Securitization[*]

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Abstract

We survey the literature on securitization and lay out a research program for its open questions. Securitization is the process by which loans, previously held to maturity on the balance sheets of financial intermediaries, are sold in capital markets. Securitization has grown from a small amount in 1990 to a pre-crisis issuance amount that makes it one of the largest capital markets. In 2005 the amount of non-mortgage asset-backed securities issued in U.S. capital markets exceeded the amount of U.S. corporate debt issued, and these securitized bonds – even those unrelated to subprime mortgages -- were at center of the recent financial crisis. Nevertheless, despite the transformative effect of securitization on financial intermediation, the literature is still relatively small and many fundamental questions remain open.

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I.   Introduction

Prior to the financial crisis of 2007-2008, securitization was a very large part of U.S. capital markets. It played a central role in the recent financial crisis. Yet it is largely unregulated and it is not well understood. There is little research on this topic. In this paper, we survey the literature on securitization and summarize the outstanding questions.

Traditionally, financial intermediaries originated loans that they then held on their balance sheets until maturity. This is no longer the case. Starting around 1990 pools of loans began to be sold in capital markets, by selling securities linked to pools of loans held by legal entities called "special purpose vehicles" (SPVs). These securities, known as asset-backed securities (ABS) (or mortgage-backed securities (MBS), in the case where the loans are mortgages) are claims to the cash flows from the pool of loans held by the SPV. Such securities can be issued with different seniorities, known as tranches. Securitization has fundamentally altered capital markets, the functioning of financial intermediation, and challenges many theories of the role of financial intermediaries.

Securitization has an important role in the U.S. economy. As of April 2011, there was $11 trillion of outstanding securitized assets, including residential mortgage-backed securities (RMBS), other ABS and asset-backed commercial paper (ABCP). This is substantially more than the size of all outstanding marketable U.S. Treasury securities—bonds, bills, notes, and TIPS combined.[1]   A large fraction of consumer credit in the U.S. is financed via securitization. It is estimated that securitization has funded between 30 percent and 75 percent of lending in various consumer lending markets and about 64 percent of outstanding home mortgages.[2]   In total, securitization has provided over 25% of outstanding U.S. consumer credit.[3]

Figure 1 shows the U.S. issuance amounts of private securitization and corporate bonds. In 2002 the amounts of securitized bonds issued ($662.4 billion) exceeded corporate bond issuance ($636.7 billion) for the first time, and continued to be larger until the financial crisis. Figure 1 includes non-agency, i.e., private, mortgage securitizations. But, even when this very large category is removed, securitization is very significant, as shown in Figure 2. The main categories of loans securitized, aside from mortgages, are credit card receivables, automobile loans, and student loans. U.S. non-mortgage securitization issuance exceeded U.S. corporate bond issuance in 2005, and then plummets during the financial crisis.

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[1] U.S. Department of the Treasury, "Monthly Statement of the Public Debt of the United States: January 31, 2011," (January 2011). < http://www.treasurydirect.gov/govt/reports/pd/mspd/2011/opds012011.pdf>.
[2] See Statement of Tom Deutsch, before the House Financial Services Committee, Subcommittee on Capital Markets and Government Sponsored Enterprises, April 14, 2011.
[3] Federal Reserve Board of Governors, "G19: Consumer Credit," (Sept. 2009). <http://www.federalreserve.gov/releases/g19/current/g19.htm>.

Figure 3 shows U.S. mortgage-related securitization, including agency bonds, residential-mortgage-backed securities (RMBS), and commercial-mortgage-backed securitization (CMBS). Securitization has also grown significantly in other countries, as well. The total European securitization issuance grew from $302 million in 1992 to a peak of $1.1 billion in 2008, falling to $512 million after the crisis. Figure 4 shows the amounts of European issuance of some of the major categories of non-mortgage securitization.

Securitization is not only important because it is quantitatively significant. It also challenges theoretical notions of the role of financial intermediation. Financial intermediaries make loans to customers, loans that traditionally were held on their balance sheets until maturity. They did this to ensure themselves an incentive, so the theory goes, to screen borrowers and to monitor them during the course of the loan. The logic of the argument is that were banks not to hold the loans, then they would not screen or monitor. Providing the banks with these incentives explained the nonmarketability of bank loans. Many firms, however, issue bonds, which do not involve banks and the associated screening and monitoring, so somehow it is possible for banks to be successfully avoided. Securitization blurs the line between bonds and loans, suggesting that the traditional arguments about screening and monitoring were not correct or that the world has changed in some important way.

Despite the quantitative and theoretical importance of securitization, there is relatively little research on the subject. In addition, the recent financial crisis centered on securitization, so the imperative to understand it is paramount. The central motivations for securitization are often driven by institutional details in law, accounting, and regulation, so it is necessary to start with some of these details. Section II provides an overview of the legal structure of securitization and a brief example of a specific securitization. Section III gives summary statistics on the growth and performance of various types of securitized vehicles, illustrating the rapid transformation of financial intermediation in the last 25 years.

To go from the old world of finance to the new world of securitization, a bank must decide to move some loans off its balance sheet into a legal entity generically known as a special purpose vehicle (SPV). This decision is driven by the relative cost of capital in the two places, and this cost of capital is itself determined by a wide variety of factors. In Section IV, we survey the literature on these factors and present a simple model of the *private* decision to securitize, driven by such factors as bankruptcy costs, taxes, and the convenience yield (if any) for bank deposits and securitized bonds. Section V explores several hypotheses for the rise of securitization over the last three decades, focusing on the changes in the banking sector and on how those changes may have affected the parameters of the Section IV model.

The Section IV model considers a full-information ideal and abstracts from the asymmetric information costs if investors perceive that securitized loans are improperly screened or suffer from a lemons problem.

The market deals with these costs using a variety of security designs and contractual features, the source of the largest current literature on securitization. Section VI summarizes the theory papers in this literature, and Section VII summarizers the empirical papers. Section VIII takes up the social costs and benefits of securitization, surveying a small literature on the role of securitization on monetary policy, financial stability, and financial regulation. Section IX concludes with a summary of what we know and lays out a set of important open questions.

II.   Securitization: Some Institutional Details

In this section we begin with an overview of the legal structure of securitization. Then we provide a brief discussion of an example, the Chase Issuance Trust, for securitizing credit card receivables. Finally, we consider some other related forms of securitization.

A. Legal Structure

"Securitization" means selling securities whose principal and interest payments are exclusively linked to a pool of legally segregated, specified, cash flows (promised loan payments) owned by a special purpose vehicle (SPV). The cash flows were originated ("underwritten") by a financial intermediary, which sold the rights to the cash flows to the special purpose vehicle. The securities, called "asset-backed securities" (ABS), are rated and sold in the capital markets. Historically, the financial intermediary would have held the loans on-balance sheet until maturity. But, with securitization the loans can be financed off-balance sheet.

Figure 5 shows a simplified overview of the securitization process. The originating firm is at the top of the figure. This firm, a financial intermediary, employs lending officers and actively engages in the process of finding lending opportunities. Whether a potential borrower represents a good lending opportunity or not is the primary decision that this intermediary must make. It determines underwriting criteria or lending standards, and proceeds to make loans. These loans must be funded, and they can be funded by the intermediary borrowing, or by selling the loans to a "special purpose vehicle" (SPV), which is a legally separate legal entity. In the figure this entity is labeled "Master Owner Trust." This SPV is not an operating entity. Indeed, no one works there and it has no physical location. Instead, it is an artificial firm that functions according to pre-specified rules, and it contractually outsources the servicing of the loans.

The SPV purchases the loan cash flows by selling securities based on seniority, called "tranches," to investors in the capital markets, shown at the bottom of the figure. These securities are claims that are linked to the cash flows of the portfolio of loans that the SPV then purchases from the operating firm (the

intermediary). The cash flows are passive in the sense that the underwriting decision has already been made, so there is nothing further to do except wait to see if the cash flows are repaid as promised.

B. Securitization Example: Credit Card Securitization via the Chase Issuance Trust

To illustrate some of the important features of securitization that we will subsequently focus on, it is useful to very briefly examine an actual example. For this purpose we will look at the Chase Issuance Trust, which is the JP Morgan Chase master trust for the securitization of credit card receivables underwritten by First USA and Chase USA. Chase merged with First USA in 2005, so credit card receivables can come from Chase or from the old First USA bank. The entity, Chase Issuance Trust, is a special purpose vehicle that periodically receives/buys credit card receivables and issues securities in the capital markets. We will highlight the important features of the structure, which are basically common to all securitizations.

The structure of the securitization is shown in Figure 6. The box labeled "Master Owner Trust" is what the deal documents refer to as "Chase Issuance Trust." The figure shows the various special purpose vehicles and participants in the securitization. Along the right-hand side of the figure are the governing legal documents corresponding to each part of the structure. At the very top of the figure are the consumers who have borrowed money on their credit cards, as customers of Chase Bank. Chase transfers/sells the receivables, depending on whether they were originated in the First USA or Chase bank to one of two master trusts, either First USA Master Trust or Chase Master Trust.

There is a two-tiered structure. Each of First USA Master Trust and Chase Master Trust is a special purpose vehicle, a trust. A business trust is a separate legal entity, created under a state's business trust law. (See Schwarcz (2003).) Each of these trusts is able to purchase the receivables by selling collateral certificates representing interests in the cash flows that credit card holders are obligated to pay to the Master Owner Trust –Chase Issuance Trust. Chase Issuance Trust issues securities in the capital markets called CHASEseries Notes that are differentiated by seniority, with Class A notes being the most senior (AAA/Aaa) and Class C notes the most junior of the publicly issued notes. In the figure, these notes are linked to one specific vintage of credit card receivables, called "Asset Pool One." Periodically, different pools of receivables are sold by Chase USA to the trusts, with different series of securities periodically issued that are contractually linked to the various pools. Securities issues by Chase Issuance Trust to capital market participants are generically known as asset-backed securities.

The structure involves multiple special purpose vehicles, which are legal entities, but not really operating companies, as there are no decisions to be made. In this example, Chase Issuance Trust is a Delaware

statutory trust, a separate legal entity that is an unincorporated association governed by a trust agreement under which management is delegated to a trustee. The master trusts activities are limited to (according to the Prospectus Supplement dated May 12, 2005):

- Acquiring and holding collateral certificates, credit card receivables and the other assets of the master trust and the proceeds from those assets;
- Issuing notes;
- Making payments on the notes;
- Engaging in other activities that are necessary or incidental to accomplish these limited purposes, which activities cannot be contrary to the status of the master owner trust as a "qualifying special purpose entity" under existing accounting literature.[4]

The trust makes no managerial decisions, but simply executes rules that are written down in the contracts.

As indicated in Figure 6, the mechanics of collecting payments from the credit card holders, monitoring them, distributing payments to note holders, and so on, is outsourced via "pooling and servicing" contracts and trustees. Servicers perform the necessary tasks needed to enforce and implement the debt contracts with respect to cash flows, while trustees monitor adherence to indentures.

There are three important features to the securitization structure. First, the SPV is tax neutral; second, the SPV is liquidation-efficient in that it avoids bankruptcy; and third, that it is bankruptcy remote from the sponsor—Chase in this example. The SPVs used in securitization, whether they are trusts, limited liability corporations, or limited partnerships can be structured so that they qualify for "pass through" tax treatment with regard to state and federal income tax purposes. This avoids income tax at the entity level. The debt issued by the SPV is then not tax advantaged, as is on-balance sheet debt issued by the sponsor. This means that the sponsor's decision about on- versus off-balance sheet financing has an important tax dimension.

Bankruptcy by an SPV is an event that effectively cannot occur; we call this liquidation-efficient. Under U.S. law private contracts cannot simply agree to avoid government bankruptcy rules, but private contracts can be written so as to minimize this possibility. While we discuss more of the details later, here we note the most important, namely, what happens if the underlying pool of securitized loans does not payoff enough to contractually honor the coupon payments to the note holders. Normally, under a debt contract, if note holders are not paid what has been contractually promised them, then they can force

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[4] A "qualifying special purpose entity" is an SPV that has satisfied certain true sale rules under old FASB rules. This is no longer relevant.

the borrowers into Chapter 11 bankruptcy. Importantly, that does not happen with asset-backed securities.

According to the prospectus, events of default include:

- The master owner trust's failure, for a period of 35 days, to pay interest on any series, class or tranche of notes when that interest becomes due and payable;

- The master owner trust's failure to pay the stated principal amount of any series, class or tranche of notes on the applicable legal maturity date for that series, class or tranche;

- The master owner trust's default in the performance, or breach, of any other of its covenants or warranties in the indenture for a period of 90 days after either the indenture trustee or the holders of at least 25% of the aggregate outstanding dollar principal amount of the outstanding notes of the affected series, class or tranche has provided written notice requesting the remedy of that breach, if, as a result of that default, the interests of those noteholders are materially and adversely affected and continue to be materially and adversely affected during that 90-day period;

- The occurrence of certain events of bankruptcy or insolvency of the master owner trust; and

- With respect to any series, class or tranche of notes, any additional events of default specified in the accompanying prospectus supplement.

An event of default, however, does not trigger bankruptcy. If the SPV cannot pay the contractually obligated coupons, it declares an "early amortization event." The contract states that:

> It is not an event of default if the issuing entity fails to redeem a series, class or tranche of notes prior to the legal maturity date for those notes because it does not have sufficient funds available or if payment of principal of a class or tranche of subordinated notes is delayed because that class or tranche is necessary to provide required subordination for senior notes.

> After an event of default and acceleration of a tranche of notes, funds on deposit in the applicable issuing entity bank accounts for the affected notes will be applied to pay principal of and interest on those notes. Then, in each following month, available

principal collections and available finance charge collections allocated to those notes will be deposited into the applicable issuing entity bank account and applied to make monthly principal and interest payments on those notes until the earlier of the date those notes are paid in full or the legal maturity date of those notes. However, subordinated notes will receive payment of principal prior to their legal maturity date only if, and to the extent that, funds are available for that payment and, after giving effect to that payment, the required subordination will be maintained for senior notes. (Chase Issuance Trust Prospectus (May 12, 2005), p. 8)

Thus, contractually there is a living will for the SPV. In particular, if the underlying pool cannot pay the contractual coupons owed to holders of the asset-backed securities, the contractual remedy is to use the available funds to start paying down principal early. Other *early amortization events* include the following (among other events):

- For any month, the three-month average of the Excess Spread Percentage is less than zero.
- The issuing entity fails to designate additional collateral certificates or credit card receivables for inclusion in the issuing entity of Chase USA fails to increase the investment amount of an existing collateral certificate . . .
- Any Issuing Entity Servicer Default occurs that would have a material adverse effect on holders of the notes;
- The occurrence of an event of default and acceleration of a class of tranche of notes.

The "excess spread" refers to the difference between what the underlying portfolio of loans yields in a month minus the amounts owed to note holders in that month (the coupon payments), the monthly servicing fee (paid to the servicer of the loans) and any realized losses on the loans.

Bankruptcy remoteness refers to the effect of the possible bankruptcy of Chase, the originator/sponsor, on the assets held by the SPV. The potential problem is that the claimants on the sponsor, Chase, could in bankruptcy seek to recover the assets that were "sold" to the securitization SPV.[5] In the early days of securitization there was some confusion about the necessary accounting steps needed to ensure that the receivables had, in fact, been sold to the SPV, rather than constituting a secured loan. To clarify this,

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[5] The equitable right of redemption refers to the possible right that the transferor of the receivables might have to recover the transferred assets, especially when the transfer of the receivables is found to be a secured loan rather than a sale.

FASB required a two-step approach, like the one shown in Figure 6. This is known as the "Norwalk two-step" because FASB is located in Norwalk, Connecticut. As we discuss later, case law has to date upheld the bankruptcy remoteness of securitization SPVs.

In the very early days of securitization, each time a pool of loans was securitized, a new SPV had to be set up. Later, the master trust became the main vehicle and different vintages of loan pools were sold to the same trust, with securities issued by the SPV as needed, corresponding to each vintage of loan pool. Figure 7 shows the outstanding receivables in the Chase Issuance Trust over time. It varies as new vintages of loans are sold to the SPV, while older vintages mature.

The Pooling and Servicing Agreement describes the eligible loans that can be sold into the trust periodically, in this case credit card receivables. The agreement states that:

> Chase USA has the right, subject to certain limitations and conditions described in the transfer and servicing agreement, to designate from time to time additional consumer revolving credit card accounts and to transfer to the issuing entity all credit card receivables arising in those additional credit card accounts, whether those credit card receivables are then existing or thereafter created. Any additional consumer revolving credit card accounts designated must be Issuing Entity Eligible Accounts as of the date the transferor designates those accounts to have their credit card receivables transferred to the issuing entity <u>and must have been selected as additional credit card accounts absent a selection procedure believed by Chase USA to be materially adverse to the interests of the holders of notes</u> secured by the assets of the issuing entity. (Emphasis added.)

It is the job of the trustee and of the rating agencies to ensure that new loans sold to the trust satisfy the contractual criteria for eligibility. The contract specifies the eligibility criteria for loans to be securitized. The underlined part of the agreement above provides that, at least contractually, if the eligibility criteria are not fine enough to prevent adverse selection, then there will be ex post recourse.

C. Other Forms of Securitization

This survey focuses on securitization, the process of moving pools of loans off-balance sheet by selling them to a special purpose vehicle, which in turn finances the purchase of the portfolio of loans by selling securities in the capital markets. The SPV then owns claims on cash flows that are essentially passive, and consequently the SPV is not an actively managed vehicle. There are a number of other, related, securitization vehicles/methods which are not our focus, but which are very briefly discussed in this subsection. These include loan sales, asset-backed commercial paper (ABCP) conduits, structured

investment vehicles (SIVs), collateralized debt obligations (CDOs), and collateralized loan obligations (CLOs). What follows is a partial literature survey about these forms of off-balance sheet activity.

Loan sales refer to the sale of a single commercial and industrial loan, or part of such a loan, by writing a new claim that is linked to the loan, known as a secondary loan participation. Loan sales are significant in size. For example, in 2006, the ratio of on-balance sheet loans (totaling $1,126 billion) to the secondary loan market volume was 21 percent. See Gorton (2010).   Not only are loan sales quantitatively significant, they are important as well simply because they occur. Loan sales are not supposed to happen according to the traditional theories of banking, but following the advent of the junk bond market, banks began to sell loans. Although not required to retain part of the loan, banks in fact do retain pieces, more so for riskier borrowers. Also, loan covenants are tighter for riskier borrowers, whose loans are sold. On loan sales, see, e.g., Pennacchi (1988), Gorton and Pennacchi (1995, 1989), Drucker and Puri (2009). Loan sales are a topic in their own right, and we do not pursue them here.

ABCP conduits and SIVs are limited-purpose operating companies that undertake arbitrage activities by purchasing mostly highly-rated medium- and long-term ABS and funding themselves with cheaper, mostly short-term, highly-rated commercial paper and medium term notes. ABCP conduits peaked at just over one trillion dollars outstanding just before the financial crisis. The differences between ABCP conduits and SIVs are described by Moody's (February 3, 2003), Moody's (January 25, 2002), and Standard and Poor's (September 4, 2003). During the crisis many of vehicles were forced to unwind, or they were re-absorbed onto the sponsors' balance sheets, as investors refused to roll their short-term liabilities. See Covitz, Liang, and Suarez (2009).

There are several important differences between the special purpose vehicles (SPVs) used in securitization and ABCP conduits and SIVs. First, securitization SPVs are not managed; they are robot companies that are not marked-to-market. New portfolios of loans may be sold into these SPVs, but they simply follow a set of prespecified rules. Unlike securitization vehicles, ABCP conduits and SIVs are managed, though there are strict criteria governing their decisions; portfolio managers make active decisions. Secondly, they are market-value vehicles. That is, they are required by rating agencies to mark portfolios to market on a frequent basis (daily or weekly), and based on the marks they are allowed to lever more or required to delever. On SIVs, see Moody's (January 25, 2002), and on ABCPs see Moody's (February 3, 2003).

CDOs and CLOS are special purpose vehicles that buy portfolios of ABS, in the case of CDOs, and commercial and industrial loans, in the case of CLOs. These are financed by issuing different tranches of risk in the capital market, rated Aaa/AAA, Aa/AA to Ba/BB. These vehicles are also managed, that is,

not completely passive. CDOs are described by Duffie and Garleanu (2001) and Benmelech and Dlugosz (2009); also see Longstaff and Rajan (2008). CLOs are discussed by Benmelech, Dlugosz, and Ivashina (2010).

The securitization that is the focus of this survey is by far quantitatively the most important.

III. Overview of the Performance of Asset-Backed Securities

In this section we briefly review the performance of asset-backed securities. First, we look at the growth and size of the market. Second, we examine the default performance and ratings performance of asset-backed securities. Next we examine spreads. Finally, we briefly look at ABS during the recent financial crisis.

A. The Size and Growth of the ABS Market

As discussed in the Introduction, securitization was sizeable prior to the recent financial crisis. To briefly review, Figures 1-4 show the issuance amounts annually for U.S. mortgage-related ABS, non-mortgage ABS and European issuance. Mortgage-backed securities represent a very large asset class. See Table 1. By looking at non-mortgage ABS, and comparing that to U.S. corporate issuance, a better sense of the significance of securitization is portrayed; see Figure 2. Indeed Figure 2 shows that in 2005 issuance of non-mortgage ABS exceeded corporate bond issuance by a small amount. The main categories of non-mortgage ABS include credit card receivables, automobile loans, and student loans. Table 2 and Table 3 show the amounts of non-mortgage ABS outstanding amounts and amounts by issuance, respectively.

Securitization is not just a U.S. phenomenon. It is a global phenomenon. The amounts issued in Europe are also significant. Figure 4 shows European issuance of some selected asset classes of ABS. Tables 4 and 5 show European securitization outstanding amounts and amounts by issuance, respectively. Table 6 breaks down European issuance by country. Securitization is also important in Asia and Latin America; see, e.g., Gyntelberg and Remolona (2006) and Scatigna and Tovar (2007).

Further, securitization prior to the financial crisis was growing in the sense that new asset classes were increasingly securitized. Table 7 lists some of the asset categories that have been securitized. The securitization of life insurance assets and liabilities is an important new asset class; see Cummins (2004) and Cowley and Cummins (2005).

B. The Default and Ratings Performance of ABS

We next present a general overview of the default and ratings performance of asset-backed securities. There are several ways to describe performance. One way is to examine default rates. Another is to look at credit rating changes. Our goal is modest. We want to convey some sense of performance, by these measures. We do not present an analysis of this asset class in a portfolio context. We start by looking at Standard and Poor's default rates, in Table 8. The table shows cumulative default rates (conditional on survival) as a percentage for all globally-issued asset-backed securities, over the period 1978-2010. Also, for comparison purposes are cumulative default rates for U.S. corporate bonds. The table looks at cumulative default rates for one year through ten years. Standard errors are in parentheses. The table shows the following:

- Comparing AAA-rated ABS to AAA-rated corporate bonds, ABS AAA-rated securities have significantly higher cumulative default rates compared to corporates.
- This is also true of all other rating categories, but the differences lessen as ratings worsen.
- The standard errors of the default rates are also higher for ABS.

