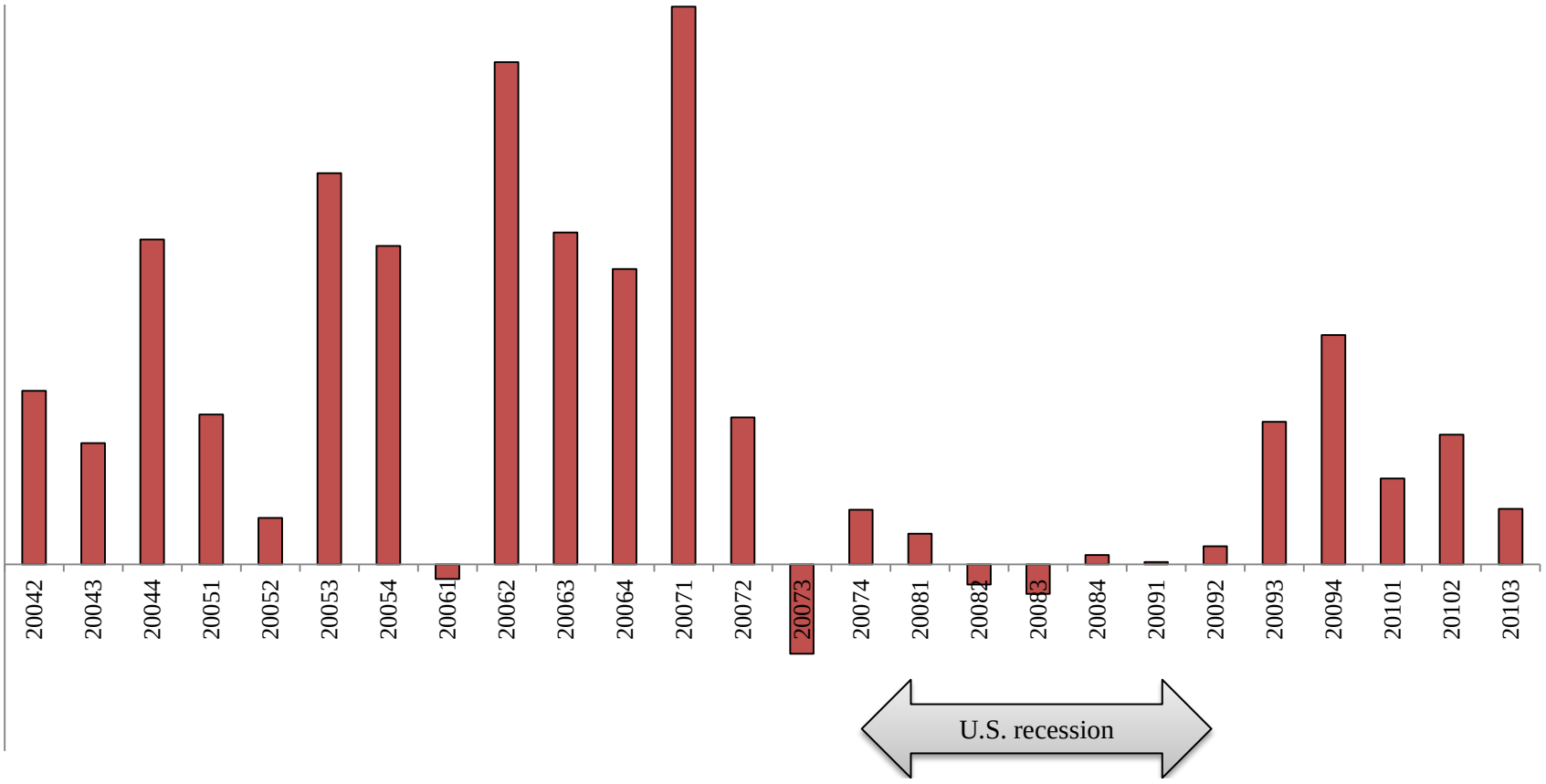

Figure 4. The risk-adjusted High Yield premium, 2003-2015

This figure is based on Becker (2015), Figure 1. The figure plots the average excess yield spread of the highest rated high yield corporate bonds (BB) relative to a polynomial fit of bond yield spreads to rating categories AA+ through B-. This excess yield on high yield assets relative two fitted values is the high yield premium. The dotted line shows the index of S&P 1500 financial companies' stock prices (renormalized). The correlation is -0.52.

