

## Working Paper

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# On the Economics of Securitization: A Framework and Some Lessons from U.S. Experience

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**On the Economics of Securitization:  
A Framework and Some Lessons from U.S. Experience**

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**ABSTRACT**

The paper provides a framework for analyzing the development of securitization as a vehicle for funding loans. Broadly speaking there are two models for funding loans: the *portfolio lender model*, which typically involves banks or other intermediaries originating and holding the loans and funding them mainly with debt, most often deposits, and the *securitization model*, which involves tapping bond markets for funds, for instance by pooling loans and selling shares in the pools. A central issue with securitization is that while securities markets are efficient sources of funding, they also involve agency costs because bond market investors are often at an informational disadvantage relative to other traders. The paper discusses alternative structures and tradeoffs among them, and the role of the public policy in securitization.

## I. INTRODUCTION

The purpose of this paper is to provide a framework for analyzing the development of securitization as a vehicle for funding loans. Broadly speaking there are two models for funding loans: the *portfolio lender model*, which typically involves banks or other intermediaries originating and holding the loans and funding them mainly with debt, most often deposits, and the *securitization model*, which involves tapping bond markets for funds, for instance by pooling loans and selling (perhaps structured<sup>1</sup>) shares in the pools. These are polar cases. The former is a simple representation of the traditional model of financial intermediation, where the intermediary focuses on the problem on managing credit risk and transforming heterogeneous assets into homogeneous liabilities; and the latter represents the model of direct access to capital (bond) markets, where the investors take responsibility for understanding the credit risk. Of course, many financial institutions are combinations of the two. The focus here is on broad issues of when securitization is likely to be the more economic form of funding and some specifics of how the funding might be structured. Experience in the U.S. mortgage market is analyzed.

Important questions are why securitization has dominated the “prime” mortgage market in the U.S., while it has not been nearly as successful in other markets and other places, and whether this dominance provides a good model for other loans. Likely answers are that securitization might not matter as much as is often thought and that it might not be an especially good tool for funding other types of loans. In particular, a reasonable way of posing the problem (of which funding structure is best) is that it can be defined by a tradeoff between the advantages of securitization as a low cost and elastic source of funds with the disadvantages of securitization due to information asymmetry between investors

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<sup>1</sup> “Structured” means taking the cash flows from the pool of mortgages and selling them in non pro rata ways, for instance selling the interest payments to one group of investors and the principal payments to another or prioritizing the impact of default losses by having one group take the first hit. Some of these structures, particularly the latter, are discussed below.

and lenders (a problem that banks tend to manage better) and costs of setting up deals (which do not apply to deposit funding), and *a priori* the balance could go either way.

### **A Framework**

Securitization is the process by which lenders raise money in capital markets, e.g., by selling shares in pools of loans. Securitization has become an important part of the U.S. financial system. At the end of 2002 the outstanding volume of mortgage and asset backed securities was close to \$6 trillion. Of this, over 80% was in the form of mortgage-backed securities. Credit cards and car loans, combined, were just over 10%.<sup>2</sup> So the basic stylized facts are that securitization is an important part of the system, but it has been largely confined to the mortgage market, particularly the “prime” market, which consists of relatively low risk, single family mortgages. The concentration in a single market is important: prime mortgages are among the most transparent financial instruments in the system, particularly because of the collateral that supports them and the legal system that supports foreclosure. That is less true for most other loans. As will be discussed below, while there is no particular reason that any asset cannot be securitized, it is not an accident that high quality mortgages have been the most successful; they suffer least from asymmetric information and small volume problems that can present important barriers to securitization.

The main advantage of securitization is that it can provide an elastic and low cost source of funds, particularly for long term fixed rate funds. This is in contrast with traditional banks, which tend to rely on deposits, which are generally not elastic in supply and have variable rates. As is argued below, in a perfect, frictionless world different sources of funds would, after adjusting for the value of different characteristics, like embedded options, hedging cost and loan term, have the same cost in an “all-in” sense, and choice of funding vehicle (e.g., traditional bank via deposits vs. packaging and selling into the bond market) would not matter. This does not appear to be the case in the real world; there are many “frictions,” like asymmetric information, that make the choice important and make the public policy issue of barriers, e.g., to securitization, at least potentially,

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<sup>2</sup> See Davidson et al (2003).

important. To get a handle on this it is best to begin with a very simple framework where frictions are unimportant and move from there to the real world by focusing on important frictions.

