

## Banking Trends:

# Skin in the Game in the CMBS Market

Issuers of commercial mortgage-backed securities must now retain a portion on their own books. What evidence is there that the rule will reduce risky lending?

BY JAMES DISALVO AND RYAN JOHNSTON

The Dodd-Frank Act imposes reforms that are designed to prevent a repeat of the disastrous performance of residential mortgage-backed securities and—less remarked upon—commercial mortgage-backed securities (CMBS) during the financial crisis. Some of these regulations are designed to force issuers of asset-backed securities to have skin in the game—that is, to keep on their own books a slice of the securities they sell and thus retain some of the credit risk associated with the loans underlying the securities. The idea is that an issuer with its own assets at stake has a greater incentive to do its due diligence, and that this stake signals to would-be investors that the issuer also stands to lose money if its securities fail to pay off as promised.

Most residential mortgage securities are exempt from the new rules because their underlying loans already conform to the standards stipulated by the government-sponsored enterprises that buy them. For commercial mortgage securities, however, the regulations are actually binding. But what is the evidence that skin in the game matters? If skin in the game is so important, why don't the securities markets insist that issuers keep an adequate stake in order to protect investors' own interests? That is, do issuers actually need a government regulation to ensure that their commercial mortgages are safely designed and that they lend only to creditworthy borrowers? And if such a regulation is needed, are Dodd-Frank's mortgage securities reforms well crafted?

### Why Have Skin in the Game?

Most models of securitization show that issuers should retain a share of the most junior slice of the securities that they issue, even without a government mandate.<sup>1</sup> Mortgage-backed securities are generally divided into levels of seniority, called *tranches*,

and they are then repaid in order of these tranches. The holders of the senior tranches are paid off first, while those holding the junior tranches are last in line and the most likely to suffer losses on the securities if the underlying mortgages perform poorly (Figure 1).

The idea behind the issuer retaining a piece of the most junior tranche, the one that carries the most risk, is that it gives the issuer an incentive to ensure that the security includes high-quality loans. Retaining this risk is thought to send a reassuring signal to investors, who are operating in an environment of asymmetric information—that is, the issuer knows more than they do about the security's underlying loans. It would be prohibitively

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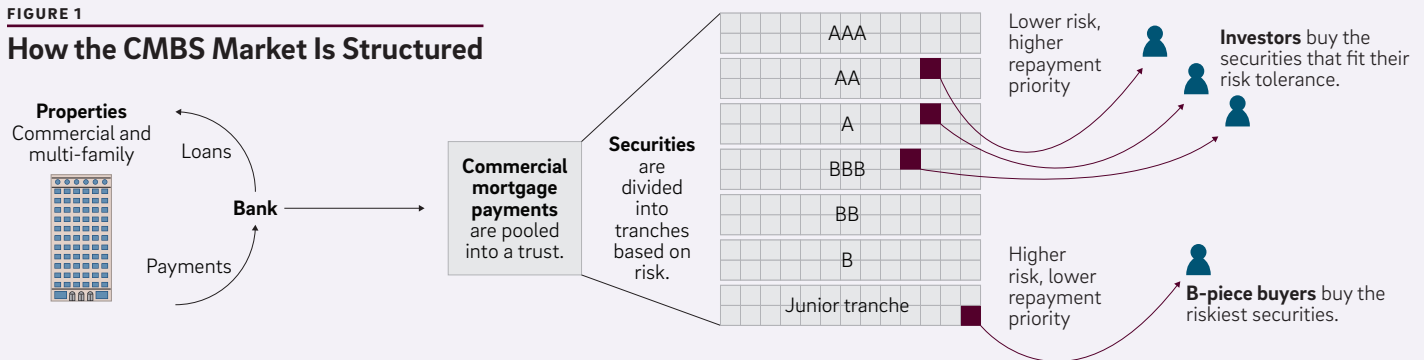
expensive for the typical securities purchaser to evaluate the characteristics of each and every loan underlying the security, such as the creditworthiness of the borrower and the value of the property.<sup>2</sup> The inability of purchasers to evaluate for themselves the underlying loans can lead to *agency* problems.<sup>3</sup> This means that if an originator makes a loan that it knows is going to be sold and securitized, it may expend too little effort in properly evaluating its risk of default, creating moral hazard—that is, it can reap higher profits without taking on the full risk normally associated with higher potential returns because someone else is bearing part of the cost. Issuers may also pack a security with higher-risk loans, while retaining the higher-quality loans for their own portfolios. Models show that if issuers retain some or all of the junior tranche, purchasers can be assured that the quality of the security is good, which in turn leads them to pay a higher price. As we will show, however, recent theories and empirical evidence address why markets do not necessarily conform to these models.