Table 9 is similar in that it looks at cumulative impairment rates for ABS, and separates ABS without excluding subprime-related securities, the top panel, from subprime mortgage-backed securities, in the middle panel. In the bottom panel is comparable information for globally issued corporate securities. Impairment is different than default, which is a more certain endpoint for the security. Default is relevant to debt and includes: (1) a missing or delayed contractually obligated interest of principal payment; (2) bankruptcy or receivership; (3) distressed exchange; or (4) change in terms of payment imposed by a sovereign that result in a lower financial obligation. "Impairment" includes those four events and also includes cases where: (1) there has been an interest shortfall or principal write-down or loss that has not been cured; (2) the security has been downgraded to Ca or C; or (3) has been subject to a distressed exchange. Impairment status may change over time if a security cures an impairment event. See Moody's (2011).

Table 9 breaks out subprime, revealing some very important differences:

- ABS impairment rates, excluding subprime, are still higher than the default rates for global corporate (non-ABS) securities, but the difference is not as great.
- Impairment rates for subprime mortgage-backed securities are significantly higher than for ABS excluding subprime.

- As in the previous table, default rates for global corporate (non-ABS) securities are lower than for subprime.

Table 10 shows time series 5-year default rates for global ABS over the period 1978-2010, by year and rating. The financial crisis took place during 2007-2008, but the effects on ABS defaults have a lag. These data show that the years of 2009 and 2010 account for the higher default rates. This is the effect of the financial crisis. Below we will look at the financial crisis in terms of spreads.

C. ABS Performance in Terms of Spreads

We next examine ABS spreads. As with credit ratings, we use the spreads on AAA corporates, namely, Industrials, as a benchmark. The Industrials are in the form of credit default swaps. We focus on AAA because corporate bonds and asset-backed securities with this rating should be the most comparable. We compare Prime Auto ABS with a 3-year maturity and Credit Card ABS with a 5-year maturity, to AAA Industrials with a maturity in the 3-5 year bucket.

The data are from a dealer bank and represent on-the-run bonds. We focus on the difference in spreads to highlight the difference between AAA Credit Card ABS and Industrial Corporates, conditional on rating. Figure 8 shows the difference in spreads over the period 2001-2005, a relatively normal period. Several points stand out. First, the difference in spreads is typically positive, that is, AAA Credit Card ABS trade higher than AAA Industrial Corporates. Secondly, looking at the scale on the y-axis, the difference in spreads is typically very low, around 10 basis points. Also, not observable is the observation that the Industrial Corporate spreads are more volatile. No research that we know of has investigated whether these observations are true more generally.

D. Performance During the Financial Crisis

In terms of ratings we saw the effects of the financial crisis above. Figure 9 again looks at the difference in spreads between AAA Credit Cards and Industrial Corporates, as in Figure 8, but now for the period 2005 through March 2011, spanning the financial crisis. The spread on AAA Credit Cards spikes during the crisis, relative to Industrial Corporates. Figure 10 shows the level of the spread for AAA Credit Cards and Industrial Corporates, as well as AAA Prime Auto receivables. During the crisis, all three asset classes moved together, although none are subprime. See Gorton and Metrick (2010a).

Although SPVs are separate legal entities, during the financial crisis sponsors brought their credit card off-balance sheet vehicles back on balance sheet. For example, in December 2007 Citigroup brought $49

billion of SPV assets that had been securitized back on balance sheet. JP Morgan and Bank of America also did this. See Scholtes and Guerrera (2009). We discuss this later.

In Section VIII we further discuss the financial crisis and related literature.

IV.   A Simple Model of the Securitization Decision

In this section we discuss the theory concerning the private securitization decision. Gorton and Souleles (2006) present a slightly more complicated version of this model and solve for the equilibrium. The point of the model outline is to provide a framework for discussing the empirical and institutional literature in later sections.

Suppose the riskless interest rate, r, is 0 and that all agents are risk neutral. Borrowers and lenders must then break-even. A competitive bank has two one-period loans, each of $1 principal; each dollar is to be repaid at the end of the period (since r=0). Suppose each loan defaults with independent probability p. If a loan defaults it repays nothing. The loans are financed with equity (E) and debt (D). The debt (demand deposits) is special in the sense that it is used as a transaction medium, so it has a convenience yield of ρ. We assume that E<$2, so some debt is needed. The debt is one-period and promises to repay F at the end of the period (since r=0). Debt is tax-advantaged so that effectively only $(1-\tau)F$ needs to be repaid, where τ is the relevant tax rate. If the bank defaults then there is a bankruptcy cost, c, borne by the creditors. Further, for simplicity, we assume that 2>F>1, i.e., both loans must pay off in order to repay the debt holders without losses.[6] In other words, there are effectively two outcomes: both loans payoff, which occurs with probability $(1-p)^2$, in which case creditors are repaid in full; there is a default by the bank, in which case creditors lose c.

In order for investors to be willing to buy the debt of this bank, the repayment amount F must satisfy:

$$(1 - p)^2 F - c[2p(1 - p) + p^2] \geq D(1 - \rho), \tag{1}$$

where the probability that both loans succeed is $(1-p)^2$, and the other three cases involve the bank failing and the creditors recovering nothing and bearing the bankruptcy cost c.[7]

From (1), the lowest promised repayment amount that the lenders will accept is:

$$F = \frac{D(1-\rho)+cp(2-p)}{(1-p)^2}.$$

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[6] Since F is endogenous this assumption is really an assumption concerning the underlying parameters, but we omit these details.

[7] The bank can fail when only one loan defaults, but the model assumes that in bankruptcy nothing is recovered from the nondefaulting borrower. This is for simplicity.

The bank's expected profit is:

$$\Pi \equiv 2(1-p)^2 - (1-\tau)F = 2(1-p)^2 - (1-\tau)\left[\frac{D(1-\rho)+cp(2-p)}{(1-p)^2}\right]. \tag{2}$$

It is apparent that on-balance sheet debt is more advantageous to the extent that it is tax-advantaged and less desirable to the extent that the bankruptcy cost is higher. Further, if there is a convenience yield on the bank debt, $\rho > 0$, then that also makes debt desirable.

Equation (2) is a simple representation of the traditional bank business model. The bank borrows in the demand deposit market and lends the money out. As long as $\Pi \geq E$, where E is the initial investment of the equity holders, then this is a successful business model. Moreover, because of limitations on entry and subsidized deposit insurance, it may be that $\Pi > E$. That is, because of limited entry into banking and local monopoly power, the bank may earn monopoly rents, not included in the above model. In the banking literature, such rents are referred to as "charter value" or "franchise value" and potentially play an important role.

Later we will be interested in the question of why securitization developed. One motivation for the development is that this traditional bank business model became less profitable, and charter value declined in the face of competition. For example, if money market mutual funds entered the market to compete with demand deposits then D would fall to D' ceteris paribus. If junk bonds entered to compete with loans, then possibly the remaining lending opportunities became riskier, p rising to p'. We review the evidence on this below.

Now, consider the case where one loan is securitized. This means that the bank sells one loan to a special purpose vehicle (SPV), which finances the purchase of the loan by issuing debt in the capital markets. The SPV will borrow D_{SPV} promising to repay F_{SPV} at the end of the period. The bank then has two assets on its balance sheet, an equity claim on the SPV and one loan. Suppose that the bank uses the proceeds of the loan sale to the SPV to pay down on-balance sheet debt.

The SPV has no bankruptcy costs; its debt is not tax-advantaged. The asset-backed security issued by the SPV, D_{SPV}, may also provide a convenience yield to its holder, ρ'.[8]

With securitization (sec) investors in the on-balance sheet debt require:

$$(1-p)F - cp \geq D_{sec}(1-\rho).$$

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[8] This is because ABS were used as collateral in sale and repurchase agreements, as we discuss later.

D_{sec} indicates the on-balance sheet debt when the bank has securitized a loan, to be distinguished from D above, the case where there is no securitization. Both of these may involve a convenience yield, but we keep such notation suppressed.

And investors in the off-balance sheet debt require:

$$(1-p)F_{spv} \geq D_{spv}(1-\rho') ,$$

where $0<\rho<1$ is the convenience yield.

So, $F = \frac{D_{sec}(1-\rho)+cp}{(1-p)}$ and $F_{spv} = \frac{D_{spv}(1-\rho\prime)}{(1-p)}$.

With securitization (sec), bank profits now are:

$$\Pi_{sec} \equiv \underbrace{(1-p)-(1-\tau)F}_{\text{On-balance sheet}} + \underbrace{(1-p)-F_{spv}}_{\text{Off-balance sheet}} = 2(1-p)-(1-\tau)\left[\frac{D_{sec}(1-\rho)+cp}{(1-p)}\right] - \frac{D_{spv}(1-\rho\prime)}{(1-p)}$$

On-balance sheet   Off-balance sheet

Assume that the on- and off-balance sheet positions are symmetric, i.e., $D_{sec}=D_{spv}=0.5D$. Then:

$$\Pi_{sec} - \Pi = 2(1-p)-(1-\tau)\left[\frac{0.5D(1-\rho)+cp}{(1-p)}\right] - \frac{0.5D(1-\rho\prime)}{(1-p)} - 2(1-p)^2 + (1-\tau)\left[\frac{D(1-\rho)+cp(2-p)}{(1-p)^2}\right]$$

(3)

If (3) is positive, then securitization is profitable, otherwise not. To understand (3), let:

$$A \equiv 2(1-p)-2(1-p)^2;$$

$$B \equiv -\frac{cp}{(1-p)}+\frac{cp(2-p)}{(1-p)^2};$$

$$C \equiv \tau\left[\frac{0.5D(1-\rho)+cp}{(1-p)} - \left(\frac{0.5D(1-\rho)+cp(2-p)}{(1-p)^2}\right)\right]; \text{ and}$$

$$D \equiv \frac{0.5D(1-\rho)}{(1-p)^2} - \frac{0.5D(1-\rho)}{(1-p)} + \frac{0.5D(1-\rho')}{(1-p)^2} = \frac{0.5D(\rho'-\varrho)}{(1-p)^2} - \frac{D(1-\rho)}{(1-p)}.$$

So, $\Pi_{sec} - \Pi = A + B + C + D.$

Note that $A = 2p(1-p) > 0$. Also, $B = \frac{cp}{(1-p)^2} > 0$; $C = \frac{-\tau}{(1-p)^2}[0.5D(1+p)-cp]$; $D = \frac{0.5D(\rho'-\varrho)}{(1-p)^2} - \frac{D(1-\rho)}{(1-p)}$.

The four terms identify some possible sources of value to securitization, as compared to financing all assets on-balance sheet. Term A (bankruptcy optionality) is unambiguously positive because the bank now has the option of going bankrupt in pieces. That is, the off-balance sheet loan can default without the bank going bankrupt. Term B (bankruptcy costs) is unambiguously positive because expected bankruptcy costs are lower, since the SPV does not face bankruptcy costs. Term C (taxes) is ambiguous. There is a loss of a valuable tax shield because less debt is issued on-balance sheet. This favors on-balance sheet debt financing, unless expected bankruptcy costs, cp, are too large. Finally, term D (relative convenience yield) is ambiguous. Its sign depends on the relative convenience yields of on- and off-balance sheet debt. On-balance sheet debt refers primarily to demand deposits. If there is no convenience yield to off-balance sheet debt (i.e., $\rho'=0$), then term D is unambiguously negative, that is, it favors on-balance sheet debt. If the debt issued by the SPV has a convenience yield then this term becomes ambiguous.

Term A appears straightforward, but is perhaps not. All firms would like to be composed of parts, say divisions, which can go bankrupt as stand-alone entities, so that equity holders retain control of the remaining divisions. But, this is not possible because decisions need to be made about the activities of each division and these decisions are made by the "firm." Value is added presumably by corporate decisions, overseen by the equity holders. Corporate control over the activities ties control rights to cash flow rights. Thus, the divisions are part of the firm, and it is this entity—the firm—that borrows and faces the possibility of bankruptcy. How can a financial firm divide itself into parts, the on-balance sheet firm and the off-balance sheet SPV? The answer is that the cash flows sold to the SPV are passive; there are no further decisions to be made since the loans have already been granted. What remains is for borrowers to repay the loans (servicing is outsourced) and, if they do not, for repossession to take place (also outsourced). In this sense, the cash flows are passive. Consequently, cash flow rights and control rights can be separated.

The sign of B, the bankruptcy costs, is unambiguous because the SPV cannot become bankrupt. This was an innovation. That is, the design of SPVs to have this feature is an important part of the value of securitization. Moreover, it has economic substance. Since the cash flows are passive, there are no valuable control rights over corporate assets to be contested in a bankruptcy process. Thus, it is in all claimants' interest to avoid a costly bankruptcy process. Below, we review some of the legal features which make the SPV liquidation-efficient.

The tax advantage of on-balance sheet debt, term C, is straightforward. The tax advantage does not apply to SPV debt because SPVs are tax neutral. If they were not, then the profits from lending would be taxed twice, making securitization infeasible. However, the model does not include taxes on corporate profits.

Han, Park, and Pennacchi (2010) point out that the presence of profit taxation favors securitization. On-balance sheet funding requires some equity financing because of regulatory capital requirements or internal risk management. But, such bank equity is costly because it does not have a tax shield like debt does. Consequently, the bank will end up paying taxes on the returns from its equity capital financing. Compare this to securitization. When the bank funds off-balance sheet, the SPV pays no corporate taxes. So, on-balance sheet financing, to the extent that it is equity financed, is disadvantage to the bank's shareholders. We discuss Han, Park, and Pennacchi's (2010) empirical tests of this mechanism in Section VII.

Finally, there is the issue of the relative convenience yield. Demand deposits are used as a transaction medium, and consequently may earn a convenience yield. Since there are now competitors to demand deposits, in particular, money market mutual funds, this convenience yield may have eroded in the last thirty years. We discuss the literature on this below. Also, as we discuss below, there may also be a convenience yield that derives from the debt issued by SPVs, since this debt was used as collateral for sale and repurchase agreements prior to the crisis. Even if not used as collateral, there may be a demand for AAA-rated assets if they are easier to sell (if need be) without incurring losses (to better informed agents).

V. The Origins of Securitization

Securitization is a fairly recent development, having started roughly thirty-five to forty years ago.[9] Why did it start? In this section we outline some of the hypotheses about the origins of securitization, and tie these hypotheses and some evidence to the components of the model from Section IV. We first discuss the literature related to the possible changes that caused financial intermediaries to move increasingly to off-balance sheet financing. Then we briefly outline possible explanations for where the demand for asset-backed securities came from, that is, who are the investors? And, what are the uses of asset-backed securities? Here, there is even less literature and so we are necessarily speculative. Thirdly, we ask whether there was financial innovation specific to securitization that reduced its cost and assisted its introduction and growth.

A. The Supply of Securitized Bonds

Why did banks switch from on-balance sheet financing to off-balance sheet financing? Above, we have outlined the factors affecting this decision. In this subsection we ask what changed to alter this

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[9] McConnell and Buser (2011) detail the history of the development and evolution of the mortgage-backed securities market, which started in 1968. Goetzmann and Newman (2009) discuss the commercial real estate mortgage bond market in the 1920s.

calculation. Banking scholars have documented important changes in U.S. banking starting in the early 1980s that caused the traditional banking model to become less profitable.[10] Securitization appears at the same time, suggesting that it was a response to the decline in profitability. In the context of the model, these changes can take many forms or it could just be that increased competition forces managers closer to the profit-maximizing ideal of our model, and less likely to rely on monopoly rents to lead a quiet life. We briefly review these factors below, although no one has explicitly linked these changes to the origins of securitization.

Basically, the argument is that commercial banks were protected from competition in various ways following the legislation passed during the Great Depression, allowing them to earn monopoly profits. But, this position starts to erode in the 1980s due to competition and innovation. Coming out of the Great Depression banks had unique products, bank loans and demand deposits. Demand deposits were insured and access to corporate debt markets was limited to large firms. Entry into banking was limited for two reasons. First, entry was limited because until 1994 branching across state lines was prohibited.[11] Secondly, entry into banking was restrictive because banks had to obtain a charter from either the federal or state government and could not branch across state lines. Peltzman (1965), in a famous paper, concluded that competition for chartering banks was reduced by the passage of the Banking Act of 1935. He found that the federal control of chartering reduced the rate of bank entry by at least 50 percent, based on a comparison of the rate of entry before 1936 to the rate during the period 1936-1962. Due to limited entry, banks had local monopolies on demand deposits, e.g., see Neumark and Sharpe (1992), and Hannan and Berger (1991). There were also more direct subsidies to banks in the form of interest rate ceilings on deposit accounts (Regulation Q, which had its origin in the original deposit insurance legislation), until lifted by the Monetary Control Act of 1980.[12] On the asset side of bank balance sheets, bank loans were the main source of external funding for nonfinancial firms. In particular, prior to the 1980s firms with no presence in the capital markets relied on banks for funding. In short, having a bank charter was valuable. In the banking literature this became known as "charter value."

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[10] See Keeley (1990), Barth, Brumbaugh, and Litan (1990, 1992), Boyd and Gertler (1993, 1994), and Berger, Kashyap, and Scalise (1995), among many others.

[11] The Riegle-Neal Interstate Banking and Branching Efficiency Act eliminated branching interstate restrictions when it was enacted in 1994. This act allowed banks to establish branches nationwide, eliminating barriers to interstate banking. Prior to this legislation, however, banks had themselves been deregulating intrastate branching restrictions. See Jayarante and Strahan (1997).

[12] The Banking Acts of 1933 and 1935 prohibited the payment of interest on demand deposits; the Federal Reserve was authorized to set interest rate ceilings on time and savings deposits. See Gilbert (1986). Congress passed the Depository Institutions Deregulation and Monetary Control Act in late 1980 and the Garn-St Germain Depository Institutions Act in late 1982. These acts phased-out Regulation Q and allowed banks to offer interest-bearing money market deposit accounts to compete with MMMFs. The economic effects of Regulation Q are less clear. See, e.g., Friedman (1975) and James (1983).

The traditional and comfortable model of banking changed dramatically during the 1980s and 1990s. These changes have been much noted and much studied, so we only briefly review them here. Berger, Kashyap, and Scalise (1995), who exhaustively document the changes, put it this way in 1995: "Virtually all aspects of the U.S. banking industry have changed dramatically over the last fifteen years" (p. 55). They go on to describe the 1980s and the first half of the 1990s as "undoubtedly the most turbulent period in U.S. banking history since the Great Depression" (p. 57). Limited entry protection disappears during the 1980s. Keeley (1985) argued that: "The recent deregulation of banking, in particular the removal of deposit-rate ceilings on almost all types of consumer accounts, appears to be taking place in an environment in which entry restrictions have been effectively eliminated or at least have been substantially relaxed." A large literature documents the decline in bank charter value; see, e.g., Keeley (1990).

Two particular changes are worth briefly noting, one on each side of the bank balance sheet. On the asset side, substitutes for bank loans arose and took market share away from banks. In the 1980s there was a dramatic shift in corporate finance: junk bonds and commercial paper became substitutes for bank longer-term and shorter-term loans, respectively, and represent an important step in the unbundling of the traditional intermediation process. Junk bonds (high yield bonds or below investment-grade bonds) substituted for bank loans. Instead of regulated commercial banks, other firms, notably Drexel Burnham Lambert, specialized in underwriting debt for below investment-grade companies. Taggart (1988a,b) documents this change, observing that bank loans accounted for 36.6 percent of the total credit market debt raised during the period 1977-1983, but only 18.2 percent of the total debt raised between 1984 and 1989. Borrowing via public debt markets increased from 30.5 percent to 54.2 percent over this period. The junk bond market grew from $10 billion in the early 1980s to over $200 billion by the end of the decade (see Taggart (1990)). This growth came at the expense of bank loans. Benveniste, Singh, and Wilhelm (1993) provide evidence that junk bonds and bank loans are substitutes. They examine the abnormal returns to money-center banks associated with the SEC's actions against Drexel and find statistically and economically excess returns associated with these events. E.g., bad news for Drexel was good news for large commercial banks; and good news for Drexel was bad news for the money center banks. Small banks' stocks were not affected, but other investment banks benefited when there was bad news for Drexel, and vice versa.

The competitor with short-term bank loans is commercial paper (CP), a short-term debt contract issued directly by firms into the capital markets. The growth in this market is described by Post (1992). Over the 1980s, the CP market (outstanding) grew at a 17 percent average annual compound growth rate (see Post (1992). Also see Hurley (1977). CP has many of the attributes of short-term, unsecured, bank loans,

but it is not a good substitute for loans for all firms because only the largest most credit-worthy firms can issue CP.

Commercial banks also came under attack on the liability side of the balance sheet; see Keeley and Zimmerman (1984, 1985). Another very marked transformation to the financial system was the shift in the source of transaction media away from demand deposits towards money market mutual funds (MMMFs).[13] MMMFs were a response to interest rate ceilings on demand deposits (Regulation Q). In the late 1970s MMMFs were around $4 billion. In 1977 interest rates rose sharply and MMMFs grew in response, growing by $2 billion per month during the first five months of 1979 (see Cook and Duffield (1979)). The Garn-St. Germaine Act of 1982, however, authorized banks to issue short-term deposit accounts with some transaction features, but with no interest rate ceiling. These were known as "money market deposit accounts." In the three months after their introduction in December 1982 these accounts attracted $300 billion. Keeley and Zimmerman (1985) argue that the response of banks resulted in a substitution of wholesale for retail deposits, and direct price competition for nonprice competition, both responses resulting in increased bank deposit costs.

Competition and deregulation lowered bank profits starting in the early 1980s. The traditional model of banking broke down. This is the environment in which securitization arose. If banks found that off-balance sheet financing was cheaper than on-balance sheet financing, given that the cost of bank capital rose, for example, due to deposit rate ceilings being lifted, among other things, then there was an incentive to securitize. This, however, remains an important topic for future research.

B. Relative Convenience Yield and the Demand for Securitized Bonds

If banks had an incentive to supply asset-backed securities starting in the 1980s, where did the demand for these securities come from? Institutional investors no doubt provided one source of the demand. The amount of money under the management of institutional investors also grew exponentially during this period. But, the demand for securitized bonds may also be linked to a significant extent to the growth in the demands for collateral. In different parts of financial markets participants need to post collateral. The collateral must be high-grade bonds. If the demand for collateral exceeds the available stock of U.S. Treasury bonds and agency bonds, then asset-backed securities would be needed as collateral. In the language of our model, the increased demand for safe collateral would be an increase in the convenience yield of securitized bonds (ρ') and a decrease in the relative convenience yield of bank deposits (ρ). This appears to have been the case, though the evidence is very indirect.