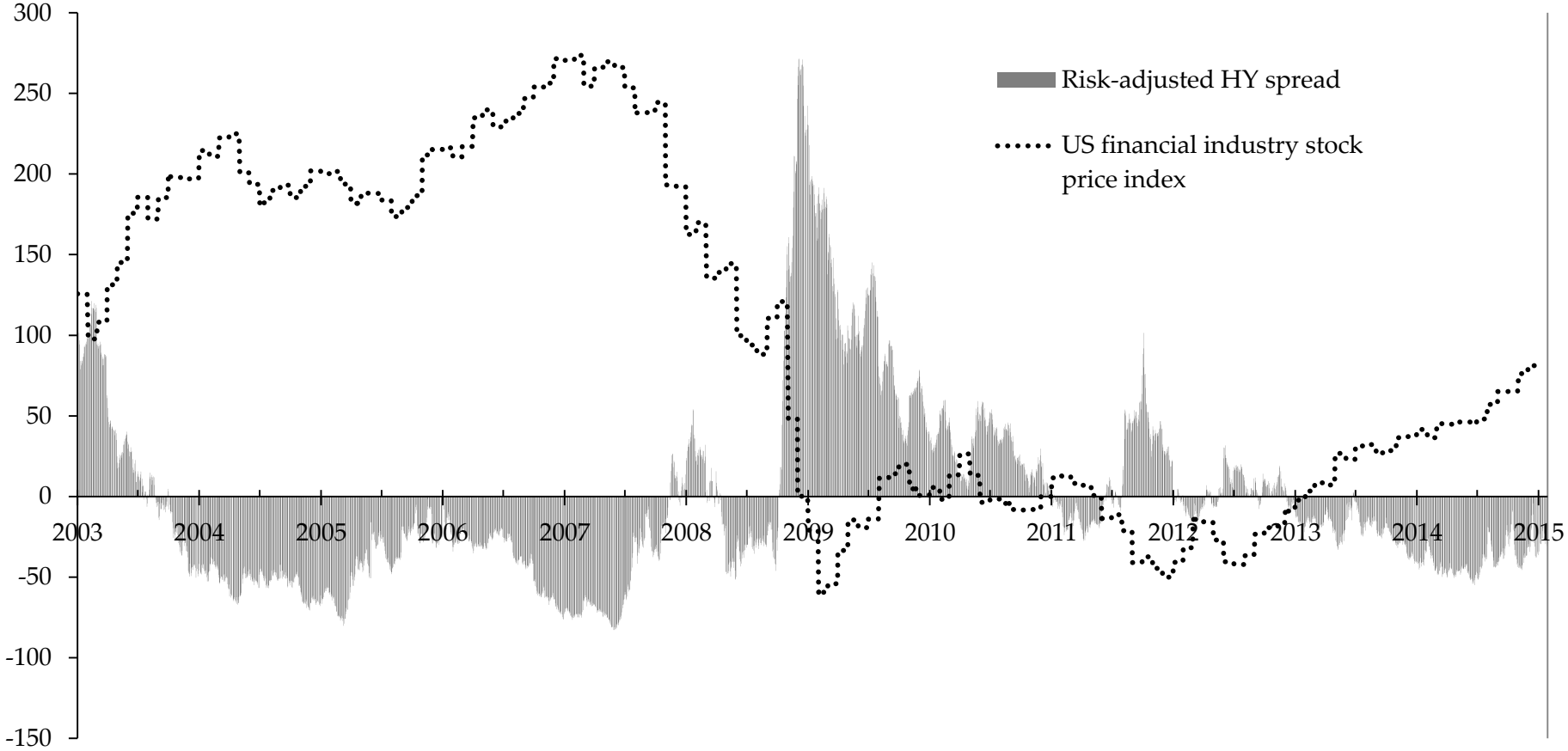

Figure 5. Seasonality of the risk-adjusted High Yield-premium

This figure is based on Becker (2015), Figure 2. The figure plots the monthly averages of the average high yield spread (the excess yield on BB-rated bonds relative to a polynomial fit of bond yield spreads to rating categories AA+ through B-). The dotted line indicates the average for all months (26.4 bps). The underlying data covers January 2003 to January 2015. 95% confidence intervals are indicated with bars for each month.