One might think issuers' desire to maintain a good reputation

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FIGURE 1

## How the CMBS Market Is Structured



would be a strong enough motivation for them to use high-quality loans in the securities they issue. After all, they don't issue securities just once but many times and would like purchasers to be repeat customers. However, there is evidence that reputational concerns don't necessarily guarantee quality. One study found that commercial mortgage-backed securities issued by institutions that had recently sustained large stock losses performed poorly.<sup>4</sup> The study also found that troubled issuers took poorly performing securities from their own portfolios and packed them into other securitized vehicles. One interpretation of these findings is that a firm that has suffered losses is more likely to fail. Since a good reputation is valuable only if the firm remains a going concern, the value of a good reputation falls for firms experiencing losses and facing a higher likelihood of failure.

Leading up to the financial crisis, issuers often created securities with the intention of selling off the entire issue, sometimes without the knowledge of investors, as we discuss below. A substantial share of these issues proved to be of poor quality, and many observers have argued that the lack of skin in the game was an important reason that the underwriting was so poor. As former Securities and Exchange Commissioner Luis A. Aguilar pointed out, "...since lenders were not going to suffer if the loans were not repaid, they no longer had the incentive of ensuring that the loans would be of appropriate quality."<sup>5</sup> The authors of Dodd-Frank adopted the view that regulations mandating skin in the game are necessary to prevent securitization markets from repeating the lax underwriting that preceded the crisis.

## An Overview of the Risk Retention Rule

The new risk retention rule—known as Regulation RR—requires issuers of all types of asset-backed securities to retain at least a 5 percent share of any security they issue, as determined by its fair value at the time of issuance.<sup>6</sup> The requirement can be met by holding a share of the junior tranche, which is called horizontal retention, a portion of each tranche, known as vertical retention, or a mixture of the two, known as L-shaped retention (Figure 2). Issuers may not directly or indirectly hedge or transfer the risk of the retained share.<sup>7</sup> However, they may sell off all or part of the junior tranche of their requirement to investors who are experts at evaluating commercial real estate, known as B-piece buyers. In the final analysis, issuers remain responsible for compliance with the risk retention rule as well as monitoring the B-piece buyers' compliance with the rule.

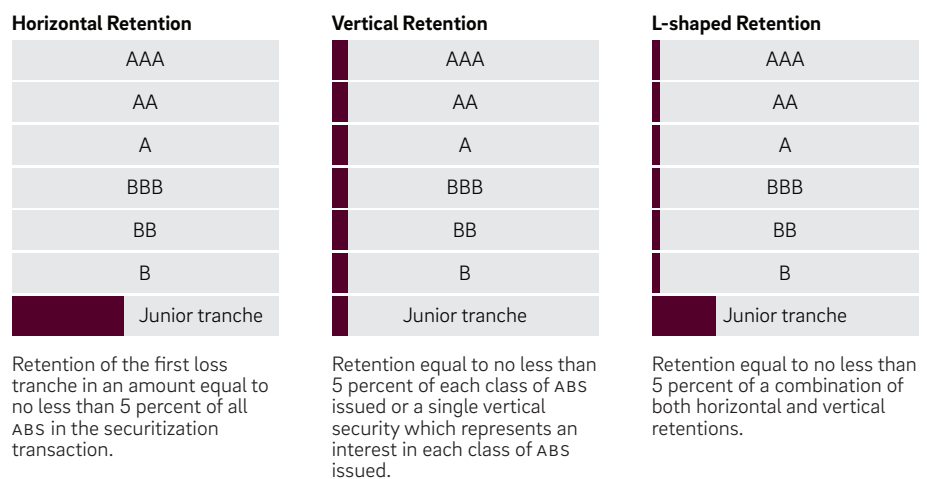
The rule contains several exceptions for issuers of commercial mortgage-backed

securities.<sup>8</sup> An issuer is not required to retain any portion of a loan that meets the definition of a qualified commercial real estate loan.<sup>9</sup> The presumption here is that a qualified loan is well documented and has prudent terms, and that the borrower is creditworthy, so the loan is less likely to default. Under the allocation-to-originator option, an issuer may allocate a portion of its required retention to any lender that had originated at least 20 percent of the underlying loans in the pool. The originator must hold at least 20 percent of the required retention but can't hold a larger percentage than the percentage of loans it originated. The rationale for this option is that providing incentives for the originator has essentially the same effect as providing incentives to the issuer.<sup>10</sup>