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[13] Money market funds are registered investment companies that are regulated by the Securities and Exchange Commission (SEC) in accordance with Rule 2a-7 adopted pursuant to the Investment Company Act of 1940.

Demands for collateral come primarily from three areas. First, in the last thirty years derivative products, e.g., interest rate swaps and swaptions, foreign exchange swaps, have grown from nothing to many trillions of dollars of notional. Derivatives require posting collateral when the position becomes a liability for one side of the transaction. Secondly, clearing and settlement requires the posting of collateral. Ironically, securitization increases the volumes in clearing and settlement as it creates securities out of previously non-tradeable loans. Thirdly, with the rise of institutional investors and more sophisticated corporate treasury departments, the use of sale and repurchase agreements (repo) appears to have increased dramatically. Repo requires the use of collateral. Added to these increases in demands is the fact that a very large fraction of U.S. fixed income securities are held abroad and not available for use as collateral. Prior to the government response to the financial crisis, it seems that there was an insufficient amount of U.S. Treasuries available for use as collateral, and ABS have many design features that make them a useful substitute.

Securitization has important features that make it very attractive as collateral. A desirable feature of collateral is that it is information-insensitive (see Gorton and Pennacchi (1990), and Dang, Gorton, and Holmström (2011)), so it preserves value. "Information-insensitive" refers to the property of debt that it is not (very) profitable for an agent to produce private information about the payoffs of the security. Such securities can be traded without fear of adverse selection. ABS are debt claims, and so are senior securities.   Further, asset-backed securities have some unique features that make them particularly valuable as collateral. First, the SPV organized as a trust has no equity that is traded, so no one has an incentive to produce information about this residual claim, and so as a by-product there is no information produced that would have an impact on the ABS. Second, there is no managerial discretion that can dramatically alter the risk profile of the underlying assets. Since the assets are passive cash flows, emanating from many contractual arrangements, the assets of the SPV are expected to retain their value. In other words, the payoffs are more certain, since they are not affected by managerial discretion. Schwarcz (2003, p. 561): "The essential difference between [commercial trusts and corporations] turns on the degree to which assets need to be at risk in order to satisfy the expectations of residual claimants. In a corporation, the residual claims are sold to third-party investors (shareholders) who expect management to use corporate assets to obtain a profitable return on their investments. But that creates a risk that the corporation will become insolvent . . . In contrast, a commercial trust's residual claimant is typically the settler of the trust, who . . . does not expect a risk-weighted return. The expectations of the trust's senior and residual claimants are therefore the same: to preserve the value of the trust's assets."

With respect to the use of collateral for derivatives positions, there are surveys conducted by the International Swaps and Derivatives Association (ISDA). According to ISDA (2009), "the amount of

collateral used in connection with over-the-counter derivatives transactions grew from $2.1 to $4.0 trillion during 2008, a growth rate of 86 percent, following 60 percent growth in 2007" (p. 2). Growth in collateral for derivatives grew not only because the use of derivatives grew, but also because the use of collateral to mitigate counterparty risk in derivatives grew, and the use of two-way collateral agreements has grown.[14] Also, see Bank for International Settlements (BIS) (2007).

With regard to clearing and settlement, real-time gross settlement systems (RTGS) have been widely adopted in the last twenty years (see, e.g., BIS (1997)).[15] Problems can arise in a RTGS system when one bank does not have enough funds in its central bank account, in which case the transaction can be rejected or the central bank can extend intraday credit. The possibility that credit may be extended to a bank raises the question of collateral requirements. Many central banks provide intraday credit through fully collateralized intraday overdrafts or intraday repos. In general, the amount of collateral required varies across different RTGS systems and across the parties involved. There are no data available to determine how much collateral is used for clearing and settlement.

The final source of demand for collateral is the repo market. In a sale and repurchase agreement (or repo) one party (the lender) deposits cash with another party, the borrower. The transaction is short-term, usually overnight, and the depositor receives interest on their deposit. To ensure the safety of the deposit, the depositor receives collateral, which he takes physical possession of. The issue is, what is this collateral?

The repo market appears to have grown enormously over the last 30 years, but there is limited data with which to measure this growth. Although there a variety of suggestive evidence, the unfortunate reality is that no official data are available on repo other than what the Federal Reserve collects with regard to the repo amounts done by the 19 primary-dealer banks. According to Fed data, primary dealers reported financing $4.5 trillion in fixed income securities with repo as of March 4, 2008. But, this covers only a fraction of the repo market in the U.S.[16] The U.S. Bond Market Association (now known as the Securities Industry and Financial Markets Association) conducted a survey of repo and securities lending in 2005, estimating that the total exceeded $5.21 trillion. Estimates of the size of the repo market in total lead roughly to a market that is about $10 trillion. See Gorton and Metrick (2010a), Singh and Aitken (2009),

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[14] A two-way collateral agreements is one in which both counterparties to the trade are required to post collateral whenever they generate an exposure that exceeds a certain agreed threshold, which can be set at zero. In one-way collateral agreements, only one of the counterparties is required to post collateral. The other counterparty is usually of much higher credit standing.

[15] A RTGS effects final settlement of fund transfers on a continuous basis during the processing day rather than at pre-specified times.

[16] Federal Reserve Flow of Funds data on repo only cover the U.S. primary dealers and so are even lower than the Federal Reserve numbers.

and Hördahl and King (2008) for different approaches to estimate the size of this market. While the available evidence is very suggestive that the repo market is very large, it is impossible to say exactly how large.

As mentioned, these three sources of demand for collateral may have outstripped the available collateral in the form of agency and Treasury bonds. In fact, of all the available collateral consisting of U.S. Treasuries, agency bonds, corporate bonds, and asset-backed securities, a large fraction is held abroad. But this is reduced by foreign holdings of U.S. securities, which may not then be available to use as collateral. Foreign holdings of U.S. securities have grown significantly in recent years. In June 2007, foreigners held 57 percent of U.S. Treasuries, 21 percent of U.S. government agency debt, and 23 percent of U.S. corporate and asset-backed securities. See U.S. Treasury (2010). It is not known how much of this is unavailable for use as collateral.

There is no direct evidence that these demands for collateral led to increased asset-backed security supply. With a lack of relevant data, the evidence that there is a shortage of collateral is indirect. For example, the Bond Market Association *Research* (February 1998, p. 2) writes:

> . . . repo activity involving financial assets other than U.S. government obligations are increasing due to dealers' and investors' desire to achieve the least expensive and most efficient funding sources for their inventories. In recent years market participants have turned to money market instruments, mortgage and asset-backed securities, corporate bonds and foreign sovereign bonds as collateral for repo agreements. Many market participants expect the lending of equity securities to become a growing segment of the repo market, in light of recent legislative and regulatory changes.

And the Bank for International Settlements (2001):

> The use of collateral has become one of the most important and widespread risk mitigation techniques in wholesale financial markets. Financial institutions extensively employ collateral in lending, in securities trading and derivatives markets and in payment and settlement systems. Central banks generally require collateral in their credit operations.
>
> Over the last decade, the use of collateral in wholesale financial markets has grown rapidly. The collateral most commonly used and apparently preferred by market participants are instruments with inherently low credit and liquidity risks, namely government securities and cash. With the growth of collateral use so rapid, concern has

been expressed that it could outstrip the growth of the effective supply of these preferred assets. Scarcity of collateral could increase the cost of financial transactions, slow or inhibit financial activity and potentially encourage greater reliance on more inefficient non-price rationing mechanisms, such as restricting access to markets. (p. 2)

The demands for collateral may have led to demands for asset-backed securities, raising their issue prices and thus making them more attractive to issue. This too is a subject for future research.

C. Securitization and Financial Innovation

Since the use of ABS as collateral rests on its contractual features, the growth of securitization may be related to financial innovation in the structure and design of the special purpose vehicle. Securitization requires that some legal entity buy the pool of loans sold by the originator. One important issue concerns the legal form of this entity, the special purpose vehicle or special purpose entity. The first question to be broached in this subsection concerns the choice of legal entity for the SPV, and further, whether there was some innovation with regard to the legal entity that facilitated the growth of securitization. The second question concerns "bankruptcy remoteness." This is the issue of the separation of the assets sold to the SPV from the originator, in the legal sense that if the originator enters bankruptcy, the assets sold cannot be clawed back. Finally, there is the issue of the structure of the SPV so that it cannot enter bankruptcy.

The SPV cannot be an incorporated firm because incorporation faces double taxation, at the corporate level when the income is earned and then again at the shareholder level when the firm pays dividends to distribute the income. (Although Subchapter S allows this to be avoided, it has some drawbacks.) There are alternatives. Many new legal forms for business organizations are relatively recent arrivals. In the last thirty years limited liability companies, limited liability partnerships, and statutory business trusts have all come into existence. See Hansmann, Kraakman and Squire (2005). These legal forms are alternative legal structures for housing businesses.

In the example considered above, the Chase Issuance Trust, the SPV was a Delaware Trust, a statutory business trust. The business trust appears to be the basic legal form of the SPV used in securitization. Trusts are also the dominant form of organizations for structuring mutual funds and pensions.[17] There is little research on why this is so. In fact, Schwarcz (2003, p. 560) notes that "There are not even clear answers to the fundamental question of whether trusts are a better form of business organization than

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[17] Jones, Moret and Storey (1988) discuss the history of registered investment companies using the Massachusetts business trust form.

corporations or partnerships." Innovation, if it did occur, is related to the use of the business trust and its subsequent evolution into a statutory trust, as explained below.

Trusts are very old, and most commonly were donative trusts, that is, they were used to holds gifts of property, for a beneficiary. Historically, the property was land and buildings. However, the legal form of the trust was adapted to a more modern use. As Langbein (2007) puts it: "What is new is that the characteristic trust asset has ceased to be ancestral land and has become instead a portfolio of marketable securities . . . modern trust property typically consists of these complex financial assets…" (p. 1072). This evolution of the type of property held by trusts, also described by Langbein (1995), required legislation to adapt the trust form for this new purpose. For example, trustees need expanded powers and more discretion. Sitkoff (2011) discusses fiduciary obligations in trust law. The Uniform Trusts Act of 1937 and the Uniform Act for Simplification of Fiduciary Security Transfers of 1958 were two such pieces of legislation (see Langbein (2007)). For securitization, another issue was prominent.

There was legal uncertainty about the legality of the trust form and about the limited liability of trusts. Some states explicitly rejected trusts as a legal form, viewing them is incompatible with corporate regulatory rules. There was no statutory recognition of limited liability. Consequently, the promulgation of the Delaware Business Trust Act (1988) was important; it eliminated this uncertainty. The motivation for this act, according to Sitkoff (2005, p. 36) was to provide a viable alternative legal form for business organizations. This act removed the uncertainty about limited liability (see Hansmann and Mattei (1998), p. 474, note 8), and contained no restrictions on the form of business (see Ribstein (1992, p. 423)). Sitkoff (2005, p. 32), under this act: "The statutory business trust is not only exceedingly flexible, but more importantly it resolves the problems of limited liability and spotty judicial recognition that have cast a pall over the use of the common-law business trust."

It is also important that Delaware took this step, as this state dominates corporate law. As Levmore (2005, p. 205) put it: " . . . Delaware is significant, and perhaps as important, in partnerships and limited liability companies as it is for corporations. Whatever the source of if its dominance in corporate law, that . . . carries over to uncorporate law." Various states adopted general business trust statutes following Delaware (though a few states predate Delaware).

Delaware's laws, and similar laws adopted by other states, can suffer from the fact that not all states recognize these laws. The Uniform Law Commission, adopted in 1892, centralizes the drafting of laws so that all states can adopt the same set of rules. The commission has commissioners appointed by the governors of all the states. This commission has, historically, played an important role in transforming traditional donative trust law into stature (see Langbein (2007)). In 2003 a drafting committee for a

Uniform Business Trust Act was set up by the National Conference of Commissioners on Uniform State Law. Sitkoff (2005, p. 6): "The Uniform Statutory Trust Entity Act, now in draft form, validates the statutory trust as a permissible form of business organization." In 2009 the Uniform Statutory Trust Entity Act was passed, and is currently being revised. See Rutledge and Habbart (2010) for a summary.

The Delaware act was important for modifying and clarifying a number of troublesome features of the traditional trust. But, the issue of bankruptcy remoteness was still troubling. One of the most important issues in securitization concerns the status of the claims of the SPV investors in the event that the originator of the SPV's assets goes bankrupt. That is, the issue is that of whether there was a "true sale" so that the creditors of the originator cannot claim to be entitled to the securitized assets. This issue first arose in the bankruptcy case of LTV Steel Company in which LTV challenged its own securitizations, claiming that they were not true sales.

The LTV Steel case (*In re* LTV Steel, Inc., No. 00-43866, 2001 Bankr. LEXIS 131 (Bankr. N.D. Ohio Feb. 5, 2001)) threatened the bankruptcy remoteness concept, but the parties settled prior to a court decision and the parties agreed that there had been a "true sale" of the assets to the SPV. [18] Although the outcome was ambiguous, it did not seem to hamper the growth of securitization. In part, that may have been due to another change, the Bankruptcy Reform Act (2001), which provided a safe harbor for ABS. According to Schwarcz (2002, p. 353-54), writing before the act was passed: " . . . the Reform Act would create, for the first time, a legislative 'safe harbor' regarding what constitutes a bankruptcy true sale in securitization transactions." Under the Act, there is an explicit exclusion from the estate of the bankruptcy entity of an "eligible asset" transferred to an "eligible entity" related to an "asset-backed securitization." The Act also more broadly defines "transferred" with regard to the sale of the assets to the SPV.

The safe harbor part of the Bankruptcy Reform Act of 2001 was still viewed as being uncertain. So, the State of Delaware enacted the Asset-Backed Securities Facilitation Act ("the Securitization Act") in January 2002. This Act also addressed the issue of what constitutes a "true sale" for the purpose of bankruptcy, attempting to strengthen it further. Why was this needed? Carbino and Schorling (2003): "The entire federal interest issue might be moot, however, because an argument exists that the plain language of Bankruptcy Code section 541 expressly preempts the Securitization Act." But, "Our review of federal interests that have been implicated in bankruptcy cases did not reveal a federal interest that expressly trumps the Securitization Act's purpose to ensure that receivables transferred to a SPV are not recaptured as 'property of the estate' in the originator's bankruptcy." The authors conclude that " … the

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[18] Because there was a settlement, no precedent was set in this case. Stark (2002) discusses the case.

efficacy of the Securitization Act remains uncertain. While the Securitization Act may provide some additional level of comfort to investors when Delaware law applies, it is by no means a panacea."

President Bush signed "*The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005*" on Wednesday, April 20, 2005, making it law. Section 541(b)(8) states "any eligible asset (or proceeds thereof), to the extent that such eligible asset was transferred by the debtor, before the date of commencement of the case, to an eligible entity in connection with an asset-backed securitization, except to the extent such asset (or proceeds or value thereof) may be recovered by the trustee under section 550 by virtue of avoidance under section 548(a)."

Despite all this, on April 16, 2009, General Growth Properties, Inc. (GGP), a publicly-traded real estate investment trust, filed for bankruptcy under Chapter 11 of the Bankruptcy Code and included in its filing more of its solvent SPVs that owned property and acted as borrowers under the property-specific loans, which were performing in most cases. The case came as a shock to participants in the securitization market. The issue essentially was whether the SPVs' assets would be substantively consolidated with GGP.

On August 11, 2009 the bankruptcy court delivered a fifty-page opinion that denied the motions to dismiss the case brought by several property-level lenders. See Memorandum of Opinion (2009). The court found that the issues should be evaluated based on the group (the company together with the SPVs), but did not substantively consolidate the entities. The opinion is colored by the financial crisis. The court says, "Faced with the unprecedented collapse of the real estate markets, and serious uncertainty as to when or if they would be able to refinance the project-level debt, the Debtors' management had to reorganize the Group's capital structure. [Secured lenders] do not explain how the billions of dollars of unsecured debt at the parent levels could be restructured responsibly if the cash flow of the parent companies continued to be based on the earnings of subsidiaries that had debt coming due in a period of years without any known means of providing for repayment or refinance" (p. 30). GGP exited bankruptcy in November 2010. It is not clear what the future impact will be.

Another issue related to the above discussion concerns the case when the originator is an FDIC-insured institution. In 2000, the FDIC adopted a rule that when it acted as conservator or receiver it would not use its statutory authority "to disaffirm or repudiate contracts to reclaim, recover, or recharacterize as property of the institution or the receivership any financial assets transferred by an [insured depository] institution in connection with a securitization" (Federal Deposit Insurance Corporation (2010, p. 2). During the financial crisis there was some uncertainty about how the FDIC would behave with respect to securitizations. But, the FDIC ended up continuing the safe harbor for financial assets in securitizations.

Aside from the above issue of the bankruptcy remoteness of the SPV, there is the issue of the SPV itself going bankrupt. The design of the securities issued by the SPV includes early amortization, as discussed above, so holders of these securities are never in a position to put the SPV into bankruptcy if there is not enough cash generated by the underlying portfolio to pay the coupons on the ABS. However, the SPV might still, for other reasons, voluntarily enter bankruptcy. The right cannot be contractually waived under U.S. law (see Klee and Butler (2002)). Consequently, the structure of the SPV must be such as to achieve this waiver in substance. As described by Klee and Butler (2002): "The use of SPVs is simply a disguised form of bankruptcy waiver" (p. 34).

How is this avoidance of the likelihood of voluntary bankruptcy achieved? Standard and Poor's (2002) lists the following traditional characteristics for the SPV to be liquidation-efficient: restrictions on objects, powers, and purposes; limitations on ability to incur indebtedness; restrictions or prohibitions on merger, consolidation, dissolution, liquidation, winding up, asset sales, transfers of equity interests, and amendments to the organizational documents relating to "separateness"; incorporation of separateness covenants restricting dealings with parents and affiliates; "non-petition" language (i.e., a covenant not to file the SPV into involuntary bankruptcy); security interests over assets; an independent director whose consent is required for the filing of a voluntary bankruptcy petition. These are all features designed to ensure that the SPV will never be bankrupt.

There is no research that we know of that discusses the history of how these features of the trust, designed to prevent it from ever going into bankruptcy, evolved over time.

In summary, the legal form and structure of the SPV used in securitizations has evolved in significant ways over the last thirty years. Whether this evolution was a passive response to the growth of securitization or whether the innovations spurred the growth of securitization is not clear.

VI. Security Design and the Cost of Capital: Theory

Securitization raises the obvious possibility of adverse selection (only low quality loans are securitized) and moral hazard (loans that can be sold are not initially screened, or securitized loans are not subsequently monitored). In order to entice investors to buy asset-backed securities there must be explicit or implicit contractual design features that mitigate these obvious problems. Indeed, originators do not have discretion over what loans are sold to the SPV. In general, the criteria for loan eligibility for a pool are carefully set out in the pooling and servicing agreement (a contractual part of securitization). Loans that are securitized are scrutinized by the servicers and the rating agencies. Nevertheless, it may well be the case that originators know more about loan characteristics than outsiders. To the extent that these

asymmetric-information costs exist, they could offset any efficiency gains from the full-information model of Section IV. This section lays out some theoretical issues of security design surrounding asymmetric information, and then Section VII examines the empirical evidence.

In models of securitization the issues of moral hazard and adverse selection have been examined by focusing on two, non-mutually exclusive, features of securitization. One has to do with the design of securitization. Design refers to the issues of pooling (the choice of assets to pool and sell to the SPV) and tranching (the capital structure of the SPV). In principle assets could be sold separately, or in portfolios. What should these portfolios look like? Once the pool has been selected, the SPV will purchase the pool with the proceeds from issuing securities of different seniority in the capital markets. These are called "tranches." The originator retains the most junior, equity, tranche. The second issue is the notion of "implicit recourse," which refers to the originator's possible incentives to support securitizations in which loans in the portfolio do not perform as expected.

The SPV capital structure design problem is no different, in principle, than the capital-structure design problem of any corporation. There is one important difference, however. A firm choosing to raise money externally already has assets-in-place, when it seeks to finance a new project. A securitization SPV can choose the assets to finance.[19] This means that the issue of which loans to pool is potentially related to the design of the capital structure (i.e., the layers of debt or tranches). DeMarzo (2005), Glaeser and Kallal (1997), and Riddiough (1997) look at this issue.

DeMarzo (2005) is interesting because he analyzes the interaction between pooling and tranching. That is, he includes the issue of pooling, the question of whether the loans should be sold separately or "pooled" into a single portfolio, as we observe in securitization. DeMarzo analyzes the different consequences of pooling. On the one hand, pooling assets is not advantageous for an informed issuer because it eliminates the advantage of his asset-specific private information – the "information destruction effect." On the other hand, there is a beneficial "risk diversification effect" of pooling, which is important to buyers precisely because it creates a potentially large low-risk pool, and associated securities, that are less sensitive to the seller's private information. Pooling is diversifying, and together with tranching, maximizes the size of the low-risk security that can be constructed from the pool of assets.

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[19] This depends in part on whether the SPV is a master trust or not. Typically, SPVs are master trusts that finance many vintages of pools of loans. The issue then concerns how the cash flows from different vintage are related, i.e., can the cash flows from one vintage of loans be used to finance asset-backed security obligations of a different vintage, or not. In socialized trusts, such cross subsidization is possible. Socialized trusts then have the equivalent of assets-in-place.

In Glaeser and Kallal (1997) information production by the seller is endogenous. The seller of the asset or pool of assets can produce information at a cost. Also, the seller can choose an amount of information to disclose. In this work the issuer of the securities has a choice of whether to gather information. In that case, pooling assets does not have a clear effect on the issuer's incentives to gather information, and hence on the liquidity of the pool.

Both DeMarzo and Glaeser and Kallal look at securitization as a two-step process, where the first step involves the originator selling a pool of loans to an intermediary, which in turn sells securities to investors. The originator is either uninformed (DeMarzo) or can commit not to take advantage of private information (Glaeser and Kallal). The second step involves an informed issuer designing and selling securities to investors. This requires the creation of the low-risk, low information-sensitivity securities, discussed above. Both papers argue that securitization involves creating liquidity by decreasing the amount of information relevant for valuing the asset-backed securities. Riddiough (1997) has similar results, but also focuses on the governance issues for an SPV, that is, which tranche, junior or senior, should control liquidation or renegotiation issues.

Axelson (2007) considers the case where the buyers are privately informed and sellers are uninformed. An example might be the Resolution Trust Corporation set up in the 1990s to sell the assets of failed savings and loan associations. In this case, the opposite result is achieved. It is optimal for the seller to issue a security that is information-sensitive, such as equity.

Fender and Mitchell (2009) examine the seller's choice of effort in screening borrowers, when making loans that are subsequently securitized. They consider three security designs for aligning incentives: the seller holds the equity tranche, the seller holds a vertical slice (a pro rata portion of each security issued); the originator holds the mezzanine tranche, rather than the equity tranche. Incentives are not always aligned via equity tranche retention. When the probability of a large systemic shock rises, the equity tranche will be wiped out, and a seller/originator will not have an incentive to make a screening effort. In that case, it would be better for the seller to hold the mezzanine tranche. The optimal design can depend on the state of the macroeconomy.