### **Modigliani-Miller**

The point of departure is the much celebrated “Modigliani-Miller Irrelevance Theorem” (Henceforth “MM;” see Modigliani and Miller (1958)). Briefly, the theorem is that under a set of assumptions, which mainly involve perfectly competitive markets, no transaction costs and widely agreed on information, the liability structure of the firm is irrelevant in the sense that changing the way the firm finances its assets will not affect its “all-in” cost of funds. This is because different liability strategies are simply different ways of rearranging the same cash flows from the firm’s assets, and in a well-informed, competitive market (with a perfectly elastic supply of funds) arbitrage will assure that all structures will be priced so that none has an overall advantage; the sum of the parts will equal the whole.

Taken literally, the theorem, applied to, say, mortgage markets implies that while there are lots of possible institutional structures for funding mortgages and lots of liability structures within the institutional structures, which institutions and structures are chosen doesn’t affect mortgage rates. A softer version is that advantages of different structures are likely to be small, and because of very elastic supply curves small advantages of one source of funding (e.g., some sort of subsidy or slightly lower transaction costs) the small differences can lead to big effects on how the financing is done (who has the biggest market share) but with small effects on interest rates on the loans and subsequent resource allocation.

The “MM” Theorem is one of those ideas that when you think about it is obvious, but of course, it is wrong (markets aren’t perfect; though they’re often rather good, asymmetric information is often the rule rather than the exception, and transaction costs matter). It has been debated extensively in the economics and finance journals. But the theorem is not a bad first approximation, and it is a good place to start because it makes us ask the

right question: why should we expect one institutional setup to be better than another at financing a particular set of cash flows when they all compete in the same overall financial system? In particular, it suggests that some reasons for particular structures, like “getting assets off balance sheet” or “the high cost of capital relative to debt” or “allowing banks to shed the risk of low downpayment loans” are wrong, or at least suspect, pending analysis of what part of MM is violated.

Much of the focus in studying MM has been on debt vs. equity funding. However, the securitization issue is less about debt-equity structure than it is about the structure of debt funding, particularly as it is related to institutions that typically use different types of debt funding. For instance, the most common type of debt funding for financial institutions is deposit funding by banks, but the important alternative, especially in the U.S. in mortgage markets, has been securitization, typically performed by the government sponsored enterprises (GSEs) Fannie Mae and Freddie Mac or the government-owned Ginnie Mae, the three “Agencies.” So the point of departure is why should there be any difference between deposit funding and securitization?<sup>3</sup>

## **II. SECURITIZATION MODELS<sup>4</sup>**

### **The U.S. Secondary Market<sup>5</sup>**

The secondary mortgage market in the U.S. is not a secondary market in the classic sense of a place where used mortgages are traded. Rather it is “secondary” in the sense that it is the second place that mortgages go, after origination in the “primary” market. After purchase the secondary market can fund mortgages either through “securitization,” which typically means packaging them into pools and selling shares in the pools, or through debt funding, or some combination. The structure of the U. S. mortgage market has changed dramatically in the last quarter century, largely because of the rise of the

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<sup>3</sup> The issue of subsidy via guarantee is not touched on to any extent here. Both sources of funds, deposits and Agency liabilities have implicit or explicit guarantees, and the question of which is more valuable (at the margin) is not clear.

<sup>4</sup> See Weicher (1999) for a discussion of some of the history of the secondary market. See also Frame and White (2005) and Van Order (2001).

<sup>5</sup> See Weicher (1999) for a discussion of some of the history of the secondary market.

secondary markets. This rise has come about largely because of standardization of pools of mortgages, brought on mainly by three secondary market “agencies”: the Federal National Mortgage Association (Fannie Mae), the Government National Mortgage Association (Ginnie Mae), and the Federal Home Loan Mortgage Corporation (Freddie Mac). Annual sales of mortgages to these three institutions have risen from under \$100 billion in 1980 to well over \$1 trillion in 2002; they now own or are responsible for about half of the outstanding stock of single family mortgages. This growth has been accompanied by a decline in the market share of the traditional lenders, thrift institutions (e.g., savings and loans).