Note that of the three options for retention, only horizontal retention fits the prescription from economic models that an issuer should retain a share of the riskiest tranche. Regulators say that having three retention options provides issuers with the flexibility to choose

FIGURE 2

## Only Horizontal Retention Fits the Risk Prescription



a structure that is compatible with the practices in a particular securitization market. For example, if an issuer usually retains less than 5 percent of a junior tranche in a commercial mortgage-backed security transaction in a particular segment of that market, the rule allows the issuer to hold the rest of its requirement through a vertical slice. This flexibility permits some variation across asset-backed securities markets, but there is some danger that it simply ratifies inefficient market practices by some participants.

## Theory Says Unregulated Markets May Be Inefficient

In a recent theoretical model, Gilles Chemla and Christopher Hennessy demonstrate that unregulated markets do not necessarily provide appropriate incentives for originators to do their due diligence, even when investors are sophisticated, by which we mean they understand the incentives of originators and issuers.<sup>11</sup> Note, Chemla and Hennessy do not argue that investors in CMBS were necessarily sophisticated during recent crisis, only that bad market outcomes can occur even when investors are sophisticated.

In the model, originators of loans must make some costly effort if they want to increase the likelihood that a loan will be repaid in full and on time.<sup>12</sup> This effort might involve carefully examining a builder's books and credit history and analyzing local real estate conditions. When the originator makes such an effort, there is a greater likelihood that the result will be a high-quality loan. But even if originators make this effort, default can still occur; for example, local real estate conditions could deteriorate unpredictably. So, whether or not the originator makes the effort, the loan will have either a low risk of default (high quality) or a high risk of default (low quality). Because there is always some risk of default, investors can't automatically infer that an originator had made too little effort if a loan defaults.

Originators in the model may sell a security based on the expected cash flow from the loan. And they will retain a junior share of the security if they expect to make a positive return from doing so.<sup>13</sup> Otherwise, they will sell off the junior tranche to willing investors. It is costly for originators to keep any portion of the loan on their books; for example, real-world originators use the proceeds from securitizing loans they made previously to fund new loans. In the model, originators determine how much underwriting effort to make by estimating both how much they expect to receive from selling the security to reinvest in new loans and their return on their retained portion.

The model includes two types of investors. Most understand originators' incentives but are not sufficiently informed to fully evaluate the riskiness of a loan. The rest, speculators, are capable of evaluating the riskiness of a loan, but at a cost. Speculators will bear this cost only if they expect to profit from identifying and buying underpriced securities backed by low-risk loans.<sup>14</sup> If speculators are active in the market—later we discuss when they will be active—their buying and selling raises the price of securities backed by low-risk loans and lowers the price of securities composed of high-risk loans. However, while speculators are more informed than most investors, they are less well informed about

the quality of the loans than the originators are. So, even with the benefit of superior pricing information from speculators, the prices of the securities are noisy; that is, they don't perfectly reflect differences in loan quality.

How accurately prices reflect the underlying risk of default is important to investors, who typically try to align their portfolios according to their risk preferences. In the model world, some investors may suffer a negative shock to their income, so they would like to purchase insurance from other investors. The more accurately the prices of securities reflect actual default risk, the closer investors can come to fully insuring their income. Importantly, even though managing these risks is important to investors, originators are not compensated for setting prices that convey the true risk; that is, from the originators' standpoint, investors' desire for insurance is an externality.<sup>15</sup>

In the simplified world of the model, two main types of market outcomes can arise. One is that originators of low-risk loans retain a junior tranche while originators of high-risk loans retain nothing and fully securitize their loans. This outcome is called a separating equilibrium because originators of loans with different likelihoods of default—low-risk or high risk—retain different size claims. The idea is that originators of low-risk loans want to signal to investors, via retention, that the loans are indeed of high quality in order to get a higher price in return. In this outcome, the prices of the securities accurately reflect the quality of the underlying loans, so originators have a strong incentive to make more effort to reduce risk. Fully informative prices also help investors better align their portfolios with their risk preferences. In a separating equilibrium, speculators have no role to play because prices are already fully informative and nobody can make a profit by examining securitized loans to buy cheap and sell dear.