In the model of Greenbaum and Thakor (1987) the low-quality loans are retained and financed largely with insured deposits, while the high-quality loans are securitized. In their setting borrowers are of different default likelihoods. Each borrower knows his own type, but no one else knows borrower type. But, banks and investors/depositors can learn a borrower type at a cost; bank information production costs are lower than the cost to the investors/depositors. A loan can be funded on-balance sheet, in which case bank equity is used to honor the deposit contract should the borrower fail. On-balance sheet funding

involves both the bank and the depositors paying information production costs. Alternatively, securitization is modeled as a partial guarantee of the loan, that is, the borrower buys some insurance from the bank. The bank produces information about the borrower and then offers a borrower-specific loan that is observable to investors and credibly communicates borrower type to investors, who then fund the loan directly. Low types however are better off with on-balance sheet financing because the bank provides too little insurance. There is a separating equilibrium.

There are some features of securitization that seem important but are not directly addressed by the theoretical literature to date. One issue is the fact that the creation of asset-backed securities always involves pooling loans that are homogeneous, that is, a pool consists exclusively of auto receivables, or credit-card receivables. It is not the case that different asset classes are mixed, even when the originator in fact originates many different asset classes. The theories suggest that diversification of the loan pool is important, but we do not observe that in the world. Asset classes are sold separately.

Another important feature of securitization is that there is no secondary (and usually no primary) market for the equity tranche. The most information-sensitive security is held by the originator, so there is no market like the equities market for firms. Originators, historically, have not been obligated to hold the equity tranche, but seem to behave that way, quite likely for incentive reasons. But, the fact that there is no incentive to produce information, and then trade the equity tranche, means that no information is revealed in the way that it is for corporations, via the stock market. This is consistent with the idea that ABS make good collateral. ABS are information-insensitive, in the parlance of Dang, Gorton, and Holmström (2011).

Implicit recourse is the focus of the model in Gorton and Souleles (2006). The idea is that the bank originating the two loans may have an incentive to support the SPV if the loan in the SPV defaults, but the on-balance sheet loan does not default, in the parlance of the above model. "Support" means that bank provides extra-contractual resources to the SPV such that the SPV can honor the debt. (How this happens is discussed below.) In Gorton and Souleles (2006) there are two incentive problems not incorporated in the model in Section IV. First, the bank must make an effort choice, which determines the likelihood of loan default (think of this as a screening effort) and second, the bank selects which loan to put into the SPV after this choice has been made. In other words, there is both a moral-hazard problem (the effort choice) and an adverse-selection problem (which loan type unobservably is placed in the SPV). The bank has an incentive to provide such support via implicit recourse only if the bank has a reputation at stake, which is essentially the present value of the future profits from securitization above the cost of on-balance sheet financing. Implicit recourse, if it exists, is an implicit contract, supported by economic

relationships not by courts of law. The benefits of securitization may depend on the presence of implicit recourse.

The other mechanism for controlling adverse selection and moral hazard is for the originator of the loans being sold to the SPV to retain an equity position in the portfolio. The issue then arises of how large this equity tranche needs to be to convince investors that there are no incentive problems. This issue is analogous to a firm issuing a security to investors, a problem that has been studied extensively in the corporate finance literature. For example, see DeMarzo and Duffie (1999) and Leland and Pyle (1977). In these models a firm is viewed as a privately informed seller of a security which signals a high project value by retaining a portion of the issue.

There has been less attention, either theoretically or empirically, on the pricing of asset-backed securities, and on what those prices (or spreads) reflect (Gorton and Souleles (2006) is one exception). In the model of Section IV, there was a possible convenience yield associated with asset-backed securities. In other words, if there was a demand for ABS due to their use as collateral in sale and repurchase agreements (see Gorton and Metrick (2010a)), then there might be an incentive to issue more ABS because, in this case, there would be a positive convenience yield. On the other hand, if financial intermediaries have an incentive to reduce regulatory capital requirements by moving assets off-balance sheet, they might accept a lower price than otherwise, a "negative convenience yield." Moreover, the price might be lower because of residual investor concerns about moral hazard and lemons problems. It may be that these problems can be contained, but not eliminated. Figures 8 and 9, which show spreads on AAA auto and AAA credit card ABS relative to industrials, strongly suggests that there is something here to explain, another area for future research.

VII.   Security Design and the Cost of Capital: Evidence

In this section, we examine the evidence on the security design and the tradeoff between the symmetric-information benefits of securitization (Section IV) and the asymmetric-information costs of securitization (Section VI). In Section VII.A we look at the summary statistic for this tradeoff: other things equal, do securitized loans have lower rates than loans held on-balance sheet? Although the perfect experiment to answer this question has not yet been run, the evidence that does exist suggests that securitized loans are indeed cheaper for borrowers. So in Section VII.B we investigate the components of this difference, using inputs from the perfect-information model of Section IV and the asymmetric-information theories discussed in Section VI.

A.   **Does securitization lower the cost of capital?**

The ideal experiment to answer this question would be to take all new loan applications, randomly assign some fraction to be securitized, and then see what happens to market rates depending on securitization. Alas, no bank has been willing to run this test yet, so researchers are forced into clever attempts to identify the effect of securitization. This literature is small and needs to get larger. But there are a few informative papers.

Nadald and Weisbach (2010) study the effects of securitization on the cost of corporate loans. Using a sample of 3000 corporate loans, they find a raw difference of 10-17 basis points between securitized and non-securitized loans. The hard part is to identify the securitization effect in this gap, which they accomplish through a difference-in-differences approach, exploiting the "securitization boom" of CLOs from 2004-2007 as the time-series driver. To combine with the securitization boom, the authors identify an important institutional feature of CLOs, driven by the types of corporate loans that tend to be included. Corporate loans are either amortizing ("Term A loans"), non-amortizing ("Term B loans"), or revolving. For a variety of reasons, Term B loans are the best raw material for securitizations, so if securitization lowers the cost of capital, then we should expect a differential effect in Term B loans over Term A loans and revolvers. And this is exactly what the authors find, with spreads on Term B shrinking by 17 and 35 bp, respectively, relative to Term A loans and revolvers. The authors also find that these spread differences are driven entirely by banks active in the securitization market, with no difference in the spreads for banks that do not securitize. Taken together, these results strongly suggest that securitization lowers the cost of corporate loans.

An at al. (2009) study the securitization differential in the commercial mortgage-backed-security (CMBS) market. The central comparison in the paper is between non-securitized "portfolio loans" on the balance sheets of banks and "conduit" loans intended for securitization. The CMBS market does not provide a clean setting for difference-in-difference estimates, so the paper uses a reduced-form regression and finds that, subject to a long list of controls, conduit loans are 10 bps lower than portfolio loans.

Of course, it is not possible to know whether this reduced-form regression has important omitted factors or endogeneity problems. The authors look for differences in prepayment and default across the two samples and find none, leaving the onus on any critics to identify other missing factors. Furthermore, inclusion of originator fixed effects increases the estimated differential to 16 basis points, as does restricting attention to a single large originator (Bank of America). Finally, to address concerns that rates

and loan-to-value may be jointly determined, the authors estimate a simultaneous equation system and find an even higher spread of 20bp.

B. Components of the Return Differential

In this subsection we discuss the evidence on each of the components of the return differential.

1. Bankruptcy Costs

Ayotte and Gaon (2010) provide the only available empirical estimates for the role of bankruptcy in securitizations. They begin with the observation that the bankruptcy process forces claimholders into costly bargaining over the future of the assets. This costly bargaining could result in an efficient outcome, but could also lead to inefficient discontinuation of a positive NPV firm or inefficient continuation of a negative NPV firm.   Inefficient continuation occurs if managers are able to extract value from secured claimholders (who are barred from seizing collateral in a judicial bankruptcy).   Securitization – by removing such collateral from the control of managers – reduces the risk of inefficient continuation. However, to the extent that the issuing firm has maintained some equity stake in the securitized assets, they are now subject to hold-up by the other claimants on the SPV, and such a hold-up would increase the risk of inefficient discontinuation in bankruptcy.

The formal model of this intuition allows for several predictions. Most relevant to our discussion here, the model predicts that a "shock" to the bankruptcy remoteness of SPVs should increase spreads on securitized bonds. To test this prediction, the authors need a shock, and they find one in the court decisions during the bankruptcy of LTV in 2001: there, a bankruptcy judge's interim decision pulled some securitized assets back from the SPV to be considered by the bankruptcy court, and this clouded the issue for all other securitizations in bankruptcy. The control group is insured depository institutions subject to FDIC-based receivership, where the remoteness of SPVs was well-established and was not affected by this court decision. Then, using a difference-in-differences approach, the authors find that relative spreads on bankruptcy-eligible ABS issuers rose between 26 and 29 basis points in the six months following the LTV decision.

2. Taxes

Taxes have an ambiguous effect on securitization. In the model presented above, tax shields create an incentive for banks to hold loans on balance sheet and finance them with deposits or other debt. There is little empirical evidence available on this effect. Gorton and Souleles (2006) find that lower-rated firms

with little income to shield using the tax shields are more likely to securitize. Thomas (2001) finds that the average abnormal returns are greater the poorer the creditworthiness of the sponsor, a result that is also consistent with this.

Han, Park, and Pennacchi (2010) show that if deposits are inelastically supplied and non-deposit debt is unavailable, the tax effects would go in the other direction: loans held on balance sheet would require equity, and the returns to such equity would be taxed. In this setting, banks with a low supply of deposits and high opportunities to make loans would have strong incentives to securitize. The authors test the sensitivity to taxes by exploiting state-level differences in corporate taxes. They find that securitization activity moves with corporate taxes, supporting the mechanism of their model.

3. *Asymmetric Information*

The moral-hazard problems of lax screening and monitoring are well-understood by the market, which uses various methods to mitigate them. Nevertheless, popular accounts of the financial crisis place much blame on the weakened screening of the originate-to-distribute model, and the 2009 Dodd-Frank Law – silent on most aspects of securitization – contains a provision intended to reduce moral hazard by requiring a minimum level of risk retention by originators. Several papers, discussed below, estimate the size of this moral hazard problem, but thus far the evidence is limited to the important but still special case of subprime securitizations.

Keys at al. (2010) looks at subprime securitizations from 2001 to 2006, using data on over 16 million loans. To capture the effect of screening, they exploit an institutional feature in subprime securitizations: buyers of loans use a FICO credit score cutoff of 620 as a rule-of-thumb for accepting loans. This rule of thumb is confirmed in the data, with a sharp discontinuity in the number of securitized loans at exactly this cutoff. The same discontinuity also appears in default rates, with loans just above the threshold defaulting at *higher* rates than loans just below.

The authors interpret this paradoxical result on defaults as evidence for lax screening of securitized loans. Since loans below the FICO threshold are harder to securitize, banks expect to hold more of them on balance sheet and expend more resources in their screening. Some other natural experiments further support this interpretation. In two states, anti-predatory lending laws were passed that restricted securitizations around the threshold; in both cases, the discontinuities around 620 FICO score were significantly attenuated while the laws were in effect, and then went back to normal when the laws were repealed. The paper also finds no evidence that the results are driven by selection rather than screening,

in part by showing that the results are just as strong among originators that have no discretion to select specific loans for securitization.

In Keys at al. (2009), these same authors expand their analysis of the moral-hazard problem to consider the mitigating role of regulation and market incentives. Using the same rule-of-thumb threshold of 620 FICO scores, the paper compares the default performance for securitized loans of various institutional types. They find that default rates were *higher* overall for loans originated by regulated banks than for less regulated independent brokers, suggesting that regulatory oversight alone is not the solution to the moral-hazard problem. Instead, they find evidence for mitigation of the moral-hazard problem from specific regulations requiring skin-in-the-game for brokers, a result supportive of the Dodd-Frank approach.

The Keys at al. papers analyze only subprime securitized loans, using the rule-of-thumb FICO cutoff for identification. Elul (2009) takes a different approach, using a large sample of both securitized and portfolio loans in 2005 and 2006, both prime and subprime, with a regression to identify the relationship between securitization and loan performance. The more comprehensive sample allows estimation of securitization impacts across a broader range of mortgages; the disadvantage is that it is not possible to separately identify screening and selection as drivers of these impacts.

Elul finds that securitized mortgages perform worse than portfolio loans, with the biggest differences in *prime* mortgages in private (non-GSE) securitizations. He attributes this result to adverse selection of poorer loans into securitized pools, but it is not possible to rule out lax screening as the cause. He further finds that subprime securitizations actually perform better than equivalent portfolio loans, but shows that this result is driven entirely by subprime defaults that occur before these loans can be securitized; that is, a loan is classified as "portfolio" during the lag between loan origination and securitization, so any early defaults would be by definition on portfolio loans.[20] Once he adjusts for this effect, subprime securitized loans perform worse than equivalent portfolio loans. Like Keys at al. (2009), he finds this latter result only occurs for low-doc/no-doc loans, and that there are no differences for full documentation loans.[21]

A more direct test of adverse selection is performed by An at al. (2009), in a follow-up study to their 2010 paper on the CMBS market. Once again, these authors exploit the difference between conduit and portfolio lenders, where the former have no flexibility to keep loans on balance sheet, and the latter do. Given that portfolio lenders choose which loans to securitize, a lemons-type model shows that the market

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[20] Jiang at al.. (2010) were the first to demonstrate this statistical artifact of securitizations, a timely reminder to all researchers of the pitfalls of relying on regression results without understanding the institutional structure.

[21] As further evidence of adverse selection in MBS, Drucker and Mayer (2008) find that underwriters possess and exploit inside information in secondary market transactions.

should discount loans from portfolio lenders. The empirical results support this prediction, with an average discount of 34 basis points for loans originated by portfolio lenders as compared to conduits. In this case, the very fact that conduit lenders have no incentive to produce private information (since they cannot keep the good loans), means that the markets do not expect any adverse selection from them. This result shows the dark side of creating screening incentives, as rules that could fix moral-hazard problems can then give rise to adverse selection – an unfortunate tradeoff.

Downing, Jaffee, and Wallace (2009) provide a sharp-test of adverse selection in the context of federally guaranteed mortgages. In this setting, since all mortgages are guaranteed, the main risk to investors is prepayment. The source of adverse selection is then based on homeowners differing propensities to optimally repay their mortgages, with information about such differences available to originators but not to purchasers of the MBS. For example, some pools of mortgages will have borrower characteristics suggesting low prepayment propensity, so that even when interest rates fall, many borrowers will not refinance their mortgages. These mortgages have high relative value, and should be retained by originators. On the other hand, pools with characteristics that forecast optimal prepayment would be lemons and should be sold by originators. Since the institutional rules do not require originators to disclose all information about these characteristics, we would expect this setting to give rise to an adverse-selection problem, and it does: the authors find that pools retained by originators have lower prepayment propensities than do pools that have been sold.[22] Using a model that translates prepayment propensity into yield, they find expected yields on retained pools that are 4-6 bp higher than on sold pools.

The papers discussed above on asymmetric information all use MBS as their unit of study. Benmelech at al. (2010) extend this analysis to CLOs built from corporate loans, and find very different results.[23] CLOs are a crucial part of the corporate-loan intermediation chain, especially in non-investment grade loans, where they hold about half of all loans. These loans are typically syndicated before they are securitized, which means that CLOs are built from pieces of loans, unlike the full loans that make up MBS. The syndication step is important, since asymmetric-information problems must be solved by lead arrangers in order to form a loan syndicate. This extra step proves crucial, as Benmelech at al. show that there is no difference in performance between CLO loans and non-CLO loans. They do, however, find some weak evidence that when CLO underwriters contribute loans from their own portfolio – about 10% of all CLO

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[22] The exact mechanism used in the paper is transfer of the MBS pool to a multi-class resecuritization known as a Real-Estate Mortgage Investment Conduit ("REMIC"), but for our purposes this resecuritization can be thought of as a sale.

[23] Ambrose at al. (2005) also studies the securitization of corporate loans, with some attention to asymmetric information and consistent results to Benmelech at al.. (2010).

loans – these loans do underperform. The authors conclude that the asymmetric-information problems in securitization can be alleviated by syndication, and that generalizations from MBS to all securitizations can be dangerous.

Albertazzi at al. (2011) analyze the rich dataset on securitizations in Italy to investigate adverse selection and its mitigation. The Italian data has detail unavailable in any single study in the United States: loan-level information for securitized and non-securitized loans, details on tranche structure in the MBS, and information about retention of tranches by the originator. The authors exploit this rich detail to simultaneously estimate the probability of securitization and the probability of default, directly handling endogeneity issues that other authors have either sidestepped or required clever natural experiments to solve. Given regulatory constraints in Italy, there is no subprime market and the data includes only prime loans, but none of the loans are government guaranteed. They find that securitized loans perform just as well as non-securitized loans. The evidence shows that the adverse-selection problem – present in other contexts – is mitigated here by modest originator retention and by the incentive for less experienced originators to intentionally place good loans into securitization, in an effort to build reputation for future securitizations.

An important issue in analyzing whether there are issues with moral hazard and adverse selection is whether potential investors and issuers are aware of these issues and structure the securitization to account for the potential problems. For example, the issues associated with 620 FICO score cut-off are well-known on Wall Street. Several researchers have looked into this. Chen, Liu and Ryan (2008) examine the determinants of the size of the equity tranche retained by the sponsor. They find that banks retain more risk when the loans are more opaque (the credit risk is less verifiable to an outsider) and banks retain larger equity tranches when the pool is riskier based on public information. In other words, the structure of the securitization is not independent of the risks of the pool. These hypotheses are framed and tested by estimating the association between banks' equity risk and the characteristics of the loan securitizations. Park (2011) studies subprime securitization, in particular the structure and pricing. Subprime securitizations are more complicated than other securitizations, presumably because the asset class is riskier. Indeed, Park shows that credit enhancement mechanisms, including tranching, reflect the risk of the underlying portfolio.

4. Regulatory Arbitrage and Implicit Recourse

One possible reason for the return advantage of securitization is regulatory arbitrage. If regulatory capital is costly, and securitization allows banks to economize on regulatory capital, then securitization can lower the private cost of bank capital. This form of regulatory arbitrage can be especially valuable when the

originator implicitly promises to cover any shortfall in the securitization, so that the "off-balance" sheet vehicle never actually leaves the balance sheet. In the case of complete implicit recourse, there is no shifting of credit risk from the originator, but regulatory capital requirements would be unambiguously lower. In principle, such arbitrage can be efficient (if bank capital rules are not socially optimal) or it can be an abuse of the bank safety net. In this subsection, we review the evidence for this role of these mechanisms in securitization.[24]

Before delving in to the empirical work on this topic, we give three important caveats. First, regulatory arbitrage cannot possibly explain securitization by non-financial corporations, since those corporations do not have any capital requirements. Since such securitization is significant (as shown in Section III), regulatory arbitrage will never be a complete explanation of securitization. Second, even for regulated financial institutions, there is still no universally accepted theory or evidence about why regulatory capital is expensive. Banks may behave as though regulatory capital is expensive, but the reason for such behavior is not well-understood. There is a long literature on this topic, and we will not attempt to do it justice here. Instead, we proceed under the assumption the regulatory capital is privately costly and economizing on it is valuable (even in the absence of non-regulatory reasons). Third, even under the assumption that regulatory capital is privately costly, it remains an open question about whether it is socially beneficial. We leave that issue for Section VIII.

The empirical evidence on implicit recourse comes primarily through studies of credit-card (CC) securitizations. These securitizations are an ideal study object for implicit recourse because sponsors have a variety of methods they can use to hide recourse from regulators. Higgins and Mason (2004) identify several of these methods used in 17 separate instances by ten different sponsors. On average, they find that the stock prices of sponsors reacts positively to recourse actions, which they interpret as evidence that such recourse, while costly in the short-run to sponsors, can be an efficient method of building reputation necessary for future securitizations. The model of Gorton and Souleles (2006), discussed above, formalizes the intuition in Higgins and Mason with a model of a repeated securitization game, where originators benefit from a reputation of bailing out their SPVs. As evidence for this mechanism, the authors show that credit-card securitization spreads depend on the credit risk of the sponsor, even though sponsors are not contractually obligated to bail out their vehicles.

Vermilyea at al. (2008) also use CC securitizations to study a very specific form of implicit recourse: the discretion of sponsors to designate CC losses as due to fraud. The rules of CC securitizations force fraud

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[24] Implicit recourse can also alleviate asymmetric-information problems, but *explicit* recourse would be a more efficient way to serve this purpose, since explicit recourse would be, by definition, more explicit. So we focus on implicit recourse as mitigating asymmetric-information problems only when combined with regulatory arbitrage.

losses back upon the sponsor, while pure credit losses fall on the investors in securitized bonds. Since sponsors have discretion in their designation of fraud or credit losses, they can exercise this discretion as a form of difficult-to-detect support for their vehicles. And, indeed, the paper finds support for this implicit recourse mechanism. First, banks that securitize have higher fraud losses than banks that do not securitize, suggesting that securitizing banks use their discretion as a means of support. Second, other things equal, banks with poorly performing vehicles have higher fraud losses. While this could suggest that fraud losses and credit losses are positively correlated, it could also be evidence of implicit recourse.

Implicit recourse could be an efficient contract – as suggested by some of these results – or it could be used to take advantage of the safety net. Calomiris and Mason (2004) attempt to disentangle these two possibilities through a cross-sectional analysis of securitization patterns and capital levels across banks. Overall, their evidence points to the "efficient contracting" view: capital levels appear to be set by the riskiness of the assets, banks that securitize do not appear to have binding capital constraints, and differences in deposit insurance do not explain differences in capital structure.

Minton at al. (2004) also find no evidence for the dark side of regulatory arbitrage. First, they observe that the most active securitizers – unregulated finance companies and investment banks – are not even subject to capital rules. Second, among regulated banks, leverage is negatively correlated with securitization activity, so that the most capital-constrained banks securitize the least.

In a world with active securitization markets, regulatory arbitrage can also influence the *types* of assets used in the vehicles. For example, to the extent that regulators "misprice" the capital costs of different assets, originators can choose to securitize the expensive (high capital charge) assets and keep the cheap (low capital charge) assets on balance sheets. Ambrose et al. (2005) show this to be the case using loan-level data from a single bank, where they find that relatively risky loans stayed on balance sheet, while relatively safe loans were securitized. One interpretation is that the bank kept loans that justified their price in regulatory capital, and sold those that did not.[25]

Overall, the literature on implicit recourse and regulatory arbitrage finds evidence that implicit recourse is assumed and viewed favorably by the market, and that socially costly regulatory arbitrage is not a main driver of securitization.[26] The main caveat to these results is that they all use pre-crisis and non-subprime

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[25] The authors also suggest reputational concerns as another possible interpretation. Note that the retention of riskier loans by itself does not say anything about adverse selection, since this study does not analyze the difference between public and private information about these loans.