### *Fannie, Freddie, and Ginnie*

Fannie Mae, the oldest of the agencies, was established in the 1930s as a secondary market for newly- created Federal Housing Administration (FHA) loans, which were insured by the government, but which during of the Great Depression had trouble gaining acceptance by investors. For much of its history (until the 1980s) it operated in some ways like a national savings and loan, gathering funds by issuing its own debt (short term debt rather than deposits) and buying mortgages that were held in portfolio, but because it held government insured mortgages it accepted almost no credit risk. This was a particularly useful function during credit crunches when deposit rate ceilings limited the ability of savings and loans to raise money.

In 1968 because of budget pressures<sup>6</sup> from the Viet Nam war Fannie Mae was moved off budget and set up as a private, government-sponsored enterprise (GSE), which in the 1970s switched its focus toward conventional (not government insured) loans, which do have credit risk. It receives no government funding, and its operations are separate from the “on budget” parts of the government. Ginnie Mae was created as a successor to the old Fannie Mae; its purpose was to handle Fannie Mae’s policy-related tasks and to provide a secondary market for government insured loans. It is on the federal budget as a part of the U.S. Department of Housing and Urban Development.

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<sup>6</sup> At the time Fannie Mae’s lending counted as spending, which was offset by repayments, which were counted as negative spending. However, because it was growing it contributed, in an accounting sense, to the (at the time) high level of government spending.

Ginnie Mae was responsible for developing the major innovation in secondary markets, the mortgage-backed security (MBS). An MBS is a “pass-through” security. The issuer, typically a mortgage bank, passes the payments from a pool of mortgages (both principal and interest, net of its fee) through to the ultimate investors, who typically receive *pro rata* shares of the payments. The issuer also guarantees the payment of interest and principal even if the borrower defaults (the issuer is covered by the government insurance for almost all of foreclosure costs), and Ginnie Mae guarantees timely payment even if the issuer does not make the payments. Hence, its guarantee is on top of the federal insurance and the issuer’s guarantee. This has proven to be quite valuable in marketing government insured loans. Because it simply enhances other guarantees its costs are small, and it has actually made money from the relatively small (.06% per year per dollar of loan balance) fee it charges. As with most pass-through securities Ginnie Maes are subject to interest rate risk.<sup>7</sup>

Freddie Mac was created in 1970 to be a secondary market for the savings and loans. At the time it dealt only with savings and loans, and Fannie Mae dealt with mortgage banks. Now both institutions deal with the same originators. Like Fannie Mae, it is a private, government-sponsored enterprise, and it too is off budget. It initiated the first MBS program for conventional (i.e., non government insured) loans in 1971. Fannie Mae began its conventional MBS program in 1981. Both institution’s MBSs are similar to Ginnie Mae’s; e.g., both protect investors against credit risk but not interest rate risk. Neither Fannie nor Freddie does more than a small amount of federally insured mortgages, which almost always go into Ginnie Mae pools.

Because Ginnie Mae is on budget, its securities have a “full faith and credit” federal guarantee. Because Freddie Mac and Fannie Mae are GSEs, which are private corporations, neither has an explicit guarantee, but they both have an “implicit” or “conjectured” guarantee, because investors believe that if these institutions failed the government would protect debt-holders (though it has no *legal* obligation to do so). This

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<sup>7</sup> For more on mortgage-backed securities see Fabozzi (2001), Havre (2001) and Hu (1997).

allows the GSEs to borrow (or sell mortgage backed securities) at interest rates lower than they would otherwise. Both are regulated by the Department of Housing and Urban Development for their public purpose missions and by the Office of Federal Housing Enterprise Oversight (OFHEO) for safety and soundness<sup>8</sup>.

Fannie Mae and Freddie Mac are now, except for details, quite similar and compete in the conventional mortgage market, as buyers of mortgages, and in the securities markets as sellers of mortgage-backed securities and issuers of debt. The primary benefit of their charter is that while Fannie and Freddie would be strong companies (probably in the low AA range according to recent “stand alone” ratings by Standard and Poors) without their federal charter, they borrow at better than AAA rates with it. This saves them between .20% and .50% (currently probably around the mid point of this range) in borrowing costs. As a result borrowing rates for loans eligible for purchase by Fannie and Freddie are lower than other rates.<sup>9</sup> Both Fannie and Freddie consistently make returns on equity in excess of 20%, suggesting relatively low levels of risk.<sup>10</sup> Fannie, Freddie, and Ginnie deal primarily in fixed rate mortgages; adjustable rate mortgages are originated and held primarily by banks and funded with short term deposits.