The other type of outcome is that all originators hold an identical claim—a pooling equilibrium. Notably, all originators can simply sell off their entire claim to willing investors, in which case the pooling equilibrium could involve no skin in the game.<sup>16</sup> Why might such a situation arise? Remember, an originator of a low-risk loan is motivated to retain a larger share of a junior tranche only by the prospect of fetching a sufficiently higher price. That is, the originator of a low-risk loan wants only to know: Will retaining a big enough share of the loan to convince investors that the risk of default is small produce a higher total return than selling the full share? In a pooling equilibrium, speculators have an incentive to expend the time and effort to examine the loan and profit from trading on their superior information. So, in equilibrium, the price of a low-risk loan will be

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higher than the price of a high-risk loan, even if the originator retains no exposure. Indeed, if the price of the high-risk loan is high enough, the originator of a low-risk loan will prefer to have no skin in the game, just like all other originators.

This pooling equilibrium outcome has some undesirable features. Although speculators increase the price of low-risk loans compared with high-risk loans, the prices are noisy because speculators are not fully informed about loan quality. So, investors are still unable to make informed portfolio decisions to achieve their desired level of insurance.<sup>17</sup> Also, there is too much default because originators typically exert too little effort to lower risk.

In this theory, the government can actually do a better job of reducing losses and improving investors' ability to choose investments that reflect their risk tolerance than unregulated markets can. One way it could do so, the authors suggest, would be to require originators to structure their claims in a way that would ensure a separating equilibrium. Specifically, the regulator could allow originators to choose between two set percentages of the security, a larger junior share and a smaller junior share, but they would have to retain one or the other. The regulator would size the required shares in such a way that the low-risk originator will prefer to retain the larger share and the high-risk originator will prefer to retain the smaller share. Because originators of low-risk loans know that default is less likely, they are willing to accept the larger junior share's higher exposure to loss in exchange for a higher price, and vice versa. In effect, by restricting the set of choices available to issuers, the regulator would lead market participants to coordinate on a separating equilibrium.<sup>18</sup> Furthermore, unlike in the separating equilibrium in an unregulated market, even the originator of a high-risk loan would retain at least a small share, thus increasing the high-risk originator's amount of effort.

Alternatively—and perhaps more realistically—regulators could require that all originators hold a share of the junior tranche above some minimum level. That is, regulators could feasibly enforce a pooling equilibrium in which all originators would have skin in the game—as now required under Dodd-Frank. Theoretically, requiring originators to retain a share of the junior tranche would motivate originators to tighten their lending criteria, leading to fewer losses than in an unregulated market.

Another theoretical study emphasizes an additional factor—the importance of investors' ability to observe originators' actual exposure. As we will see in the next section, even if they initially retain some risk, originators are disposed to find ways to minimize their exposure, for example, secretly hedging against the risk of loss. This ability to subsequently shed their

exposure without investors knowing it could reduce originators' incentive to do their due diligence. In a model developed by Victoria Vanasco, even when originators can't secretly reduce their initial exposure, outcomes similar to those identified by Chemla and Hennessey arise.<sup>19</sup> But if investors are unable to monitor whether an originator has retained its exposure, particularly bad outcomes arise because originators can no longer use their retained share to convey information to investors. Vanasco's model suggests that preventing such hedging also requires regulation.

## Evidence Shows Skin in the Game Improves Quality

There is empirical evidence that skin in the game mattered in the commercial mortgage-backed securities market leading up to the financial crisis. Furthermore, evidence from the CMBS market is consistent with theoretical models such as we described above that indicate that issuers may hold too little skin in the game when markets are unregulated.

### Evidence from the CMBS Market

In a segment of the CMBS market known as the conduit market, before a deal is completed, the junior claim, known as the B-piece, is typically sold to sophisticated investors who specialize in evaluating the quality of the underlying collateral. B-piece investors are seen as the last underwriters of a deal before it is issued and generally gather as much information about the quality of the underlying loans as the originators do. They also control which loans go into the pool underlying the deal. During negotiations with issuers, B-piece investors may insist on restructuring the securitization by, for example, throwing out loans that they find are priced incorrectly. So, in principle, the willingness of such well-informed investors to hold a share of the junior claim should play a key role in ensuring the quality of the issuance.