[26] Thomas (2001) presents event study evidence which, among other findings, shows that first time securitizers, more frequent securitizers, and securitizers with actively traded bonds show abnormal gains to their shareholders.

data sources and these latter sources may yield very different results. If regulatory arbitrage was a contributor to the recent financial crisis, then the literature still awaits the seminal evidence.

5. Other Considerations

There are two other potential benefits to the sponsors of securitization. Loutskina (2010) argues that since securitization allows sponsors to sell their otherwise illiquid assets, they need not hold as many liquid assets on balance sheet. She finds this to be the case for commercial banks. Moreover, she finds that since banks that securitize can fund new loans by selling old ones, rather than just relying on issuing new liabilities, banks are more likely to extend credit when there is an external shock to the cost of funds.

Another possible benefit to the sponsors may be that they use the discretion associated with fair-value accounting rules to manage the size of reported securitization gains. Dechow, Myers and Shakespeare (2009) find weak evidence of "less earnings management in firms with independent boards" and no evidence that various director characteristics matter. Dechow and Shakespeare (2009) argue that managers will time their securitizations to be at the end of the quarter. They find that securitization issuance tends to bunch in the last few days of the third quarter, suggesting that there is window-dressing –an attractive feature of the ability to securitize. Karaoglu (2004) also argues empirically that banks use the accounting for the retained equity tranche in ways consistent with managing earnings and regulator capital.

VIII. Securitization, Regulation, and Public Policy

In this section we review the literature on some of the larger issues to do with securitization, asking in particular whether the net private benefits of securitization are consistent with the net social benefits.

A. Securitization and Financial Stability

There may be social benefits to securitization because the marketability of loan portfolios allows risk to be spread and asset-backed securities can be used as collateral in repo, for example. These factors may lead to an increase in lending, furthering economic growth. There is no evidence on this issue of the social benefits to date, however. The financial crisis has dramatically raised the issue of the social costs of securitization. Asset-backed securities played a role in the crisis, as they were used as collateral for repo. See Gorton (2010), and Gorton and Metrick (2010a). Did ABS lead to fragility or to real effects during the crisis?

The crisis involved market participants losing confidence in asset-backed securities. ABS thought to be information-insensitive appeared to become sensitive to information. When repo haircuts increased and

investors refused to renew commercial paper for asset-backed commercial paper conduits (limited purpose firms that held ABS and financed it mostly with commercial paper), firms were forced to delever, selling billions of dollars of ABS. Gorton (2010), and Gorton and Metrick (2010a,c) document the increase in repo haircuts on ABS and show that spreads on ABS completely unrelated to subprime mortgages moved together more in line with measures of counterparty risk than with subprime risk. Covitz, Liang, and Suarez (2009) document the contraction in the asset-backed commercial paper (ABCP) market, a market that fell by 20 percent when investors refused to roll over their commercial paper. Gorton (2010), Gorton and Metrick (2010a,c) and Covitz, Liang, and Suarez (2009) describe the events in the repo and ABCP markets as runs.

Manconi, Massa and Yasuda (2010) document how the price declines of ABS led to price declines in corporate bonds. They study mutual funds and find that when the prices of ABS fell, funds that faced outflows, as investors withdrew, sold corporate bonds. Yield spreads increased more for corporate bonds where the fund had a higher fraction of the portfolio in ABS, compared to bonds of the same issuer that were held by funds less exposed to ABS. The price declines in the ABS market due to fire sales led to price declines in the corporate bond market, a contagion.

These papers document aspects of the role of ABS during the crisis, but they are only suggestive about the social costs related to ABS. There are social costs to crises, but what specifically are the social costs of securitization? At this point there are some theory papers that suggest that there are social costs.

Shliefer and Vishny (2010) introduce a model of financial intermediation in which banks originate loans, but then securitize and trade these loans. They also can borrow using their ABS as collateral. Banks are profit maximizing, but their activity is driven by investor sentiment, which they want to cater to. When asset prices are high banks expand their balance sheets. To do this they borrow short-term, accepting the risk that they may have to sell assets if prices go down. Security prices can deviate from fundamentals due to the investor sentiment and these deviations translate into fragility for the banks. Further, this affects real investment because the banks are making loans. Securitization increases the level of investment, but also its volatility. The model highlights how capital markets and financial intermediation have changed with securitization. But, it is not clear what the welfare implications are, because the investor sentiment is exogenous.

Hanson and Sunderam (2010) focus on the issuance, performance, and information properties of ABS. In the model, investors must determine initially, once and for all, whether they want to be informed investors or not. This choice is made before the state of the macroeconomy is known. Because they expend resources to become informed, they must be compensated for this. After this choice is made, the state of

the macroeconomy is revealed. In the model "good times" means that the difference in quality between good loan pools and bad loan pools is small (though the type of each loan pool is not known, except to informed investors). After the state of the macroeconomy is realized, lending decisions are made. Following that there is a date when some investors face liquidity shocks, requiring them to trade. This is a problem for uninformed investors, as they will face adverse selection. To minimize funding costs originators want to sell as much information-insensitive ABS as possible. Informed investors earn little in the good state of the macroeconomy, so this reduces their incentive to become informed ex ante. But, then in the bad state, there are too few informed investors, and the amount that can be originated is much lower. The key private problem is that the information-production infrastructure must be built prior to knowing whether the state of the economy is good or bad.

Stein (2011) also builds on the idea that there is a demand for information-insensitive debt. Stein views this debt as money and assumes that it has a convenience yield. In his model banks produce as much of this short-term debt as they can because it is cheap financing for loans, due to the convenience yield. If there is a need to sell loans or assets (to patient investors) to honor this debt at an interim date, then there is a discount. The patient investor have a fixed amount to spend at the interim date, and can either make real investments at that date or can buy assets being sold by banks. Their indifference condition determines the discount, which each bank takes as given. This discount constrains the amount of safe short-term debt that can be issued. It imposes a collateral constraint on each bank. (Long-term debt is always risky because the loans are risky.) There is an externality because when the collateral constraint binds, an increase in short-term debt by one bank lowers the value of other banks' collateral; the discount is lowered, and the patient investors end up making less real investment if banks need to sell assets. The social planner would prefer less private money and more real investment.

Gorton and Ordoñez (2011) also consider short-term debt backed by collateral, in their case, in the context of a dynamic production economy. Firms finance themselves by issuing short-term debt backed by collateral. Collateral is either high or low value, but all firms are of the same efficient-type. The issue central to the model concerns whether investors produce costly information about the collateral or not. It is not always optimal to produce information. Collateral value can evolve through time and investors do not know for sure its true quality, but they have beliefs about its quality. If information is not produced, and the perceived (uninformed) value of collateral is high, then more and more firms can borrow. For example, a firm that has low-value collateral initially can borrow subsequently because the value of its collateral will in fact evolve such that it can borrow. As this happens firms with low-quality collateral end up borrowing. There is a credit boom. In fact, first best would be the case where no information is ever produced. But, short of that the economy can be very fragile because after a credit boom a small

shock can cause investors to produce information or constrain lending. Endogenously, the economy would select collateral to be complex, such as mortgage-backed securities.

Geanakoplos' (2009, 2003, 1997) focuses on collateral, which could naturally be interpreted as ABS. In Geanakoplos (2009) agents are either optimists or pessimists in a market for assets, such as houses or mortgages, or ABS. Optimists want to buy and pessimists want to sell. Collateral and haircuts arise because less optimistic agents must be convinced that the asset is safe. If bad news arrives, some optimists will have their equity wiped out and so the marginal buyer is someone who is less optimistic. That means that the effect of the shock is amplified.

Like Shliefer and Vishny (2010), Shin (2009) emphasizes the effects of market prices on the behavior of financial intermediaries. If the market value of ABS rises, the risk-taking capacity of the intermediaries can increase and they expand their balance sheets. Shin does not propose a mechanism for why the market prices rise, or perceived default risk fall, but Adrian and Shin (2010) provides empirical evidence for the procyclicality of leverage. They show that changes in dealer bank repos, the main way that leverage is altered, forecasts changes in financial market risk, as measured by innovations in the Chicago Board Options Exchange Volatility Index (the VIX).

B. The Federal Reserve and Asset-Backed Securities during the Crisis

Asset-backed securities were at the core of the financial crisis of 2007-2008 because they were, to a large extent, used as collateral in sale and repurchase agreements (repo) and as the assets held by asset-backed commercial paper (ABCP) conduits. Moreover, repo and ABCP were sizeable. ABCP peaked at about $1.2 trillion in July 2007. Repo was around $10 trillion (see Gorton and Metrick (2010a) for a discussion of the size of the repo market). These markets are two of the larger money markets, that is, short-term debt obligations that serve essentially like demand deposits in the wholesale market.

In a repo transaction one party deposits/lends money overnight and receives the repo rate. In addition, bonds are provided as collateral to the depositor/lender. The collateral is valued at market and is returned to the borrower when the repo matures if it is not rolled over. This collateral was often ABS, although there are no data to measure the extent of this. Asset-backed commercial paper conduits are managed vehicles which issue short-term debt to finance longer term ABS. Conduits have sponsors, which are financial intermediaries, and the sponsors manage the conduits.

When there was a run on repo and on ABCP conduits, the demand for cash led these intermediaries to sell assets, depressing their prices, leading to further sales, and so on. This is why the prices of ABS

completely unrelated to subprime mortgages fell dramatically. Covitz, Liang and Suarez (2009), Gorton (2010) and Gorton and Metrick (2010a,c) describe these dynamics of the crisis.

The financial intermediaries at the center of the crisis were dealer banks (the old investment banks), not regulated depository institutions.[27] The short-term liabilities of dealer banks are not insured by the government and dealer banks do not have access to the discount window of the Federal Reserve System. Consequently, the U.S. Treasury Department and the Federal Reserve System introduced a number of programs, involving hundreds of billions of dollars, in response to the financial crisis. Several of these programs were either specifically aimed at asset-backed securities or ABS were eligible to be part of the program. In this subsection we briefly discuss these programs and their effectiveness. Table 11 lists some of the lending facilities related to ABS adopted by the Federal Reserve System during the Crisis. Johnson (2010) provides some detail about each facility.

The Term Securities Lending Facility (TSLF) was adopted on March 11, 2008 to specifically address the problem that dealer banks were having with ABS that had become difficult to use as collateral. The haircuts on this type of collateral were rising. A "haircut" refers to a situation where the depositor in repo demands overcollateralization for the deposit. For example, if a deposit of $90 million requires collateral worth $100 million, there is said to be a ten-percent haircut. Gorton and Metrick (2010a,c) document the increases in haircuts. This facility is unique in that the dealer borrows U.S. Treasury bonds from the Fed, posting agency bonds, ABS, or investment-grade corporate bonds as collateral. The exchange is one type of bond for another. Fleming, Hrung, and Keane (2010a,b) and Hrung and Seligman (2011) describe and analyze the TSLF.

All the other facilities involve posting collateral in exchange for cash (funds). The Primary Dealer Credit Facility (PDCF) was adopted on March 16, 2008 during the extremes of the Bear Stearns failure and takeover by JP Morgan. The PDCF allows the primary dealers to borrow cash from the Federal Reserve System on a collateralized basis. The PDCF is akin to the Federal Reserve's discount window, which was not available to dealer banks, the institutions at the heart of the financial crisis. The PDCF exchanges eligible bonds as collateral for cash funds. See Adrian, Burke and McAndrews (2009) for further details.

The remaining two facilities listed in the table were aimed at alleviating the problems that arose for the holders of ABCP and the issuers of CP. The Asset-Backed Commercial Paper Money Market Mutual

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[27] A dealer bank operates as a securities dealer by underwriting and trading publicly registered securities. "Investment banks" are dealer banks that do not have any depository function. Dealer banks which have been designated as "primary dealers" engage transact with the Federal Reserve System's open market desk when it engages in open market operations.

Fund Liquidity Facility (AMLF) was created to provide collateralized loans to depository banks and bank holding companies allowing them to buy ABCP from money market mutual funds (MMMFs). The AMLF was intended to increase the liquidity of the ABCP market and also to provide a way for MMMFs to sell their ABCP holdings as they faced runs following the failure of Lehman Brothers –to avoid "breaking the buck." See the discussion in Duygan-Bump at al. (2010).

MMMFs are a very important set of buyers of commercial paper, so when these funds faced massive redemptions following Lehman Brothers' demise, issuers faced a problem: there were few buyers when it came time to roll over their commercial paper. The Commercial Paper Funding Facility was intended to address this liquidity problem by extending the discount window to issuers of commercial paper. A special purpose vehicle was created (CPFF LLC) to purchase 90-day commercial paper from highly rated U.S. issuers and essentially pledge it to the Federal Reserve System for cash. See Adrian, Kimbrough, and Marchioni (2011).

An important issue concerns whether these special liquidity facilities were effective or not. There is a small, but burgeoning literature on this topic. The most common approach is a time-series approach that tries to determine if spreads changed when a program was initiated; see, e.g., Fleming, Hrung and Keane (2010a,b), Christensen, Lopez, and Rudebusch (2009), Taylor, John B., and John C. Williams (2009). An alternative uses cross-sectional variation. For example, Duygan-Bump at al. (2010) have rich micro data to evaluate the AMLF, and find that it was successful.

The most relevant study is Hrung and Seligman (2011) who study the TSLF in the context of other programs that increased the amount of U.S. Treasuries outstanding. The TSLF increase the amount of Treasuries outstanding because it allows other bonds to be used as collateral to borrow Treasuries. Open market operations exchange cash for Treasuries or vice versa. In addition there was the Supplementary Financing Program (SFP), introduced on September 17, 2008 – two days after Lehman's collapse. The SFP was designed to help the Federal Reserve manage bank reserves. Reserves had to be drained as cash was building up in the banking system. The Treasury was also selling debt for budgetary purposes.

Hrung and Seligman focus on the unique feature of the TSLF, in the context of all the various programs that are changing the overall amount of Treasuries in the economy. The unique feature of the TSLF is that it did not just provide a way to get cash into the system. It was very specific in that instead of cash it allowed high-quality collateral to be substituted for low-quality collateral, i.e., Treasuries for ABS. Hrung and Seligman look at the effect on the spread between the repo rate when Treasuries are used for collateral (the "general collateral" or GC rate) and the federal funds rate, using daily data and the daily

changes in the TSLF amounts, conditional on all other programs. Federal funds are uncollateralized transactions while repo is collateralized; collateralized rates are lower, so this spread is negative.

Their main finding is that an increase in collateral due to the TSLF narrows the fed funds-repo spread. An increase of $1 billion of Treasury collateral via the TSLF narrows the fed funds-repo spread by 12 basis points. This is consistent with the notion that the problem was a run on repo and that dealer banks needed higher quality collateral. The TSLF was a success in this sense.

C. Securitization and Monetary Policy

In recent years, an active group of researchers from central banks and international organizations has begun to explore the impact of securitization on monetary policy. The intuition for an effect is securitization provides banks with an alternative funding source, and thus may weaken central banks' impact on the bank-lending channel. Researchers have focused on two different mechanisms: the role of securitization on central bank control of interest rates, and the role of securitization on the elasticity of interest rates to output, either analyzed directly through time-series regressions or indirectly through effects on bank lending.

Kuttner (2000) is an early paper in this literature, looking for indirect evidence by comparing the relative growth of securitization and portfolio loans over the business cycle. He finds support for the hypothesis that these two forms of finance are substitutes in the mortgage market, suggesting a weakening role for monetary policy. Estrella (2002), another paper out of the New York Federal Reserve, followed up this work with both direct and indirect evidence and found an interest-rate elasticity close to zero in recent years, suggesting that any impact of monetary policy must come from mechanisms beyond the interest rate.

Recent papers have confirmed these results, with evidence that securitization has both strengthened the direct impact of monetary policy on interest rates while simultaneously reducing the elasticity of interest rates for output and leaving banks more dependent on capital markets for funding. Work by Altunbas at al. (2007), Goswami at al. (2009), and Gambacorta and Marquez-Ibanez (2011) tells a consistent story: with securitization, banks are less reliant on deposits and buffered against interest-rate shocks, whether or not these shocks are policy-driven. With banks more reliant on securitization and capital markets, they are more subject to funding shocks in these markets, thus forcing central banks to take a broader view of "liquidity policy." With banks more closely tied to capital markets, monetary policy is more easily translated into market interest rates, it is just that these rates are less important for bank lending then they used to be.

Loutskina and Strahan (2006) break the central bank monopoly on this research with a clever natural experiment to study the role of securitization on bank lending. In the United States, GSE securitizations are limited to "conforming" mortgages, which have an upper limit above which loans are classified as "jumbo" and are ineligible for federal insurance. Since jumbo loans have less liquid secondary markets than do conforming loans, the authors exploit the cutoff between the two types to investigate the relationship between mortgage lending and bank balance sheets. They find that asset liquidity and deposit costs are correlated to jumbo lending, but not to conforming lending. That is, banks that appear illiquid or deposit-funding constrained do not reduce their mortgage lending when securitization is relatively easy, but do reduce their lending where securitization is relatively difficult.

Overall, this literature is consistent in finding that securitization has weakened banks reliance on traditional funding sources and sensitivity to interest-rate shocks. While this buffering by capital markets has some benefits, it has also increased sensitivity to the vagaries of securitization markets (a harsh lesson during the recent crisis) and likely reduced the efficacy of the traditional interest-rate policy of central banks. These findings have opened up an important set of policy questions about the proper evolution of central bank instruments for measurement and control, and indeed the very meaning of "monetary policy" as distinct from "capital markets policy" and "financial regulation."

D. The Future of Securitization

The future of securitization is uncertain. Securitization was a very significant source of funding for mortgages and consumer finance and remains important. It was also an important source of collateral for repo and ABCP. The sheer size of the securitization market, and its decimation during the financial crisis, makes the future of this market a question to ponder. The decimation is clear from Table 2, for example, which shows that credit card ABS issuance fell from almost $100 billion in 2007 to $7 billion in 2010. And, from Table 3, non-agency residential mortgage-backed securities fell from an issuance amount of $740 billion in 2005 to $12 billion in 2010. Figure 12 shows the nose dive in issuance for the major categories of asset-backed securities. Only automobile receivables show some sign of recovery. Of course, part of the failure to recover for the other categories is the recession. But, the issues are these: Will securitization come back? On its own? What will happen if it remains a dormant market? As John Dugan, the then Comptroller of the Currency (February 2, 2010) put it: " . . . we are at a crossroads: the collective decisions we make in the next year in an effort to reform and revitalize the securitization market will have profound consequences for consumer and business credit in the United States and abroad. . . . I believe we need a vibrant, credible securitization market to help fund the real economy going forward."

Despite the prominent role often ascribed to securitization in the recent financial crisis, national and international regulatory efforts have focused predominantly on traditional financial institutions in writing new laws and regulations. For example, the proposed Basel III rules, while addressing the capital requirements of securitization done by banks, is focused on banking institutions and does not address securitization vehicles themselves. Other international efforts through the G20 and the Financial Stability Board have spoken of securitization and other components of the "shadow banking" system, but have not proposed any specific rules. Reform efforts in many European countries are ongoing, but so far there have been no strong regulations for securitization adopted.

In the United States, the Dodd-Frank Act of 2010 is mostly silent on securitization, except for a still-to-be-finalized "skin-in-the-game" requirement for securitization that would require originators to maintain some stake in their vehicles. Even this provision has been hotly debated and fiercely resisted by the industry, with claims that a severe rule could have a major impact on the cost-of-capital. On this important policy debate, there is no direct research to provide guidance to regulators, a gap in the literature that badly needs to be filled. It is likely that there will be a number of changes to how securitization is done. But, it is less clear whether these changes will foster securitization or repress it. Among other possible changes are alterations to accounting rules, making it harder to move assets off balance sheet.

While Dodd-Frank did not focus on securitization, the Law did create a council of regulators with significant power to identify and manage systemic risks. Most importantly, this Financial Stability Oversight Council has the power to recommend significant changes in regulation, if such changes are deemed necessary for financial stability. With this authority in mind, Gorton and Metrick (2010b) propose the creation of "Narrow-Funding Banks" as a mechanism for the regulation of securitization. Under their proposal, these limited-purpose institutions would be the only legal conduits for securitization, and their chartering and oversight would provide regulators with the ability to exercise some control over this part of the shadow banking system. The main use of oversight would be to give regulators a direct look into a formally dark part of the financial system, and the main use of control would be to monitor tranches of securitization so as to minimize regulatory arbitrage.

IX. Final Comments and Open Questions

Surprisingly, given the importance of securitization, the most basic questions remain open questions. Studying securitization offers an opportunity to examine some basic issues in financial economics and macroeconomics. In this final section we try to spell out some of these issues, and offer some speculations and hypotheses about them.

Some open questions are:

1. Why did securitization arise? Was there innovation? What are the sources of value? These seem like the most basic and pressing questions. Policy recommendations concerning the future of securitization depend on the answers to these questions. They also strike at the heart of the process of financial innovation. How and why does innovation occur? Further, the view that financial intermediation is most importantly about the creation of bank loans which have to be held on balance sheet until maturity is inconsistent with selling the loans. But, banks still make the credit decision and hold the residual. Is that sufficient for incentive compatibility?

2. The tranching of pools sold to SPVs remains a puzzle. Securitization is about the creation of mostly low-risk debt. The debt issued by a securitization SPV has no tax advantages and there are no expected bankruptcy costs associated with ABS. From the point of view of Modigliani and Miller, no particular capital structure for the SPV would be predicted. However, securitization appears to maximize the amount of AAA/Aaa debt that is created. What is the violation of M&M? Is debt optimal because of privately-informed sponsors or is it because there is a demand for high-quality collateral?

3. The choice of loans to pool and sell to the SPV also remains a puzzle. Existing theories cannot address why securitized-loan pools are homogeneous – all credit cards or all prime mortgages, for example. The existing theory suggests that credit card receivables, auto receivables, mortgages, and so on should be in the same pool - -for diversification, but this never happens. Nor have any of the theories suggested a prominent role for the lack of trade of the equity residual. Explaining the structure of securitization appears to have a long way to go.

4. The contractual nature of securitization also needs more attention. Implicit recourse may be part of the structure of securitization. Indeed, during the crisis we saw sponsors absorb many vehicles back onto their balance sheets.   SIVs, ABCP conduits, and credit-card securitizations were often reabsorbed. But, mortgage securitizations do not appear to be reabsorbed. There appears to be important variation, depending on the asset class being securitized. The reasons for this are not known.

5. The structure of securitization, that is, the internal workings of the SPV, has received little attention. The internal allocation of cash flows, amortization structure, triggers, and other features vary by the asset class being securitized. This is important as market participants are aware of adverse selection

and moral hazard and it is most likely reflected in ABS prices and structures. But, there is little work on the pricing and structure of securitization. For example, little is known about tranche thickness across various asset classes and sponsors.

6. Bankruptcy remoteness has received much more attention (in the legal literature) than liquidation-efficiency, that is, the living will aspect of the SPV. There are a few examples (that we know of) where SPVs have been liquidated following the contractual rules, but there are no studies of the contractual rules, or of their evolution. Because there have not been legal cases, the examples of liquidation have not surfaced. But, liquidation efficiency may be an important source of value.