The main difference between Fannie Mae and Freddie Mac and Ginnie Mae is in ownership structure. Fannie and Freddie are both owned by private shareholders (both are in the Fortune 500).<sup>11</sup> Their shareholders presumably have the same motivation as other private shareholders. Hence, it is generally presumed that Fannie and Freddie’s motivation is shareholder wealth maximization subject to their charters and regulations; whereas Ginnie Mae is government owned and is presumed to be more oriented toward public policy issues. The idea of the GSE charter is to combine the advantages of market-oriented private companies (e.g., cost minimization, responding to the market)

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<sup>8</sup> While Fannie Mae and Freddie Mac are off-budget, there is a separate federal credit budget which does analyze their risks. See Budget of the United States, 1992.

<sup>9</sup> For a discussion of benefits and costs etc. see Van Order (2001).

<sup>10</sup> Risk is discussed below. Recent stress tests by Fannie and Freddie’s regulator also suggest low levels of risk, particularly credit and interest rate risk.

<sup>11</sup> Both companies have boards of directors with eighteen members, thirteen of which are determined by shareholders and five of which are presidential appointees.

with charter restrictions and regulation to pursue public interest goals. Some public policy aspects and conflicts inherent in the GSE structure are discussed below.

#### *“Private Label MBS”*

There is a growing “private label” market, which securitizes mortgages without using Fannie, Freddie or Ginnie. This market operates mostly in areas not eligible for the agencies, primarily loans with balance above the conforming loan limit (currently \$322,000) or which are too risky for them. It is about 10 to 20% of the market. Private label securities resemble agency MBSs except that credit is typically managed by breaking pools into two tranches: a subordinated tranche, which takes the default losses up to some amount (e.g., 5% of the pool balance) and a senior part, which takes the rest. This allows the bulk of the credit risk to be taken by specialists, with the senior part (which typically has an AA or AAA rating) open to a wide range of investors who do not want to manage the problems associated with mortgage credit risk. An alternate but less widely used credit enhancement tool is mortgage insurance on the pool, typically with limits on losses to the insurer.

#### *Changes In Funding Mortgages*

For most of the last 30 years the secondary market has relied primarily on the standard pass through security described above. But there have been important changes. Since the early 1980s secondary markets have developed beyond the “plain vanilla” pass through security and have attracted funds by partitioning MBSs into “derivative” securities. This is because a *pro rata* share in a pool of 30-year fixed-rate mortgages is not what all investors want. While agency MBSs have virtually no credit risk, they have two types of interest rate risk: the usual risk of any long-term security that its value will fall when rates rise, and a second risk that is similar to that of callable bonds, because borrowers have the option to refinance (i.e., call the mortgage) and they tend to do this when rates fall. This call risk is difficult for many investors to evaluate because borrowers’ prepayment behavior is difficult to predict; and because some investors work much harder than others at assessing prepayment risk (e.g., by gathering data and estimating sophisticated

statistical models) there is the risk that less informed investors will be selected against and end up with the loans with the worst prepayment characteristics.

Beginning in 1983 with the first collateralized mortgage obligation (CMO), issuers and Wall Street dealers have created derivative securities, which take pools of mortgages and pass the payments through in non *pro rata* ways. The first CMOs established *tranches* that received principal payments in sequence, the first *tranche* receiving interest plus the first share of principle payments, the second *tranche* receiving the next share, etc. In this way a complicated pool of 30-year callable securities was broken into a sequence of short-, medium-, and long-term bonds, which could be sold to different types of investors. This carving up of the mortgages does not eliminate interest rate risk, but it does allow the risk to be allocated more efficiently. Since the 1980s CMOs have become quite complicated, often divided into over fifty *tranches*. On the order of half (the actual share fluctuates from year to year) of the fixed rate mortgages that Fannie and Freddie buy now go into CMO like derivatives.

Both Fannie and Freddie also fund mortgages with debt.<sup>12</sup> The share of debt financing has increased sharply for both GSEs, especially Freddie Mac, and is now around 45%. An accurate way of thinking about Fannie and Freddie's operations is that they buy mortgages that are financed with a portfolio of securities made up of pass throughs, comprising about 55% of the funding and various types of debt (and derivatives) comprising 45%. Variations in this mixture affect their exposure to interest rate risk, and both companies almost always take on credit risk regardless of the means of funding. Both companies make heavy use of futures and options contracts to hedge against the interest and prepayment risk associated with debt funding (see Jaffe (2003)). Currently on the order of 75% of loans purchased by Fannie and Freddie are funded with debt or CMOs.