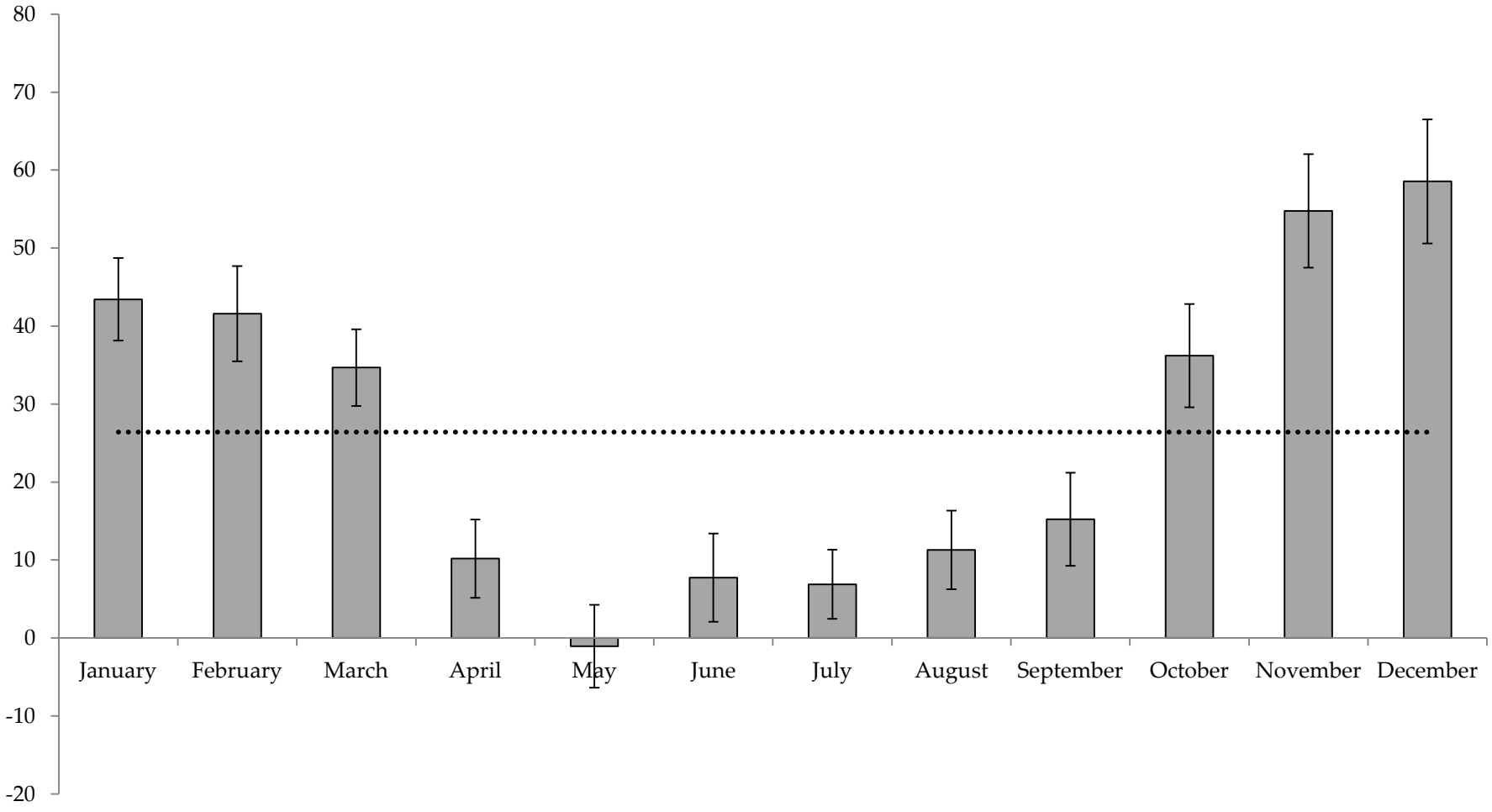

Figure 6. The effect of the reform of MBS capital requirements

The figure is based on Becker and Opp (2015), Figure 3. These graphs show capital requirements scaled by book value. The black line shows actual requirements under new system. The dotted orange line refers to the counterfactual path if the old system had been kept. Residential and Commercial MBS are show separately.

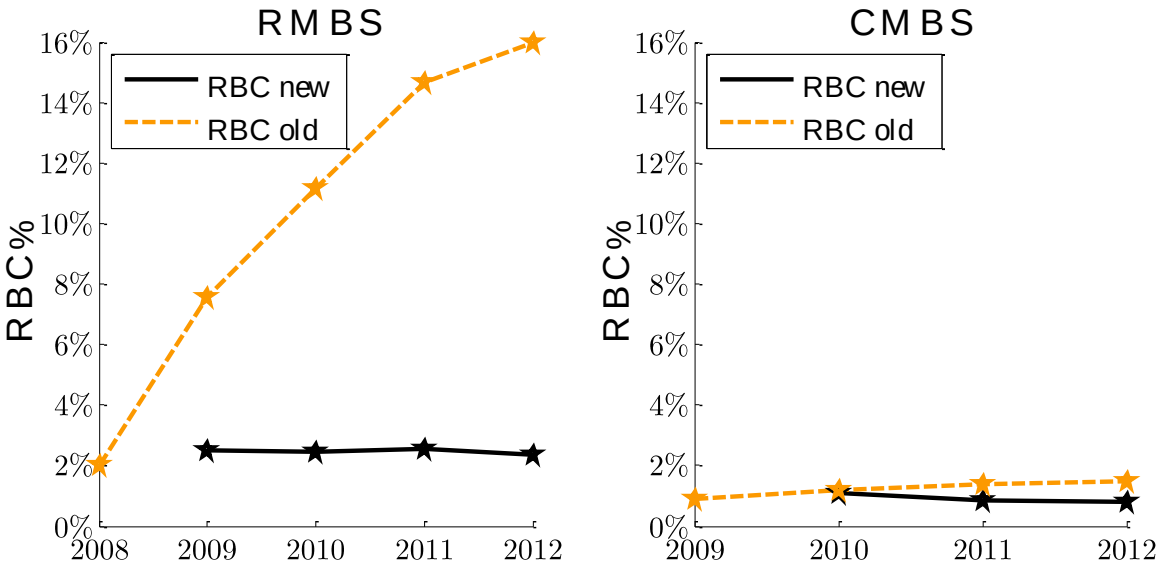

Figure 7. Risk taking across asset classes

The figure is based on Becker and Opp (2015), Figure 5. The figure plots the composition of the insurance industry's purchases of newly issued securities 2008-2012, by asset category. Asset categories are Corporate Bonds, Municipal Bonds, MBS, Other Asset Backed (Federal Government securities are excluded). Only rated securities with a category indicated in NAIC data are included. Each graphs represents the fraction of aggregate purchases in a category (valued at par) that are rated investment grade. For expository clarity, exact values are only displayed for MBS. Total purchases of $980 billion are reflected in the graph.