7. The market pricing of ABS, both primary and secondary, are very under-studied. While there is some evidence of misaligned incentives in forming asset pools, there is little about whether such pool attributes are priced. Similarly, it is clear whether the contractual structure of the ABS bonds is priced. As an important asset class, asset pricing of ABS is woefully lacking.

8. The legal form of the special purpose vehicle, typically a trust, has not been studied. It is not clear, for example, that this has always been the legal form of choice for SPVs. It is also not clear whether there was any innovation with regard to the legal form, which facilitated the growth of securitization. Many countries other than the U.S. had to pass special legislation to create tax neutral legal vehicles. But, this international dimension has also not been studied.

9. In fact, little is known about the international cross section of securitization, other than that it has grown. Whether there is important national variation is not known.

10. Nothing is known about servicers of securitized portfolios or about the contractual arrangements with servicers. Pooling and servicing contracts govern how loans can or cannot be renegotiated, for example. This is important because once the sponsor has sold the loan, it is no longer in a position to renegotiate, which is often cited as an important function of banks.

11. Could securitization evolve further? For example, why does an SPV need a sponsor? Couldn't an SPV contract with an entity for credit decisions to be made, which the SPV then finances via ABS? That is, what are the limits to unbundling banks?

12. An important asset class securitized in Europe is "whole businesses" – whole business securitization. In traditional securitization, discussed here, assets are sold to a stand-alone SPV. In whole-business securitization, the SPV is not an orphan but a member of the corporate group. Whole business

securitization does not involve a specified pool of assets but the income stream of an entire business or business unit. In the U.S. whole-business securitization was quite embryonic but growing prior to the crisis. For example, the revenue generated by franchise agreements and real estate leases created by Dunkin' Donuts, Baskin-Robbins and Togo's fast food enterprises was securitized. What are the limits of securitization?

13. What are the implications of securitization for monetary policy? While there is no consensus view on the transmission mechanism of monetary policy, all views are some version of how the central bank affects the pricing and volume of credit instruments, prominently those created by the traditional banking system. Securitization, repo, and ABCP changed all this. Securitization seems to create collateral for repo, a kind of private money. Has this had an effect on the effectiveness of monetary policy?

14. Asset-backed securities were at the core of the financial crisis. Their value as collateral was questioned, causing runs on repo and ABCP. What is the social calculus as to costs and benefits of securitization? Can a new regulatory design retain the benefits while minimizing the costs?

Answering these questions will, in large part, require an interdisciplinary approach involving scholars of accounting, finance, and law. The institutional and legal details are very important. It is also clear that answering many of these questions will require much more data collection than has happened to date. The data to address these questions is not obtainable at low cost. It can't simply be downloaded. Time to get to work!

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Table 1: U.S. Asset-Backed Securities Outstanding ($ billions)

Year	Auto[1]	Credit Card[2]	Equipment[3]	Home Equity[4]	Manufactured Housing	Student Loans	Other	Total
1985	0.9		0.3					1.2
1986	10.5		0.7					11.3
1987	14.3	2.5	0.4		0.2		0.5	18.0
1988	13.6	9.4	0.3		2.5		2.1	27.9
1989	14.6	20.3	0.1	2.2	3.4		1.5	41.9
1990	19.4	42.7	0.5	7.3	4.3	0.0	1.4	75.6
1991	27.4	59.5	0.9	15.8	4.8	0.2	1.1	109.7
1992	37.0	71.2	1.8	16.6	6.7	0.4	2.6	136.2
1993	42.9	75.2	4.6	17.9	8.0	0.8	4.4	154.0
1994	41.0	98.3	5.2	22.8	10.8	3.4	8.8	190.4
1995	54.8	130.0	5.1	31.5	16.1	6.5	12.3	256.3
1996	69.8	167.1	10.2	57.1	22.1	14.3	23.7	364.4
1997	82.7	190.8	14.6	102.2	28.6	25.9	46.7	491.5
1998	90.9	199.4	19.2	141.6	36.2	31.5	114.8	633.7
1999	110.6	215.4	21.6	329.5	46.3	36.4	163.6	923.4
2000	133.1	306.3	25.0	151.5	50.2	41.1	377.9	1,085.1
2001	187.9	361.9	22.8	185.1	50.7	60.2	420.6	1,289.2
2002	221.7	397.9	18.2	286.5	47.4	74.4	500.0	1,546.1
2003	234.5	401.9	20.4	346.0	38.9	99.2	547.4	1,688.3
2004	232.1	390.7	22.0	454.0	33.8	115.2	571.6	1,819.4
2005	219.7	356.7	24.2	551.1	29.2	153.2	615.8	1,949.9
2006	202.4	339.9	28.2	581.2	25.4	183.6	766.3	2,127.0
2007	198.5	347.8	27.8	585.6	22.3	243.9	1,041.9	2,472.4
2008	137.7	314.1	19.4	395.5	20.0	239.5	1,545.6	2,671.8
2009	135.9	292.0	16.5	320.0	17.9	246.1	1,400.5	2,428.9
2010	126.9	205.8	13.8	276.9	16.5	248.4	1,263.4	2,150.2

1. Auto includes truck loans and wholesale auto receivables, and as of 2008 include floorplans, motorcycles, rentals, and recreational vehicles. Prior years have not been revised to include these categories yet.
2. Credit Cards include charge cards.
3. Equipment does not include aircraft leases.
4. Home Equity contains both 1st and junior lien home equity loans and lines of credit, *subprime*, small balance issues and servicing rights; these numbers do not overlap with mortgage-related issuance in other SIFMA statistics.

Sources: Bloomberg, Dealogic, Fitch Ratings, Moody's, prospectus filings, Standard and Poor's, Thomson Reuters, compiled by the Securities Industry and Financial Markets Association.

Table 2: U.S. Asset-Backed Securities Issuance ($ millions)

Year	Auto[1]	Credit Card[2]	Equipment[3]	Home Equity[4]	Manufactured Housing	Student Loans	Other	Total
1996	33,223.00	48,736.80	12,391.20	36,157.80	8,117.70	8,047.50	20,081.60	166,755.60
1997	36,442.00	40,570.90	8,321.80	65,723.80	9,581.10	12,563.90	28,862.80	202,066.30
1998	39,504.30	43,070.00	10,142.80	83,952.80	11,893.70	10,229.20	48,312.10	247,104.90
1999	43,000.10	40,676.80	12,527.30	74,814.60	15,009.60	11,092.90	38,976.60	236,097.90
2000	67,468.30	57,143.30	11,464.90	74,402.30	11,277.30	18,562.00	41,148.80	281,466.90
2001	70,175.90	68,618.40	8,499.60	112,209.50	7,149.90	14,883.90	44,668.40	326,205.60
2002	88,764.30	70,336.90	6,419.50	150,774.60	4,619.50	27,739.90	25,247.90	373,902.60
2003	75,988.40	66,730.90	9,451.40	229,074.20	399.20	42,993.00	36,905.20	461,542.30
2004	66,909.20	53,742.30	8,462.80	425,029.10	368.90	48,042.80	48,976.20	651,531.30
2005	84,945.70	67,833.50	10,442.80	460,494.30	439.90	63,239.60	66,119.60	753,515.40
2006	81,926.10	66,899.00	8,777.60	483,913.10	200.60	67,129.20	45,030.30	753,875.90
2007	74,103.80	99,527.20	5,768.90	216,890.20	413.00	61,370.90	51,658.30	509,732.30
2008	36,164.20	59,059.50	3,070.30	3,815.70	307.80	28,204.00	8,870.20	139,491.70
2009	62,748.00	46,094.50	7,655.10	2,070.40		22,095.90	10,249.50	150,913.40
2010	57,856.96	7,433.34	7,624.57	3,506.90		17,719.10	13,353.27	107,494.14

1. Auto includes truck loans and wholesale auto receivables, and as of 2008 include floorplans, motorcycles, rentals, and recreational vehicles. Prior years have not been revised to include these categories yet.
2. Credit Cards include charge cards.
3. Equipment does not include aircraft leases.
4. Home Equity contains both 1st and junior lien home equity loans and lines of credit, subprime, small balance issues and servicing rights; these numbers do not overlap with mortgage-related issuance in other SIFMA statistics.

Sources: Bloomberg, Dealogic, Fitch Ratings, Moody's, prospectus filings, Standard and Poor's, Thomson Reuters, compiled by the Securities Industry and Financial Markets Association.

Table 3: U.S. Mortgage-Related Securities Issuance[1]
(USD billions)

	Agency[4]	FDIC/NCUA[3]	Non-Agency[2]		Total
			CMBS	RMBS	
1996	427.1		12.8	39.8	479.7
1997	508.9		14.0	54.6	577.6
1998	923.6		66.1	128.4	1,118.1
1999	846.0		48.4	91.1	985.4
2000	558.3		43.9	57.8	660.0
2001	1,451.0		63.7	149.3	1,663.9
2002	1,985.5		50.0	247.6	2,283.0
2003	2,661.8		72.3	350.2	3,084.3
2004	1,347.2		93.5	438.4	1,879.0
2005	1,285.4		156.7	740.2	2,182.4
2006	1,179.4		183.8	725.6	2,088.8
2007	1,420.3		229.2	536.7	2,186.2
2008	1,317.1		12.8	32.4	1,362.2
2009	2,029.8		0.7	9.2	2,039.7
2010	1,707.3	21.3	6.2	12.1	1,746.8

1. Includes GNMA, FNMA, FHLMC mortgage-backed securities, CMOs, private-label MBS/CMOs. Does not include certain subprime categories, which are included in the Home Equity category of ABS.
2. Non-agency includes CMBS and RMBS, and may include re-REMICs.
3. FDIC transactions are structured transactions backed by assets of failed banks and may include non-mortgage related collateral; NCUA transactions are structured transactions backed by assets of failed credit unions and may include non-mortgage related collateral.
4. Agency transactions include both single and multifamily MBS and CMOs.

Sources: FDIC, GSEs, Thomson Reuters, Bloomberg, compiled by the Securities Industry and Financial Markets Association.

Table 4: European Securitization Outstanding, USD millions

Year	Asset-Backed Securities					CDO	Mortgage-Backed Securities			SME	Whole Business		
	Auto	Consumer	Credit Cards	Leases	Other	CDO	CMBS	Mixed	RMBS	SME	Other	Pubs	Total
1990									179.25				179.25
1991									179.25				179.25
1992									481.36				481.36
1993	481.02								854.53				1,335.55
1994	481.02	30.02			6.63				1,839.90				2,357.57
1995	481.02	682.00	41.78		340.23		42.44		2,427.75				4,015.23
1996	984.37	1,260.70	184.28		1,277.90	431.28	532.54		3,271.44				7,942.51
1997	923.64	1,640.20	210.15		1,446.57	519.05	1,741.69		8,822.80		51.14		15,355.24
1998	1,570.17	3,218.60	1,925.31		3,537.14	4,768.55	2,424.60	895.68	19,505.18		1,161.88	677.94	39,685.05
1999	3,832.33	5,326.76	3,314.93		8,334.43	10,630.32	6,905.82	902.09	40,258.38	3,391.61	2,128.58	2,513.27	87,538.53
2000	5,128.54	6,433.37	6,913.59	520.12	10,156.07	24,924.42	21,780.89	776.88	73,134.57	4,843.39	3,038.79	2,944.14	160,594.75
2001	8,989.30	11,755.78	8,765.41	4,369.26	22,738.88	63,163.35	32,935.87	2,683.92	138,147.28	18,857.35	8,236.96	3,063.95	323,707.30
2002	17,775.95	16,550.78	14,213.46	11,197.63	32,360.71	79,547.61	46,878.05	3,182.91	211,305.17	25,213.14	15,166.79	6,666.84	480,059.03
2003	19,179.07	23,923.25	19,678.51	13,538.00	37,542.79	101,357.36	53,593.56	4,781.45	307,510.35	31,684.90	23,266.92	11,339.37	647,395.54
2004	23,950.40	20,381.68	26,188.06	21,247.12	49,994.63	129,946.09	60,156.49	4,021.60	398,603.98	40,480.77	25,839.30	11,985.85	812,795.96
2005	24,192.43	19,878.43	37,251.67	27,557.15	70,313.70	171,330.24	86,192.88	4,586.91	506,935.79	70,017.82	26,955.42	14,333.60	1,059,546.05
2006	30,933.87	30,169.52	37,881.34	30,604.96	93,936.84	236,561.81	129,597.10	5,632.75	712,048.42	88,802.13	29,149.82	15,856.63	1,441,175.19
2007	42,170.51	37,960.65	29,995.65	28,579.48	94,899.99	294,132.04	163,343.54	7,620.29	1,068,671.74	157,538.23	31,276.14	15,347.37	1,971,535.64
2008	51,154.83	63,480.73	34,904.96	39,958.75	86,500.70	379,601.92	158,169.17	12,250.00	1,667,348.49	189,769.88	30,938.99	15,052.19	2,729,130.60
2009	57,473.83	75,267.65	29,471.55	43,072.38	88,398.39	356,292.25	161,426.47	23,081.98	1,777,379.86	221,706.21	30,556.30	14,479.19	2,878,606.08
2010	50,533.15	68,616.33	23,906.15	36,208.36	79,267.49	311,593.66	156,069.87	21,273.28	1,686,223.43	226,182.45	35,379.24	14,219.32	2,709,472.72

Sources**:** AFME & SIFMA Members, Bloomberg, Thomson Reuters, prospectus filings, Fitch Ratings, Moody's, S&P, AFME & SIFMA, compiled by the Securities Industry and Financial Markets Association.

Table 5: European Securitization Issuance, USD millions

| Year | Asset-Backed Securities | | | | | CDO | Mortgage-Backed Securities | | | SME[1] | Whole Business | | |
	Auto	Consumer	Credit Cards	Leases	Other	CDO	CMBS	Mixed	RMBS	SME	Other	Pubs	Total
1992									302.11				302.11
1993	481.02								373.18				854.20
1994		30.02			6.63				1,061.26				1,097.90
1995		651.99	41.78		336.24		42.44		827.83				1,900.28
1996	503.35	578.70	142.50		962.51	431.28	492.22		1,098.60				4,209.16
1997	420.29	379.50	25.88		259.59	242.95	1,262.57		5,946.11		59.90		8,596.78
1998	1,151.76	1,594.33	1,715.15		2,275.99	4,705.47	780.25	942.92	13,257.01		1,118.59	677.94	28,219.43
1999	2,690.56	2,516.16	1,389.63		5,317.65	7,664.50	4,663.61	117.58	25,782.32	3,391.61	973.61	1,835.34	56,342.56
2000	1,909.17	2,254.17	3,711.88	520.12	2,904.41	17,227.72	15,720.32		39,501.19	1,451.78	917.22	430.86	86,548.83
2001	6,077.02	6,022.94	1,948.35	3,849.14	13,559.46	40,522.19	12,021.02	2,065.79	74,845.21	14,075.12	5,218.29	183.09	180,387.62
2002	11,244.78	5,882.14	6,495.86	6,828.38	12,362.61	20,857.00	17,472.69	1,018.75	91,236.15	10,809.64	6,986.62	3,614.52	194,809.14
2003	4,680.37	12,260.42	6,983.19	2,946.45	9,209.56	24,659.24	9,944.05	1,959.40	132,379.90	10,025.34	8,310.95	4,728.26	228,087.11
2004	9,530.89	2,490.38	6,587.57	10,971.33	18,658.94	41,242.11	15,388.41	56.00	143,099.49	14,501.26	3,364.89	1,949.53	267,840.81
2005	7,956.32	3,857.64	13,535.44	8,747.60	27,831.69	51,016.84	41,762.96	1,540.20	181,633.91	39,452.63	2,318.23	3,306.75	382,960.22
2006	14,668.18	15,963.78	3,189.93	8,566.69	32,885.76	81,004.35	65,002.52	2,177.68	306,371.78	31,545.18	2,411.24	2,572.38	566,359.48
2007	19,259.22	11,432.14	597.34	5,572.24	11,895.99	82,677.01	59,356.52	3,535.83	503,777.07	92,261.25	6,547.62	484.01	797,396.25
2008	18,886.13	35,957.83	15,823.95	18,548.60	4,957.10	125,863.27	8,674.79	7,864.86	790,743.24	67,690.98			1,095,010.76
2009	19,769.34	20,306.32	795.37	11,304.14	16,324.98	53,911.21	18,664.57	12,237.00	295,817.99	83,711.77	1,815.88		534,658.57
2010	18,847.18	9,649.21	7,584.18	2,459.29	2,787.11	38,802.04	8,019.94	841.44	367,921.12	52,101.48	5,904.89		514,917.88

1. SME: Small and Medium Enterprises
2. WBS: Whole Business Securitization. Certain WBS structures may be bucketed in other categories (ABS and CMBS) based on the nature of the transaction and are evaluated on a case by case basis.

Sources: AFME & SIFMA Members, Bloomberg, Thomson Reuters, prospectus filings, Fitch Ratings, Moody's, S&P, AFME & SIFMA, compiled by the Securities Industry and Financial Markets Association.

Table 6: European Securitization Issuance, USD millions

Year	Belgium	France	Germany	Greece	Ireland	Italy	Multinational[1]	Netherlands	Other[1]	PanEurope[3]	Portugal	Russian Federation	Spain	United Kingdom	Total
1992														302.11	302.11
1993														854.20	854.20
1994		293.46											522.18	282.26	1,097.90
1995		612.90			161.79				363.70		336.24		272.11	153.54	1,900.28
1996	718.96	1,541.21					79.52		382.90				484.41	1,002.17	4,209.16
1997	1,544.83	3,197.98						1,693.44					730.17	1,430.35	8,596.78
1998	1,796.63	3,265.25	3,240.31		583.60	793.82	3,827.84	1,040.81	816.15		244.44		3,301.71	9,308.87	28,219.43
1999	821.58	5,665.23	9,167.09		1,213.93	1,537.29	2,581.53	5,951.09	721.10	378.35	1,111.69		7,095.42	20,098.25	56,342.56
2000	213.55	2,168.10	5,103.10	624.41	1,538.63	8,838.41	12,758.42	5,449.88	3,018.25	1,306.94	419.70		7,319.19	37,790.26	86,548.83
2001		5,881.06	5,299.04	509.11	2,624.98	35,489.88	41,361.93	20,947.22	7,278.26	3,199.92	3,809.73		10,694.91	43,291.59	180,387.62
2002		7,610.54	10,208.97			43,738.14	19,519.76	24,357.53	2,670.87	7,595.05	4,588.27		20,608.26	53,911.75	194,809.14
2003	2,778.10	7,173.29	7,007.01	423.04	1,678.05	33,543.10	21,917.67	28,139.04	6,911.93	1,552.28	13,039.20		28,524.63	75,399.77	228,087.11
2004	2,482.51	7,693.47	8,366.30	921.53		35,660.61	38,214.40	19,639.22	2,756.41	3,257.80	9,576.12	1,550.00	40,064.24	97,658.22	267,840.81
2005	586.10	4,027.72	27,649.62	2,770.65	2,042.95	33,935.67	57,861.65	49,645.54	5,382.40	4,645.77	9,127.54	391.88	50,801.11	134,091.61	382,960.22
2006	2,943.66	9,029.52	45,740.07	4,475.50	13,140.88	42,442.28	79,965.39	51,747.80	4,940.68	16,632.89	7,942.57	5,096.01	86,493.15	195,769.06	566,359.48
2007	5,715.55	7,645.27	27,870.90	7,488.24	21,216.03	47,889.74	75,293.50	173,590.67	11,778.01	34,058.36	12,088.45	2,988.44	157,601.53	212,171.54	797,396.25
2008	69,465.12	16,164.84	92,433.25	16,686.68	50,876.46	137,387.27	58,778.16	105,918.61	10,889.72	29,175.14	21,943.99	7,172.55	146,762.32	331,356.66	1,095,010.76
2009	33,730.83	8,258.72	19,926.81	30,248.41	19,222.35	93,928.48	38,985.31	58,335.61	650.00	29,278.32	18,591.08	4,061.95	84,224.56	95,216.12	534,658.57
2010	23,037.77	12,058.18	18,164.42	1,295.28	8,745.23	21,123.60	998.95	190,263.41	3,886.09	3,464.96	22,710.55	201.90	70,837.14	138,130.40	514,917.88

1. "Multinational" contains collateral from multiple and/or unknown countries; most CDOs are bucketed in this group.
2. "Other" countries include countries too small to be displayed: Austria, Sweden, Denmark, Finland, the Channel Islands, Hungary, Iceland, Poland, Switzerland, Turkey, Ukraine, and the United States.
3. "PanEurope" collateral consists of collateral predominantly sourced from multiple European countries.

Sources: AFME & SIFMA Members, Bloomberg, Thomson Reuters, prospectus filings, Fitch Ratings, Moody's, S&P, AFME & SIFMA.

Table 7: Major Securitized Asset Classes

Aircraft leases	Manufactured housing loans
Auto loans (prime)	Mortgages (prime)
Auto loans (subprime)	Mortgages (alt-A)
Auto leases	Mortgages (subprime)
Commercial real estate	Mortgages (commercial)
Computer leases	RV loans
Consumer loans	Small business loans
Credit card receivables	Stranded utility costs
Equipment leases	Student loans
Equipment loans	Trade receivables
Franchise loans	Time share loans
Future flows receivables	Tax liens
Healthcare receivables	Taxi medallion loans
Health club receivables	Viatical settlements
Home equity loans	Whole businesses
Intellectual property cash flows	
Insurance receivables	
Motorcycle loans	
Music royalties	

Source: Rating agency reports.