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The debt funding is generally done by repurchasing existing pools and then issuing debt to fund the repurchase. This may seem like an odd way to hold mortgages, but there is a point to it. The point is that if Fannie or Freddie choose which loans to hold and which to sell the market will assume it is being selected against (keeping the ones with the least prepayment risk) and will be reluctant to hold the securities. When the securities are repurchased Fannie and Freddie traders purchase them with the same information (about pools) as everyone else, mitigating the selection problem.

## **The Economics of Securitization**

The economic issues revolve around the above-mentioned asymmetric information and transaction cost problems. The analysis focuses on types of structures and how they solve these problems.

### ***Basic Securitization Models:***

There are two basic models of securitization:

#### ***Model 1: the MBS (Conduit/Mutual Fund) Model***

The simplest model of securitization is the standard MBS model as developed by Ginnie Mae and pursued by Fannie, Freddie and some private label securitizers. It is set up like a mutual fund. Mortgages are sold to a Special Purpose Vehicle (SPV, Grantor Trust in the U.S.), which manages the cash flows. In the Agency case the Agencies guarantee timely payment; generally there is some other form of credit enhancement. In this model the securitization is set up as a conduit device for packaging securities to open up a new source of funds from the bond market. The conduit need not sell *pro rata* shares to investors. It can sell different parts to different investors (like the CMOs discussed above).

#### ***Model 2: the Bowie (Financial Intermediary) Model***

In 1997 David Bowie raised \$55 million in the bond market by securitizing the future royalty income from 25 of his albums. This was not structured as a pass through. It used an SPV as above, but investors did not get shares in the royalties; rather they got a debt claim secured by the royalties. Royalty income is not especially transparent or stable, and bond market investors most likely would have felt they were at an informational disadvantage in holding straight shares. So the deal was structured by selling 10 year bonds with a fixed 7.9% rate. This approach is less like the conduit approach and more like the way a traditional intermediary works, by transforming messy assets into more

transparent liabilities. Nonetheless, it is a securitization, but it looks like straight debt issued by a corporation whose assets are royalty rights. A version of this, used for some time by the Federal Home Loan Banks when they lend to banks, is to have borrowers issue debt collateralized by specific loans that remain on balance sheet.

The two structures have a lot in common: they both have to find a way of managing credit risk, by an Agency taking it, by having subordinated *tranches* take it, or by providing excess collateral; and they both tap the long term bond market by putting the bond market investors down in the queue for credit risk so that they can get high (AA or AAA) bond ratings. For the time being I shall focus on the MBS model because it has been most prominent in the U.S. However, I shall return to the Bowie model in discussing alternative securitization structures. Indeed, it is a structure that is probably the more likely to succeed with CED loans.

### ***Alternatives to Securitization***

The main alternative to securitization is the portfolio lending of banks (and savings and loans). Banks have a low cost source of funds in the form of insured deposits, but that has not been as elastic a source of funds as the one coming from capital markets in general, which can be tapped quickly by the secondary market. As a result banks sometimes have trouble raising money quickly, especially relative to the Agencies.

GSEs holding loans or pools of loans and funding the purchases with debt is similar to the portfolio lending model. However, they do not originate or service the loans, and they still have the problem of being selected against.

### ***Unbundling and the Securitization Process***

The traditional portfolio lender performs all aspects of the mortgage bundle: it originates the mortgage, it services it, it takes the risk of default (perhaps along with a private or government insurer), and it raises money in the deposit market to fund it. The secondary market evolved by unbundling this package. The major contribution of Ginnie Mae, Fannie Mae, and Freddie Mac has been to facilitate the money-raising part of the bundle

by taking on residual credit risk and packaging mortgages, so that mortgages can be sold as relatively homogenous securities or financed with homogenous debt in the capital markets. This has allowed separation of the funding part of the bundle from the other three parts.

All four aspects of the mortgage bundle can now be unbundled. Mortgage securitization typically has four major actors: (1) mortgage originators, who are large in number and sometimes small in scale, who sell the loans themselves or who (mortgage brokers) act as agents for mortgage bankers or depositories, who sell the loans;<sup>13</sup> (2) mortgage servicers who sell the mortgages into the secondary market and either keep the servicing or sell the servicing rights to other mortgage servicers; (3) secondary market institutions and mortgage insurers,<sup>14</sup> who take on credit risk; and (4) investors who buy mortgage-backed securities or GSE debt. Indeed, the last function has become further unbundled with the advent of derivative securities (e.g., CMOs).