To find out if that is so, Adam Ashcraft, Kunal Gooriah, and Amir Kermani examined this B-piece market in the years before the crisis. They measured the performance during the crisis of deals originated from 2000 to 2007 in which B-piece buyers in turn sold off their share of the most junior, lower-rated (BBB) tranche versus deals in which they retained their share. The rise of collateralized debt obligations (CDOs) and other new financial instruments in the early 2000s enabled B-piece buyers to sell off their shares of the junior tranche and rid themselves of the risk in the underlying loans.<sup>20</sup> The authors argue that investors in the BBB tranche had no way of knowing whether a B-piece buyer had sold off its exposure. Issues in which B-piece investors had sold off their claims performed poorly compared with issues

### The Conduit Market

The conduit market is a part of the commercial mortgage-backed securities market that includes only those commercial mortgages that are originated purely to be securitized (Figure 1). Conduit commercial mortgage-backed securities typically consist of a diverse pool of 25 to 100 commercial mortgages that have higher leverage and lower quality than investment-grade loans. Most conduit transactions include a B-piece buyer, although this is not a universal requirement. Lenders in the conduit market include life insurance companies, pension companies, investment banks, and large commercial banks.

in which they retained their exposure, a finding that supports the argument that skin in the game helps reduce agency problems.

Also, the prices that general investors paid for the securities were not sensitive to how much of the junior tranche the B-piece investors had retained, which supports the authors' claim that investors were unaware of the B-piece buyers' true exposure.<sup>21</sup> This result also supports Vanasco's emphasis on the benefits of regulations requiring issuers to maintain their exposure.

### Evidence from the RMBS Market

Two studies of another segment of the mortgage-backed securities market, residential mortgage-backed securities, further support the importance of skin in the game in securitization markets. Taylor Begley and Amiyatosh Purnanandam show that private-label residential mortgage-backed securities deals performed better when the issuers held a larger share of the junior claim.<sup>22</sup> The more opaque the security, the stronger this positive effect. That is, if a security was backed by home loans that only the issuer could have useful information about—such as in so-called no-doc mortgages that became popular leading up to the housing crash in which there is no documentation of borrowers' creditworthiness—the bigger the issuer's retained share, the better the issue performed.

Another study also suggests that originators of residential mortgage-backed securities will make a stronger effort to ensure that loan quality is high if their exposure to losses on the loans is greater. Cem Demiroglu and Christopher James found that deals in which the originators of the underlying loans were affiliated with the issuers of the securities experienced fewer losses compared with deals in which the originators and issuers were not affiliated.<sup>23</sup> Similar to the previous study, affiliation was more important to the performance of securitizations with a large fraction of low-doc loans, ones for which documentation was limited. Interestingly, the study also found that for deals in which originators did not retain a portion of the junior claim, yields were significantly higher compared with those in which originators kept a portion. In other words, since investors knew that originators had no skin in the game, they expected the loans to be riskier and demanded higher rates of return for taking on that risk.

Unlike the study of the CMBS market by Ashcraft and his coauthors, both of these studies of the RMBS market find that securities prices are sensitive to issuers' exposure to risk. This finding suggests that investors were aware of RMBS issuers' incentives and knew how exposed to loss issuers were. Thus, investors in the RMBS market were sophisticated, as in Chemla and Hennessy's model.


In contrast, investors in CMBS may have been unaware that B-piece buyers now had wider opportunities to off-load their exposure, because the instruments such as CDOs that afforded those opportunities were still a novelty. Armed with the knowledge of what occurred during the crisis, CMBS investors now may naturally be inclined to monitor for themselves how much exposure B-piece buyers' are retaining without the need for an explicit regulation limiting B-piece buyers' ability to hedge their risk.

### Effects of the Regulation

It is too soon to determine whether the risk retention rule has improved the performance of the underlying loans in the CMBS market or whether the restrictions will hamper CMBS issuance in the long run. So far, contrary to fears expressed by some market observers, issuances are up and deals have been priced favorably. According to market data provider Trepp, CMBS issues totaled \$70.65 billion in 2016. Between January and August 2017, they had reached almost \$64 billion and were on pace to surpass their 2016 volume.