Table 8: S & P Global Structured Finance Cumulative Default Rates Conditional on Survival, 1978-2010
(%; standard errors in parentheses)

Rating	ABS 1-yr	Corp 1-yr	ABS 3-yr	Corp 3-yr	ABS 5-yr	Corp 5-yr	ABS 7-yr	Corp 7-yr	ABS 10-yr	Corp 10-yr
AAA	0.12	0.03	0.14	0.17	1.98	0.38	2.15	0.56	2.38	0.79
	(0.11)	(0.20)	(0.39)	(0.60)	(0.05)	(0.59)	(0.06)	(0.75)	(0.07)	(0.83)
AA	0.64	0.07	0.15	0.20	13.75	0.37	14.80	0.58	15.57	0.82
	(0.27)	(0.12)	(0.19)	(0.45)	(1.18)	(0.36)	(1.23)	(0.56)	(1.30)	(0.72)
A	0.64	0.19	0.33	0.42	13.75	0.68	14.80	1.15	15.57	1.84
	(0.58)	(0.21)	(0.27)	(0.37)	(0.85)	(0.44)	(1.37)	(0.54)	(1.47)	(0.77)
BBB	1.46	0.70	1.19	1.21	22.79	2.43	25.18	3.59	26.70	5.22
	(1.28)	(0.60)	(0.88)	(0.74)	(3.81)	(1.32)	(4.91)	(1.59)	(5.62)	(1.57)
BB	3.41	2.83	5.03	5.47	31.85	9.04	35.66	12.48	38.28	16.54
	(12.41)	(2.32)	(3.39)	(3.19)	(12.32)	(4.64)	(16.56)	(4.78)	(17.51)	(4.24)
B	8.18	10.40	15.22	15.78	48.31	21.76	54.63	25.82	58.59	29.94
	(5.12)	(5.69)	(6.93)	(6.77)	(8.81)	(8.10)	(9.92)	(7.33)	(9.37)	(5.97)
CCC/C	40.59	36.79	42.12	45.51	69.25	47.64	72.84	49.72	75.30	52.88
	(17.25)	(13.97)	(13.61)	(14.75)	(24.09)	(14.05)	(25.03)	(12.70)	(24.27)	(10.47)
Invest-grade	0.56	0.13	7.28	0.59	10.55	1.21	11.30	1.83	11.78	2.68
	(0.49)	(0.12)	(2.58)	(0.41)	(0.70)	(0.61)	(0.75)	(0.69)	(0.72)	(0.84)
Spec-grade	18.35	4.36	38.71	12.17	48.51	17.48	52.79	21.13	55.64	25.16
	(11.76)	(2.80)	(7.65)	(5.61)	(7.89)	(6.41)	(8.65)	(5.61)	(6.53)	(4.07)
All	4.45	1.61	13.84	4.60	17.72	6.79	19.97	8.38	19.69	10.18
	(3.00)	(1.06)	(3.08)	(2.40)	(1.23)	(2.88)	(1.30)	(2.68)	(1.10)	(2.39)

Source: Standard and Poor's (2011a,b).

Table 9: Cumulative Impairment and Default Rates

U.S. ABS Cumulative Impairment Rates, excluding Subprime ABS, 1993-2009 (%)									
Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Aaa	0.02	0.05	0.15	0.28	0.39	0.54	0.95	1.41	1.79	1.99
Aa	0.71	1.93	3.26	4.77	6.27	7.63	8.98	10.69	12.47	14.58
A	0.42	1.27	2.30	3.31	4.42	5.86	6.74	7.62	8.40	8.85
Baa	1.61	4.23	7.49	10.71	15.88	22.45	28.98	33.77	36.45	38.82
Ba	8.68	18.64	26.82	37.03	45.53	55.05	61.21	65.59	70.77	70.77
B	13.22	22.69	31.18	39.42	50.51	57.97	59.56	61.62	64.62	66.03
Caa-C	30.07	48.50	63.05	78.29	90.52	95.26	NA	NA	NA	
Invest-grade	0.31	0.87	1.59	2.36	3.36	4.57	5.81	6.99	7.93	8.80
Spec-grade	13.09	24.30	33.69	44.38	54.24	62.20	66.28	69.39	73.22	73.63
All	0.88	1.92	3.06	4.29	5.61	6.94	8.21	9.41	10.39	11.24

U.S. Subprime ABS, Cumulative Impairment Rates, 1993-2009 (%)									
Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Aaa	0.74	2.18	3.09	3.24	3.27	3.29	3.30	3.32	3.33	3.37
Aa	6.70	19.76	26.46	27.73	27.91	28.09	28.28	28.39	28.53	28.81
A	8.62	25.34	35.09	38.98	40.69	42.42	44.22	45.47	46.32	47.50
Baa	15.12	33.38	46.90	55.50	60.60	62.84	64.34	65.23	66.13	66.88
Ba	31.23	47.25	58.50	64.53	67.17	68.93	70.30	71.47	72.57	73.97
B	61.03	66.80	71.35	74.94	77.60	79.35	80.54	81.42	82.51	83.82
Caa-C	93.32	95.02	95.94	96.69	97.37	98.15	98.43	98.82	99.22	99.22
Invest-grade	3.92	10.75	15.46	17.67	18.72	19.44	19.93	20.24	20.53	20.66
Spec-grade	49.16	59.90	67.60	72.13	74.51	76.13	77.29	78.26	79.26	80.47
All	6.81	13.93	18.92	21.41	22.66	23.53	24.15	24.58	24.99	25.48

Average Cumulative Issuer-Weighted Global Default Rates, Corporates, 1970-2010 (%)									
Rating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Aaa	0	0.013	0.013	0.037	0.104	0.172	0.244	0.321	0.404	0.494
Aa	0.021	0.059	0.103	0.184	0.273	0.363	0.443	0.512	0.559	0.619
A	0.055	0.177	0.362	0.549	0.756	0.984	1.239	1.535	1.844	2.136
Baa	0.181	0.51	0.933	1.427	1.953	2.504	3.031	3.575	4.195	4.904
Ba	1.157	3.191	5.596	8.146	10.453	12.581	14.44	16.295	18.178	20.101
B	4.465	10.432	16.334	21.51	26.173	30.562	34.721	38.353	41.646	44.573
Caa-C	18.163	30.204	39.709	47.317	53.768	58.079	61.181	64.813	68.506	72.384
Invest-grade	0.087	0.253	0.476	0.73	1.006	1.296	1.587	1.895	2.225	2.574
Spec-grade	4.673	9.564	14.195	18.27	21.804	24.89	27.595	30.038	32.313	34.445
All	1.63	3.308	4.86	6.188	7.314	8.281	9.116	9.872	10.585	11.266

Source: Moody's (2010 a, b).

Table 10: S & P Global Structured Finance 5-Year Default Rates, 1978-2010 (%)

| 5 years ending	AAA	AA	A	BBB	BB	B	CCC	CC/C	Investment-grade	Spec-grade	All
1982	0.00		0.00						0.00		0.00
1983	0.00	0.00	0.00						0.00		0.00
1984	0.00	0.00	0.00						0.00		0.00
1985	0.00	0.00	0.00						0.00		0.00
1986	0.00	0.00	0.00						0.00		0.00
1987	0.00	0.00	0.00						0.00		0.00
1988	0.00	4.23	0.00						1.86		1.86
1989	0.00	4.12	0.00	0.00					1.67		1.67
1990	0.00	3.10	0.00	0.00					1.20		1.20
1991	0.00	1.61	0.00	0.00	57.14		0.00		0.69	0.00	0.69
1992	0.00	0.00	0.00	0.00			0.00		0.00	44.44	0.42
1993	0.00	0.16	0.00	0.00	0.00	0.00	0.00		0.07	0.00	0.07
1994	0.00	0.12	0.91	0.00	0.00	0.00	0.00		0.11	0.00	0.11
1995	0.00	0.76	2.28	3.85	0.00	0.00	0.00		0.68	0.00	0.68
1996	0.00	0.90	2.27	15.52	40.0	20.00	0.00		1.01	23.08	1.10
1997	0.00	0.39	2.41	6.25	15.38	11.76	44.44		0.74	20.51	0.92
1998	0.00	0.40	1.72	2.13	17.46	8.77	33.33		0.52	15.15	0.89
1999	0.00	0.00	0.10	1.81	8.33	14.81	70.97	71.43	0.12	20.47	0.96
2000	0.00	0.00	0.09	0.46	5.65	12.50	44.00	100.0	0.05	12.30	0.69
2001	0.00	0.00	0.30	0.58	3.37	11.64	35.29	75.00	0.10	9.66	0.74
2002	0.00	0.21	1.34	3.85	7.91	12.77	53.33	50.00	0.63	11.99	1.45
2003	0.11	0.37	1.01	9.21	10.81	14.60	44.44	38.46	1.33	13.40	2.36
2004	0.13	0.51	1.19	9.55	11.99	15.31	22.73	25.00	1.62	13.69	2.73
2005	0.12	0.60	1.68	5.79	10.05	28.92	48.94	30.00	1.28	19.27	3.17
2006	0.00	0.72	1.67	5.14	8.53	25.00	53.93	22.73	1.33	16.99	3.19
2007	0.00	0.51	1.13	4.14	5.83	10.69	52.91	55.74	1.17	11.68	2.63
2008	0.01	0.07	0.42	4.26	3.95	10.10	40.00	48.86	1.13	9.13	2.33
2009	0.22	0.64	2.14	7.93	9.98	22.18	40.26	57.55	2.67	16.96	4.83
2010	1.53	5.91	12.14	22.33	33.73	50.89	50.68	52.17	10.34	40.56	14.96
Average	0.07	0.90	1.13	4.90	13.90	15.00	31.76	52.24	1.05	14.96	1.71
Median	0.00	0.38	0.30	3.85	9.26	12.64	40.13	51.09	0.68	13.54	0.92
Stn. Dev.	0.29	1.53	2.28	5.69	15.01	12.00	23.35	22.40	1.92	11.85	2.83
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.73	0.00	0.00	0.00
Maximum	1.53	5.91	12.14	22.33	57.14	50.89	70.97	100.0	10.34	44.44	14.96

Source: Standard and Poor's (2011a).

Table 11: Selected Forms of Federal Reserve Lending Adopted during the Financial Crisis

	Term Securities Lending Facility	Primary Dealer Credit Facility	ABCP Money Market Fund Liquidity Facility	Commercial Paper Funding Facility	Term Asset-Backed Securities Facility
Announcement Date	March 11, 2008	March 16, 2008	September 19, 2008	October 7, 2008	November 25, 2008
Eligible borrowers	Primary dealers	Primary dealers	Funds	Eligible CP issuers	All U.S. persons that own eligible collateral
Facility type	Auction	Standing	Standing	Standing	Standing
Operation frequency	Weekly	As requested	As requested	As requested	Twice a month, alternating between non-mortgage backed ABS and CMBS collateral types
Type of borrowing	U.S. Treasuries	Funds	Funds	Funds	Funds
Eligible collateral	U.S. Treasury securities, agency debt, agency MBS, investment grade debt	Tri-party repo system collateral	First-tier ABCP	Newly-issued 3-month unsecured and asset-backed CP from eligible U.S. issuers	Recently originated U.S. dollar-denominated AAA ABS, CMBS and legacy CMBS

Source: Federal Reserve Bank of New York, http://www.newyorkfed.org/markets/Forms_of_Fed_Lending.pdf .

Figure 1
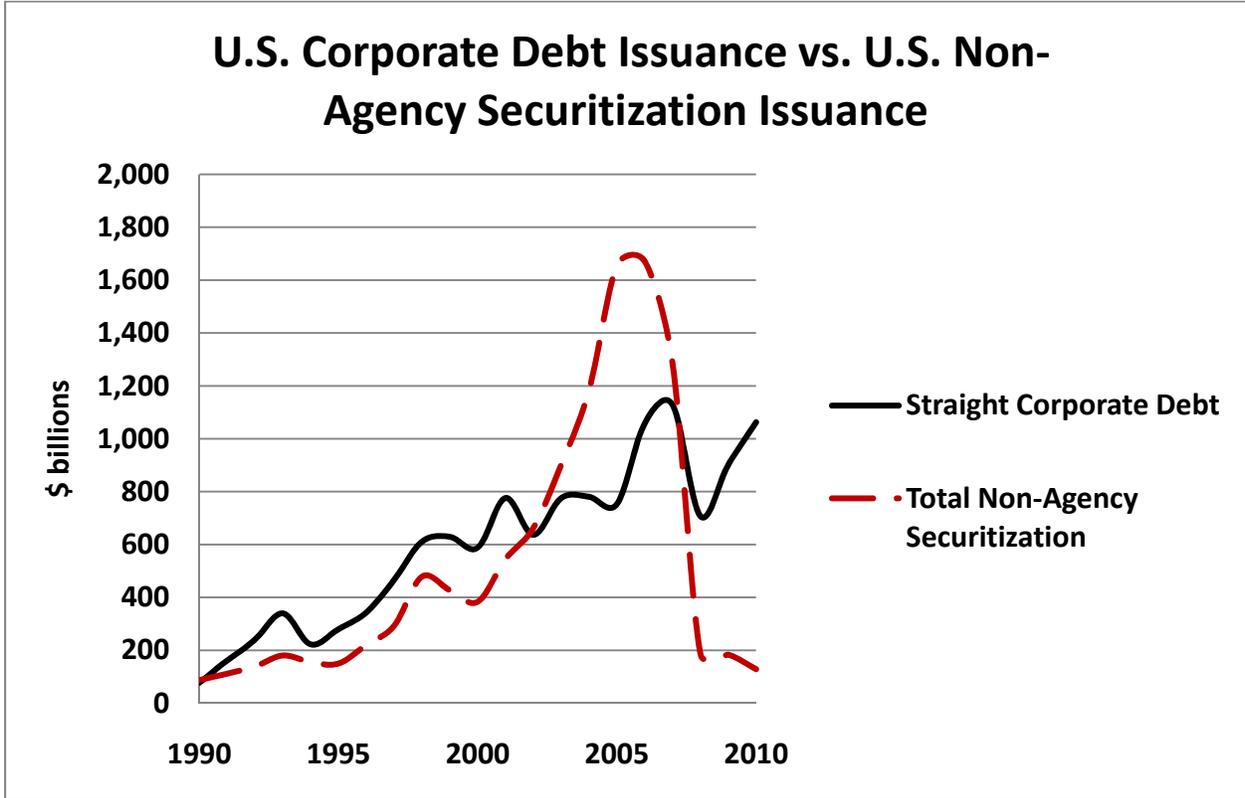
U.S. Corporate Debt Issuance vs. U.S. Non-Agency Securitization Issuance

Sources: Bloomberg, Dealogic, Fitch Ratings, Moody's, prospectus filings, Standard and Poor's, Thomson Reuters, compiled by the Securities Industry and Financial Markets Association.

Figure 2

Non-Mortgage ABS Issuance vs. Corporate Debt Issuance

Sources: Bloomberg, Dealogic, Fitch Ratings, Moody's, prospectus filings, Standard and Poor's, Thomson
        Reuters, compiled by the Securities Industry and Financial Markets Association.

Figure 3

U.S. Mortgage-Related Securities Issuance
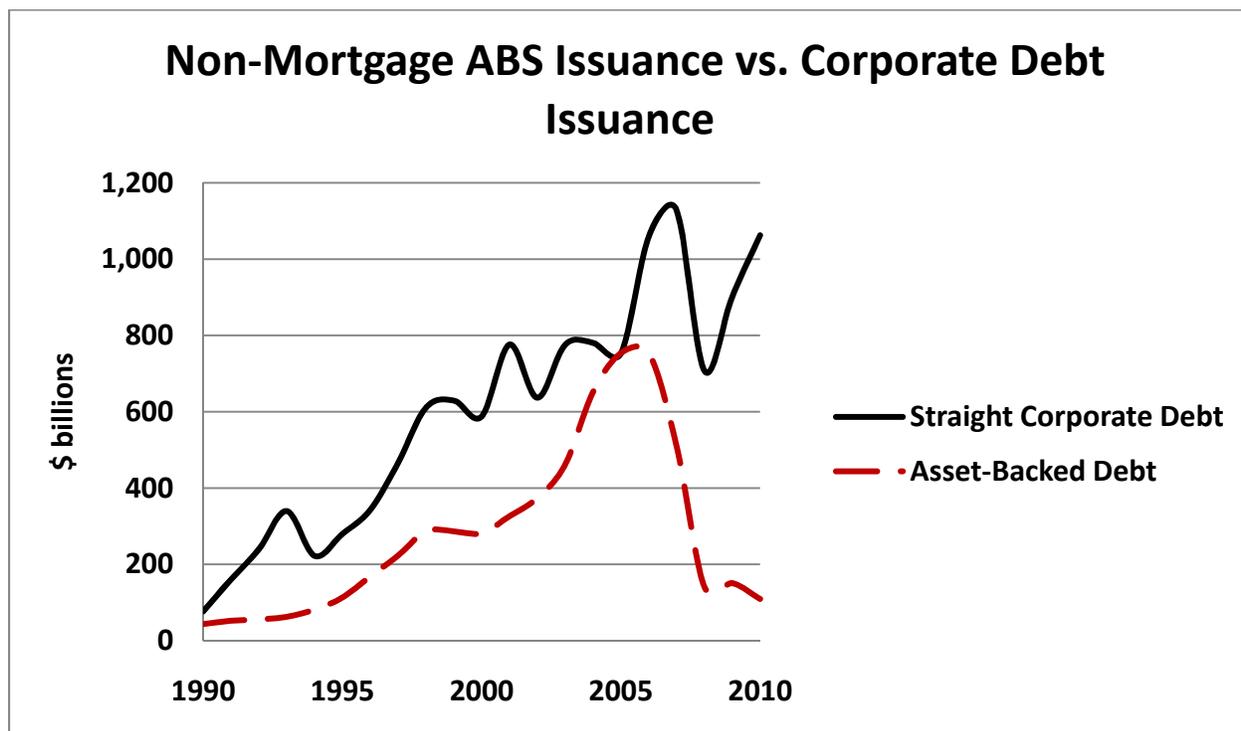
Source: SIFMA (FDIC, GSEs, Thomson Reuters, Bloomberg).