### ***Principal/Agent Problems***

Unbundling takes advantage of scale economies and division of labor and promotes competition among the suppliers of the various bundles, but it occurs with a cost. The cost is that the players that focus on one part of the bundle depend on players in the other parts of the unbundling to perform services for them as expected (e.g., sell them good loans) when it is not always in their interest to do so. That is, there is a “principal/agent” problem: the principals (e.g., ultimate investors) depend on agents (e.g., the institutions originating and servicing the loans) to perform as promised, even though it may not be profitable for them to do so.

For investors, or more broadly those who end up taking the risk, especially credit risk, the major principal-agent issue has come from the reliance on originators and servicers to originate good loans and service them properly. The major risks are that sellers, with superior information about loans, will select against them, keeping good loans and selling

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<sup>13</sup> In 2002 over half of the loans originated were done through mortgage brokers.

<sup>14</sup> It is typically the case that loans with down payments of less than 20% have private mortgage insurance. The insurance typically covers the first 20 to 25 cents on the dollar of loss.

the ones that are riskier than they appear to be, relaxing monitoring, underwriting and servicing poorly, etc., or making loans that are of low quality (occasionally this involves actual fraud, e.g., selling mortgages not associated with houses). This is particularly true for institutions that are in danger of bankruptcy, for which reputation is less valuable. Hence, to control credit risk, whoever is taking the credit risk (e.g., Fannie Mae and Freddie Mac) needs to do things that align the incentives of originators and servicers with their own or get better information on risk.

Securitizing on a large scale, which keeps fund-raising costs low, has historically required that Fannie and Freddie not spend a lot of resources monitoring the credit risk of individual loans. Hence, the burden of controlling credit costs has largely fallen on: the performance of mortgage insurers, who insure loans with down payments of 20% or less; underwriting guidelines, which attempt to define the parameters of an acceptable mortgage; the ability to monitor and provide incentives to induce originators to make good loans; and ultimately the ability to foreclose on borrowers who do not make their payments.

This is all in contrast with the traditional, bundled bank, which had all the elements of the bundle under its control and was less worried that the part of the firm that originates mortgages would take advantage of the part of the firm that evaluates credit risk<sup>15</sup>.

### ***Controlling Agency Costs and Competitive Balance***

The balance between the role of securitization and the role of banks has largely depended on the balance between economies of scale and fundraising that the secondary market brings with the advantages of control over some important risks that the traditional portfolio lender brings (see Van Order (2000a) for a more formal discussion) and on differences in the values of the guarantees received by the two. That this balance has been favorable to the securitization of single family mortgages has been due to advantageous circumstances in the market for single family houses that make it easier to control

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<sup>15</sup> That is not to say that there is no risk. Compensation schemes could induce conflicts of interest inside the firm. The point is that conflicts inside the firm are easier to resolve.

principal-agent conflicts (and may not be easily replicable for other types of loans or in other countries) and to constraints on banks (they have to spend their subsidy in the deposit rather than the bond market).

The most important of the favorable circumstances is the ability to use a house as collateral (this comes from foreclosure laws and property registration) and the relatively good information that exists about house values (because houses trade frequently and are relatively (though still imperfectly) easy to appraise). These two factors mean that lenders have a good idea of homeowner equity at loan origination and can foreclose and thereby minimize losses, so that homeowner equity is both a good deterrent to default (homeowners will be reluctant to default and lose their equity) and cuts costs in the event of default. An important element of this is the ability to foreclose quickly. Lost interest during the foreclosure period (which in some countries can be 10 years) can easily overcome equity previously built up and leads to large downpayment requirements.

As a result the major concern of institutions that accept mortgage credit risk is the probability of equity becoming negative. The ability to treat houses and mortgages almost like commodities and default risk almost like a financial option (i.e., a “put” option, which gives the borrower the right to exchange the house for the mortgage) is a major factor in the success of the secondary market. Expected default costs then depend primarily on the initial loan to value ratio, which is known to everyone,<sup>16</sup> and on the probability of house value falling by enough to trigger default, which is not known equally well by everyone, but which can generally be estimated reasonably well by the secondary market, and on other factors that can be diversified away.<sup>17</sup>

These advantages are not common to many other markets. For instance, lending for rental housing is quite different. It is much more difficult to evaluate apartment building

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<sup>16</sup> Of course this is subject to having a good appraisal of property value. For arm’s length purchases of single family houses this is not a major problem; trading is usually deep and borrowers have incentives not to overpay. For refinancing (especially if the borrower is increasing the loan balance) there can be problems, as can be the case for apartment buildings and commercial property.