The risk retention rule appears to have changed issuers' behavior, perhaps in unintended ways. The mixture of funding structures used for CMBS issues in the first half of 2017—38.2 percent horizontal retention, 37.5 percent vertical, and 24.3 percent L-shaped<sup>24</sup>—shows that given the choice, issuers will not always choose horizontal, which, according to Chemla and Hennessy and other models, is the optimal structure.

Furthermore, market participants have argued that the new regulation has led to other changes in the CMBS market. In some cases, issuances that previously would have contained an entire large loan are being replaced by multiple, smaller issuances that each contain only a portion of a larger loan, with each small deal having a different issuer. This allows issuers to limit their potential losses, since the amount an issuer is required to retain for a small security is less than it would be on a large security.<sup>25</sup> Note that spreading a loan across multiple CMBS deals in this way means more claimants if the loan defaults, which could complicate the resolution effort. Only in the next downturn in commercial real estate will it become clear whether this will be a significant problem.

In 2017, Treasury Secretary Steven Mnuchin recommended expanding the definition of qualifying exemptions based on the characteristics of the securitized asset class and relaxing restrictions on third-party purchasers of the junior claim.<sup>26</sup> The future of Regulation RR may ultimately depend on not just loan performance in the CMBS market but on whether that provision in Dodd-Frank is rolled back. 

## Notes

**1** See Ronel Elul's 2012 article for a discussion of these models.

**2** Unlike a residential mortgage-backed security, which is backed by hundreds of individual home mortgages that are evaluated using a common model, a commercial mortgage-backed security is backed by far fewer loans that are evaluated on a case-by-case basis based on characteristics such as location and property type.

**3** Most would-be purchasers tend to rely on evaluations such as risk ratings from a major credit ratings agency. As became clear during the crisis, when even securities with top ratings went bad, the use of ratings agencies does not fully overcome these agency problems.

**4** See Sheridan Titman and Sergey Tsyplov's article.

**5** From "Skin in the Game: Aligning the Interests of Sponsors and Investors."

**6** Although the regulation governs all asset-backed securities, we focus on those portions that affect CMBS. The regulation defines an issuer—otherwise known as a sponsor—as "a person who organizes and initiates an asset-backed securities transaction by selling or transferring assets, either directly or indirectly, including through an affiliate, to the issuing entity."

**7** The intention of this restriction is to make sure that issuers do not undermine the incentive effect of skin in the game by selling off the risk without actually selling the junior security. For example, an issuer of CMBS might hedge the risk that real estate prices will drop by buying a credit default swap, in which the seller compensates the issuer when real estate prices fall. The regulation does not specifically define hedging. Whether a particular hedge is permissible will be determined in practice over time on a case-by-case basis.

**8** There are also exceptions for issuers of residential mortgage-backed securities that are composed of conforming loans—loans that meet the underwriting standards of the government-sponsored enterprises (GSEs)—are exempt. In practice, this means that most of the residential mortgage-backed securities market is exempt. The regulation may become binding for a larger share of the RMBS market if and when the private-label mortgage-backed securities market regains strength.

**9** The regulation defines a qualifying commercial real estate loan as a fixed-rate loan with a minimum maturity of 10 years and a maximum amortization of 25 years (30 for loans secured by multifamily properties). Lenders must document the income from the property for at least the previous two years. The borrower's debt service ratio must not exceed 1.25 percent for multifamily properties, 1.5 percent for leased properties, and 1.7 percent for all other loans. Also, the combined loan-to-value ratio of all loans on the property cannot exceed 70 percent, and the loan-to-value ratio of the first lien loan cannot exceed 65 percent.

**10** Furthermore, allowing the issuer to share risks with the originator might reduce the cost of issuance.

**11** Chemla and Hennessy simplify and treat the originator of the loan and

the issuer of the securities as a single agent. Throughout this section we use only originators to avoid confusion.

**12** In the simplified world of the model, each originator screens a single loan.

**13** We focus on the cases in which originators retain a junior tranche if they retain any share at all. In Chemla and Hennessy's model, cases can arise in which originators retain a senior tranche, a particularly bad outcome.

**14** In their model, only low-risk loans are profitable to buy. However, speculators can also profit from taking short positions in securities backed by high-risk loans.