Figure 4

European Issuance of Selected Non-Mortgage ABS

Figure 5: Overview of Securitization

Figure 6

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                    ┌─────────────────┐
                    │   Credit card   │
                    │    Borrowers    │
                    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │    Chase USA    │
                    └─────────────────┘
                             │
                    ╭─────────────────╮
                    │   Credit Card   │
                    │   Receivables   │                    Master
                    ╰─────────────────╯           ←──    Trust Pooling
                     │       │      │                     and Servicing
              ┌──────┘       ▼      ▼                      Agreements
              │      ┌──────────┐ ┌──────────┐
              │      │First USA │ │  Chase   │
              │      │ Master   │ │ Master   │    ←──        Series
              │      │  Trust   │ │  Trust   │             Supplements
              │      └──────────┘ └──────────┘
              │           ▼            ▼
              │      ┌──────────┐ ┌──────────┐
              │      │Collateral│ │Collateral│
              │      │Certificate│ │Certificate│
              │      └──────────┘ └──────────┘
              │           ▼            ▼            Transfer and
              │      ┌─────────────────┐      ←──    Servicing
              └─────▶│  Master Owner   │             Agreement
                     │     Trust       │
                     └─────────────────┘
                             │              ←──     Indenture
                    ┌─────────────────┐
                    │  Asset Pool One │      ←──   Asset Pool One
                    └─────────────────┘            Supplement
                             │
                    ╭─────────────────╮            CHASEseries
                    │   CHASEseries   │      ←──     Indenture
                    │     Notes       │             Supplement
                    ╰─────────────────╯
              ┌──────────┬──────────┐
        ┌─────────┐┌─────────┐┌─────────┐            Term
        │ Class A ││ Class B ││ Class C │    ←──    Documents
        │  Notes  ││  Notes  ││  Notes  │
        └─────────┘└─────────┘└─────────┘
              └──────────┼──────────┘
                    ┌─────────────────┐
                    │   Noteholders   │
                    └─────────────────┘
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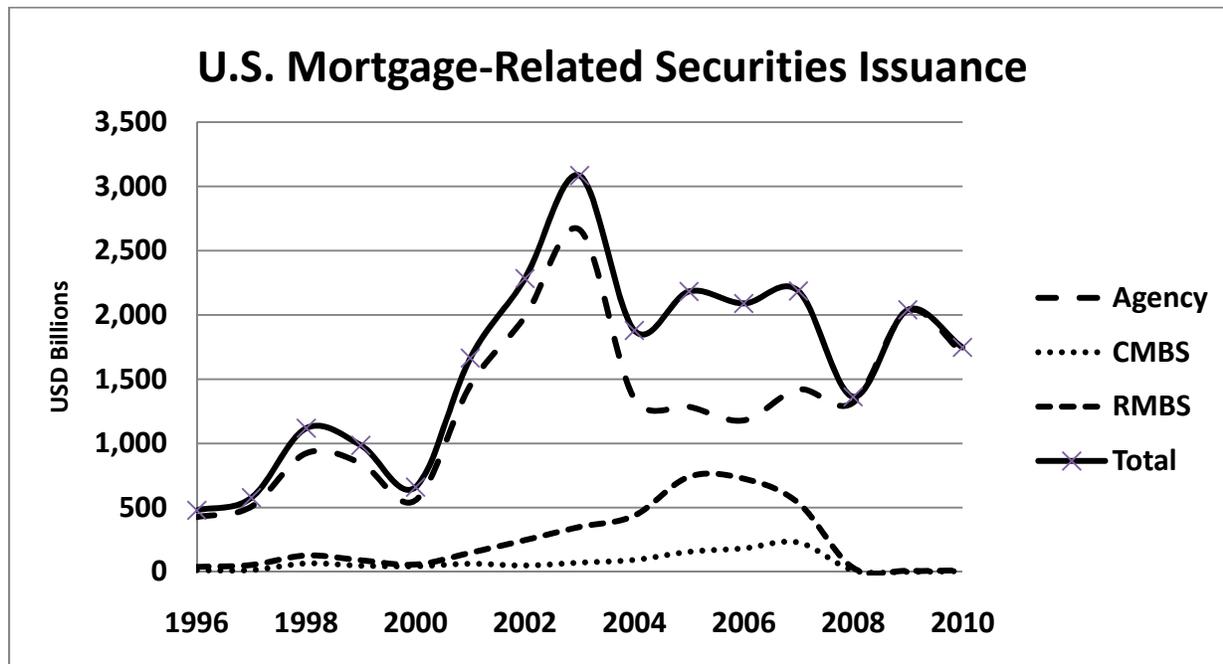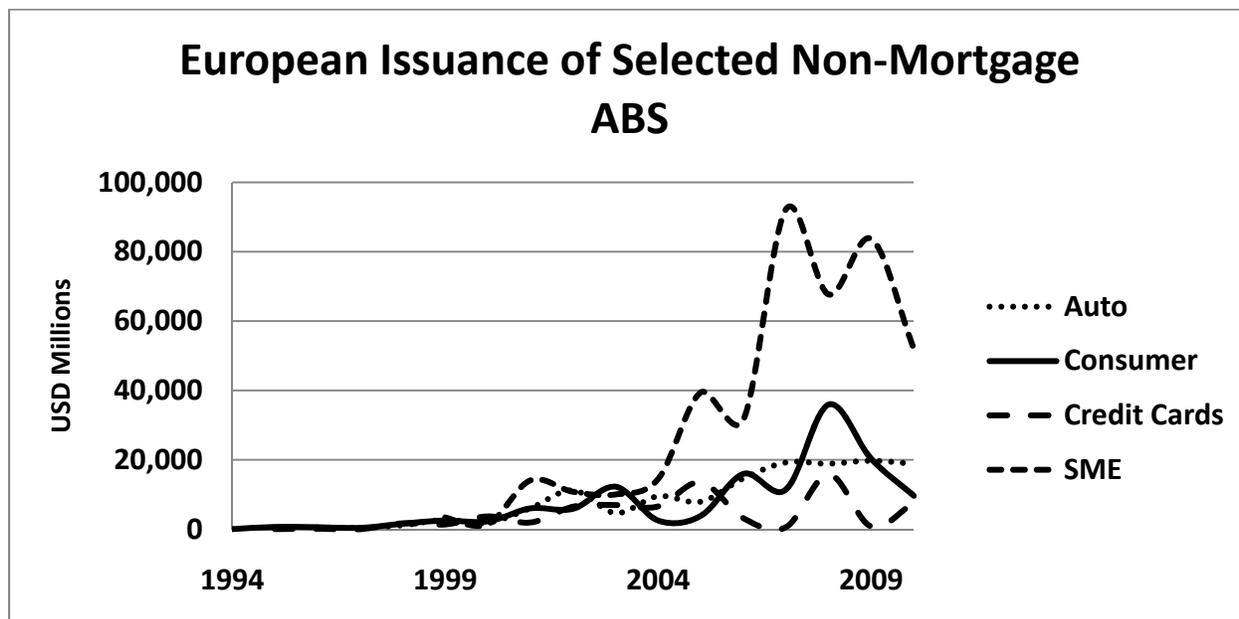
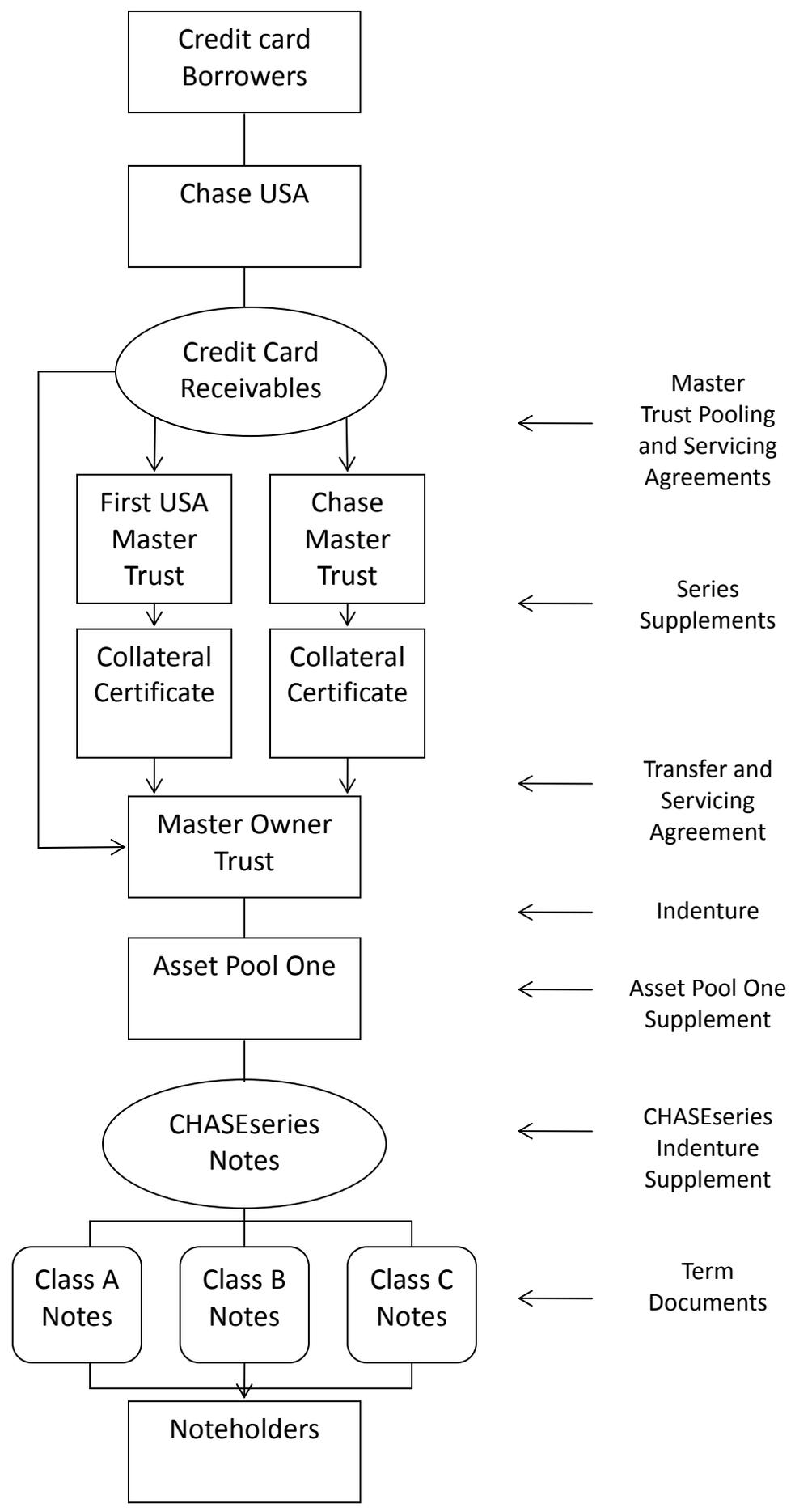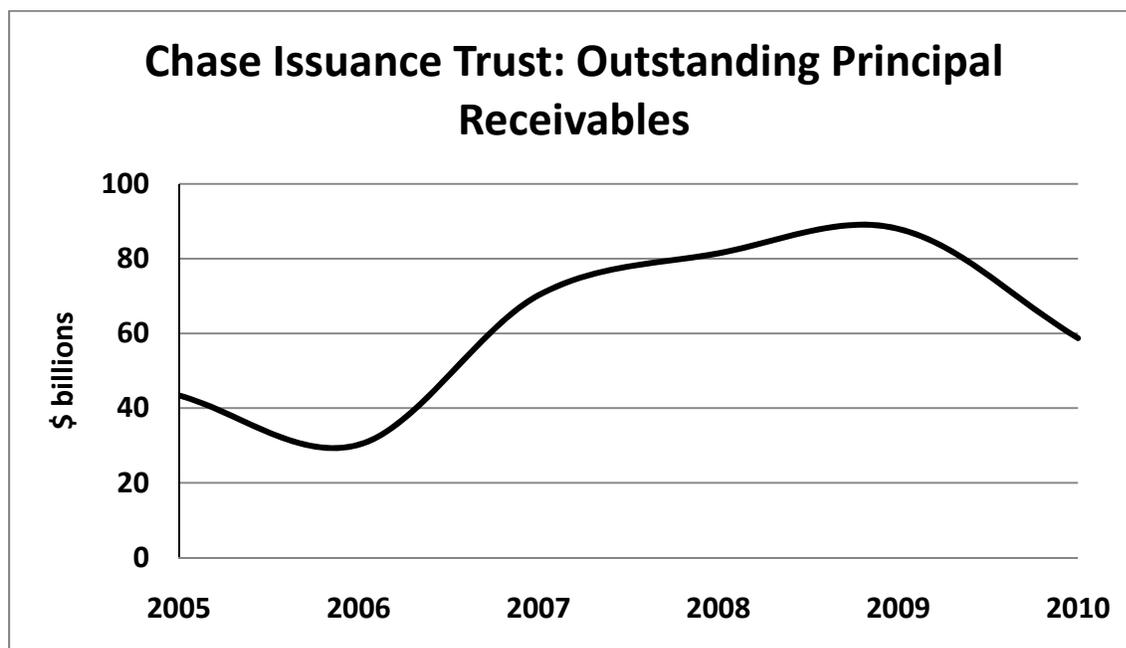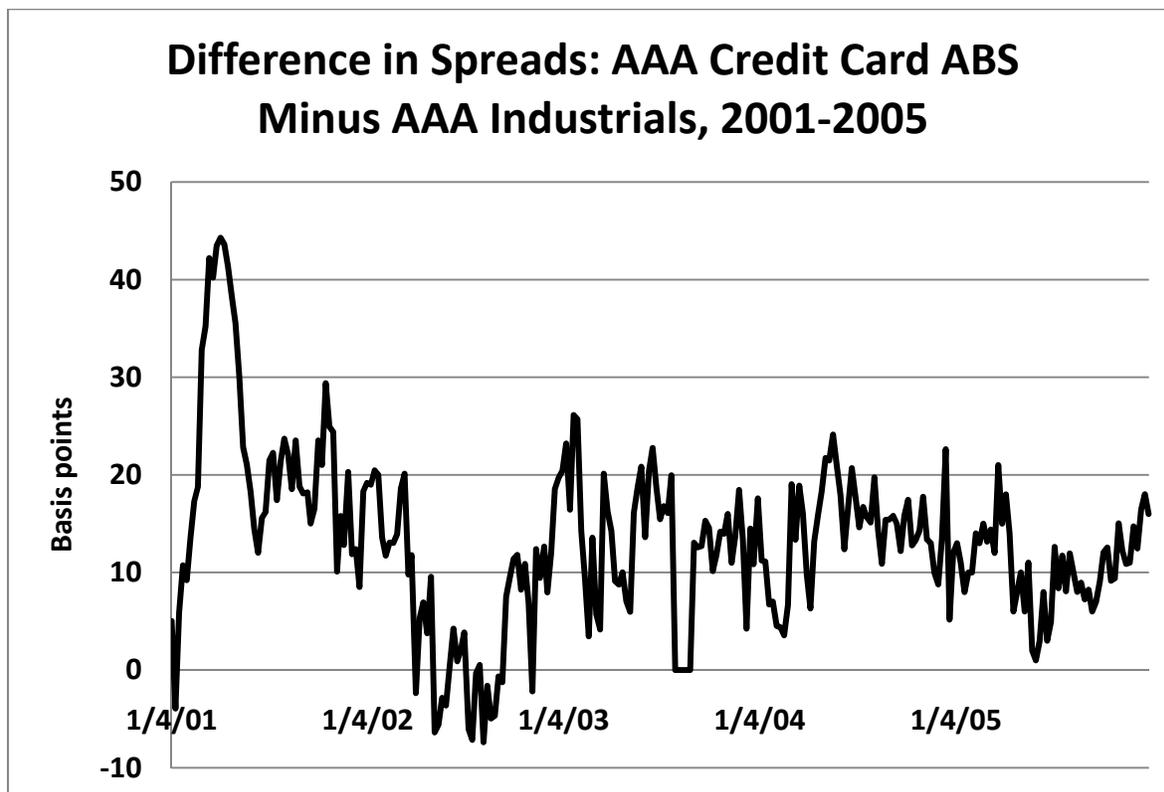**Figure 7**

Chase Issuance Trust: Outstanding Principal Receivables

Source: JP Morgan Chase, static pool data; see
http://www.jpmorgan.com/cm/cs?pagename=Chase/Href&urlname=jpmc/ir/financial/abs/static/cc

Figure 8

Difference in Spreads: AAA Credit Card ABS Minus AAA Industrials, 2001-2005

Source: Dealer Bank.

Figure 9

Difference in Spreads: AAA Credit Card ABS Minus AAA Industrials, 2005-March 2011

Source: Dealer Bank.

Figure 10

Spreads, 2005-March 2011

Figure 11

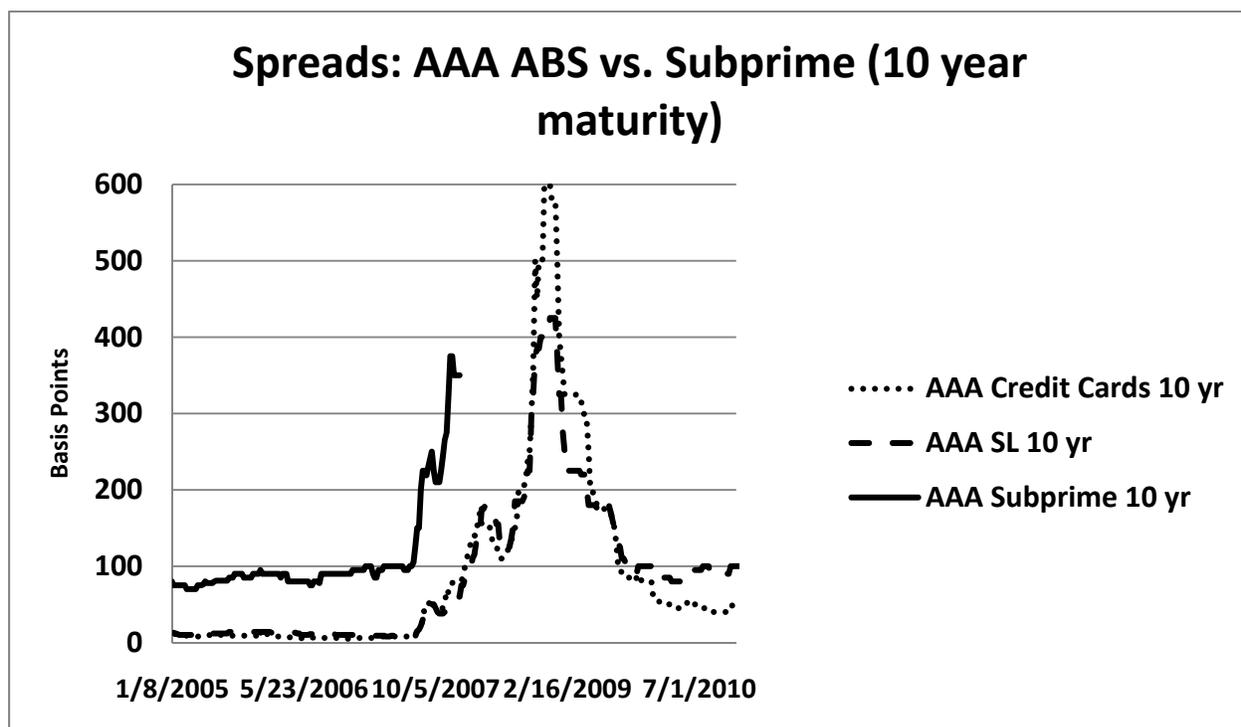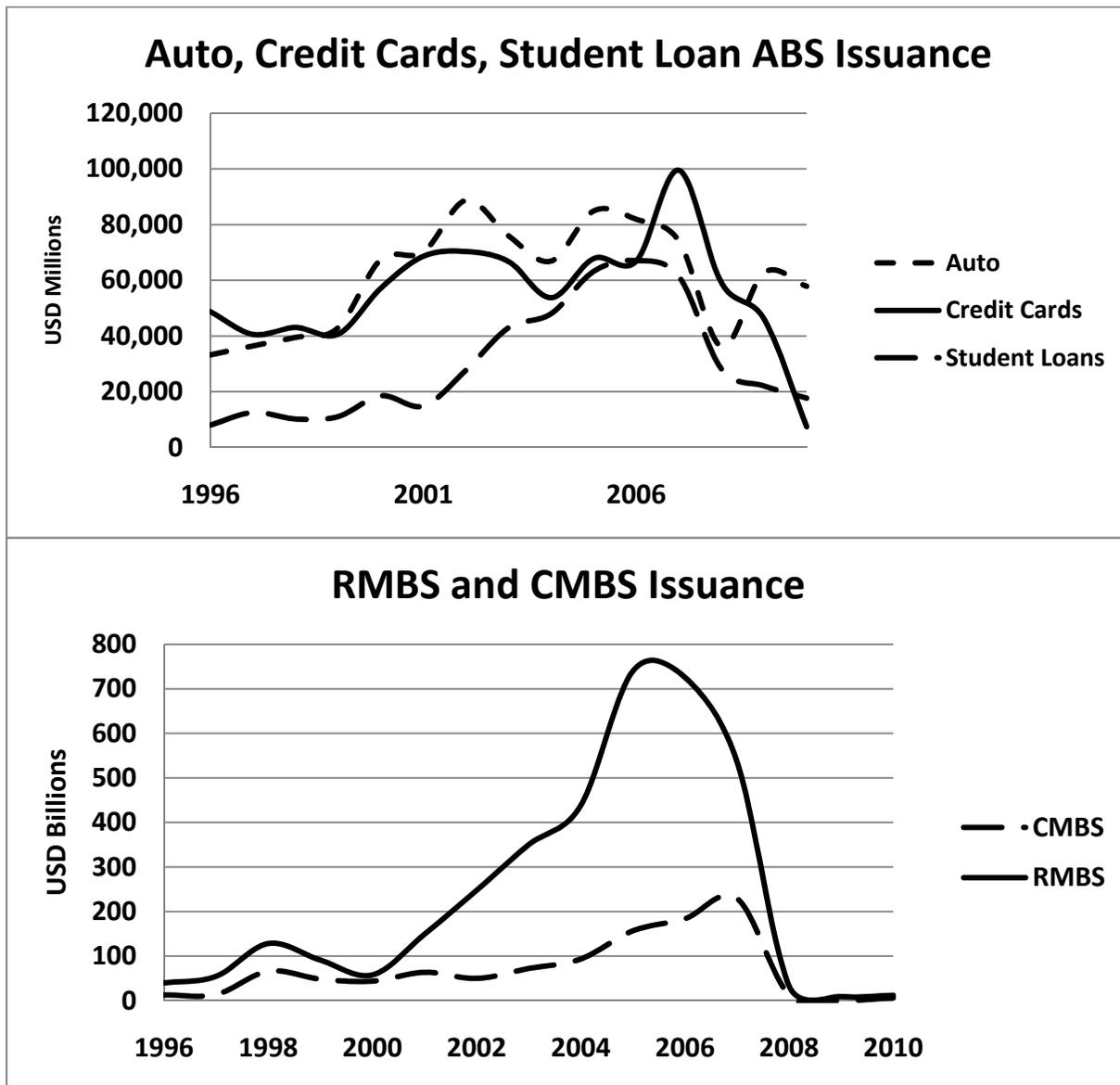**Figure 12**

Auto, Credit Cards, Student Loan ABS Issuance

RMBS and CMBS Issuance
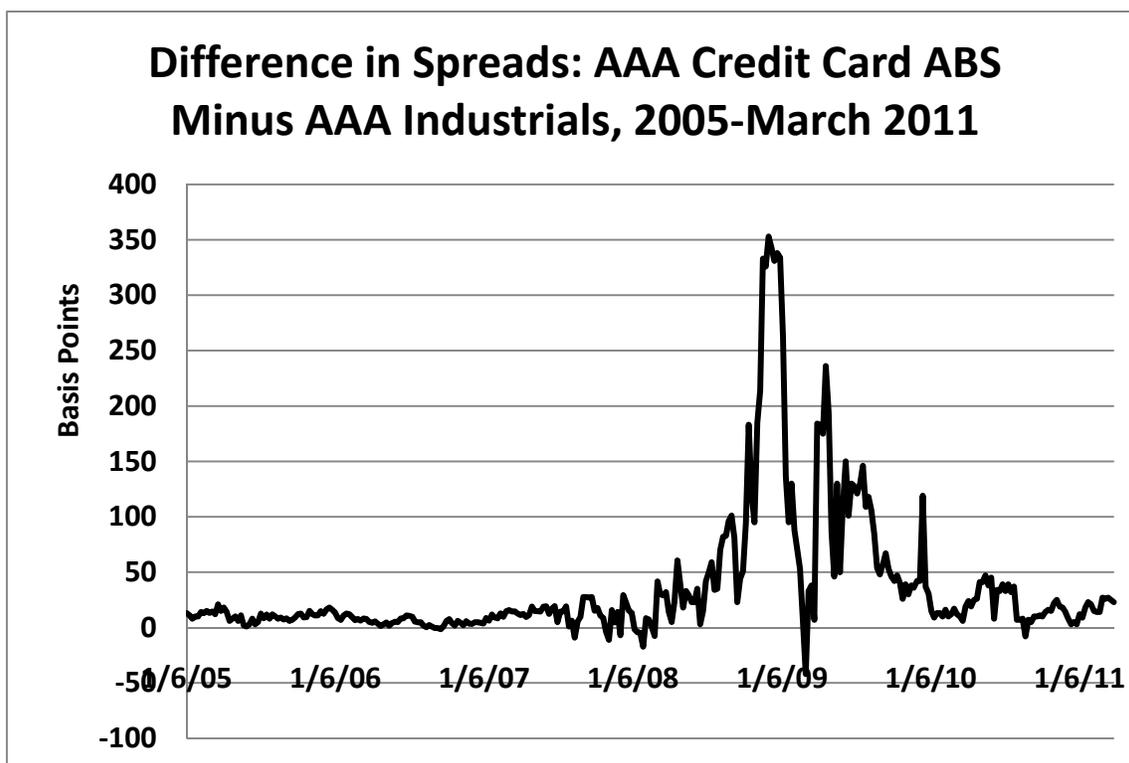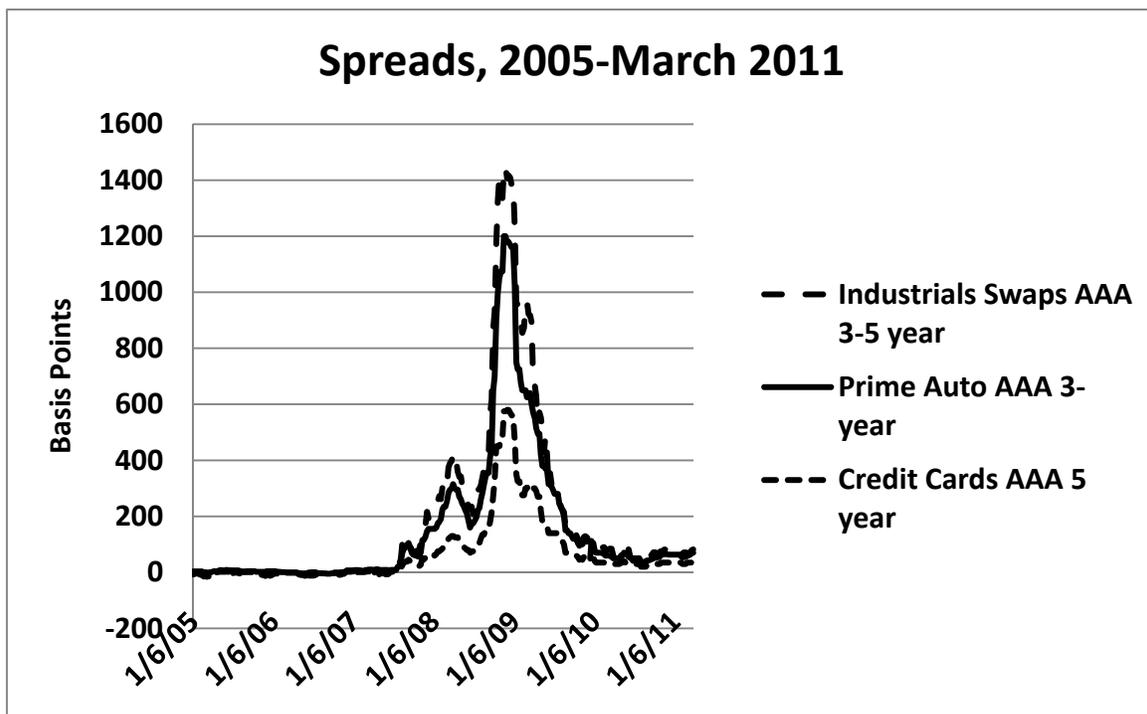
Source: Thomson Reuters, SIFMA.