**15** According to Chemla and Hennessy, another externality, or failure to price in the true cost, is the neighborhood effect of loan defaults. For example, when the failure to screen a borrower's creditworthiness results in a boarded-up foreclosed property, neighboring home values may also drop.

**16** To be precise, the authors demonstrate that whenever a pooling equilibrium is possible, a pooling equilibrium in which originators hold no skin in the game is also possible.

**17** We are simplifying Chemla and Hennessy's analysis of the relative efficiency of the different equilibrium outcomes. For example, in their model, we can't automatically conclude that a separating equilibrium is better than a pooling equilibrium, although this is one possibility. While the incentives are typically smaller in a pooling equilibrium for an originator to make an effort, speculative buying and selling may lead to a price difference large enough to prompt them to make the effort.

**18** In the separating equilibrium designed by the regulator, both types of originators hold skin in the game.

**19** Note, in Chemla and Hennessy's model, there is no issue of originators choosing some level of retention initially and subsequently selling off the exposure without investors' knowledge.

**20** Banks may repackage certain loans in a security into CDOs, which are then sold to investors on the secondary market. CDOs usually consist of a pool of loans from the lowest tranches in a securitization.

**21** The insensitivity might also be consistent with investors' not understanding the importance of skin in the game. However, the empirical studies we discuss below cast some doubt on this explanation.

**22** Private-label securitizations are those set up by firms other than government-sponsored enterprises, such as Fannie Mae or Freddie Mac. Begley and Purnanandam study a sample of private-label securitization contracts in 2002 and 2004–2005.

**23** Originators can also be the issuers in a securitization transaction. In this study, originators were considered affiliated with the deal if they were also the issuer or if they retained the servicing rights to the transaction. An example of an unaffiliated originator is a loan broker. The broker

underwrites the loan and typically sells it to a bank that will assemble it with other loans into a security.

**24** From Trepp's Q1 and Q2 2017 CMBS Issuance Recaps.

**25** See the *American Banker* article. The extent to which this development is actually due to regulatory changes is uncertain. While the number of securitizations broken up in this way increased substantially in 2017, this was an acceleration of a trend that began in 2011.

**26** See the Treasury Department report.

## References

Aguilar, Luis A. "Skin in the Game: Aligning the Interests of Sponsors and Investors," U.S. Securities and Exchange Commission Public Statement (October 2014).

Ashcraft, Adam B., Kunal Goorah, and Amir Kermani. "Does Skin-in-the-Game Affect Security Performance?" working paper (October 2014).

Begley, Taylor, and Amiyatosh Purnanandam. "Design of Financial Securities: Empirical Evidence from Private-label RMBS Deals," *Review of Financial Studies*, forthcoming.

Bisbey, Allison. "Large CMBS Loans Are Being Carved Up to Spread Risk, but...," *American Banker* (May 2017).

Chemla, Gilles, and Christopher Hennessy. "Skin in the Game and Moral Hazard," *Journal of Finance*, 69:4 (August 2014), pp. 1,597–1,641.

Demiroglu, Cem, and Christopher James. "How Important Is Having Skin in the Game? Originator-Sponsor Affiliation and Losses on Mortgage-backed Securities," *Review of Financial Studies*, 25 (November 2012), pp. 3,217–3,258.

Elul, Ronel. "The Economics of Asset Securitization," Federal Reserve Bank of Philadelphia *Business Review* (Third Quarter 2005).

Elul, Ronel. "Securitization and Mortgage Default," *Journal of Financial Services Research*, forthcoming.

Financial Stability Oversight Council, "2011 Annual Report" (2011).

Office of the Comptroller of the Currency, Federal Reserve Board, Federal Deposit Insurance Corporation, Federal Housing Administration, U.S. Securities and Exchange Commission, and Housing and Urban Development. "Final Rule on Credit Risk Retention," *Federal Register*, 79:247 (December 24, 2014), pp. 77,602–77,766.

Titman, Sheridan, and Sergey Tsyplakov. "Originator Performance, CMBS Structures, and the Risk of Commercial Mortgages," *Review of Financial Studies*, 23:9 (September 2010), pp. 3,558–3,594.

Trepp. "Q2 2017 CMBS Issuance Recap" (August 2017).

U.S. Department of the Treasury. "A Financial System That Creates Economic Opportunities: Capital Markets" (October 2017).

Vanasco, Victoria. "The Downside of Asset-Screening for Market Liquidity," *Journal of Finance*, forthcoming.