<sup>17</sup> An alternative to use of equity is strong borrower liability. For instance in some civil code countries borrowers remain liable for residual liability after foreclosure.

property values (these properties are much more heterogeneous, they trade less frequently, and incentives for inaccurate appraisals are greater), and incentives to take care of the property are weaker when owners are not also occupants.<sup>18</sup> Similarly, the “sub prime” mortgage market has not had a lot of securitization, and has important principal-agent problems, as has the market for business loans.<sup>19</sup>

Recent changes in information technology are also bringing about important changes in how risks are managed and on competition in the industry. The major innovation has been the use of technology to evaluate credit risk, which turns to be an important determinant of default risk, along with equity and which, historically was something about which mortgage originators had better information. In particular, Fannie and Freddie (and many other lenders and insurers) have developed statistical automated underwriting systems (with credit history and equity as the major explanatory variables) that allow rapid decisions about what they want to purchase and what they do not want; the decision to accept can be made in five minutes. This has further reduced principle/agent problems.

### ***Interest Rate Risk***

Long term lending raises the question of interest rate risk because banks tend to raise money in the deposit market and pay variable deposit rates. A major part of the U.S. financial crisis in the 1980s was the interest rate risk taken by S and Ls in the 1970s and the rise in rates in the late 1970s and early 1980s. Securitization handles the risk to conduits automatically because the risk is passed through to the investor. However, not all investors want to take interest rate risk, particularly the mortgage specific risk of prepayments when rates fall. CMOs are a device to reallocate this risk, and so is debt funding.

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<sup>18</sup> It is the case that it is relatively easier to foreclose on a rental unit because it does require moving the occupant. On the other hand it is difficult in many countries to evict tenants, which increases the risk of lending on rental units.

<sup>19</sup> See Cutts and Van Order (2004) for some analysis of sub prime markets.

Both Fannie Mae and Freddie Mac finance close to half their purchases with debt.<sup>20</sup> This can be interpreted as a move in the direction of the “Bowie/Intermediation Model” where heterogeneous mortgages (in terms of prepayment risk) are transformed into homogeneous liabilities for bond market investors. However, they do not run the deal through an SPV. Rather they issue corporate debt backed by the whole portfolio, so as is discussed above, they are a bit like a portfolio lender, but with the same agency costs. While both GSEs have sizable holdings of mortgages that are funded by debt, rather than mortgage-backed securities, they have learned the interest rate risk lessons from the early 1980s, and neither company is short-funded; both rely largely on long term, callable debt or its equivalent (e.g., short term debt and derivatives like interest rate futures and options)<sup>21</sup> to finance long term mortgages.

The advantage of debt funding is that debt is more transparent to investors than pass-through securities because: (1) if the debt is not callable, Fannie and Freddie take the call risk on the mortgages (and hedge it at lower cost than most investors have) and the cash flows are known by investors with little uncertainty, and (2) even if it is callable the circumstances under which it will be called are more transparent than the circumstances under which borrowers will prepay. The disadvantage to the GSEs is that it is not easy to hedge interest rate risk because borrowers’ prepayment behavior is not easy to model.

From an accounting point of view MBS and debt are different because MBS funding takes the loans off the lenders balance sheet.<sup>22</sup> This advantage is more apparent than real if the lender keeps the credit risk (for instance by selling with recourse or taking a subordinated position in the pool). Securitization could, then, simply be a way of

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<sup>20</sup> Most mortgages go into pools, and debt-funding comes primarily from repurchasing the pools, rather than simply holding whole loans in portfolio. A reason for this is that it helps control the adverse selection problem faced by MBS investors if FF use superior information about prepayment to decide which loans to put into pools.

<sup>21</sup> A typical procedure is to do an interest rate “swap,” for instance receiving an income stream indexed to LIBOR (and thereby offsetting short term borrowing rate fluctuations) in exchange for a fixed rate liability, then using a “swaption,” which in effect is an option undo the swap to handle prepayment risk. This gives the equivalent of long term callable debt.

<sup>22</sup> This is done through a “special purpose vehicle” (SPV; in the U.S. this is via a “grantor trust”), which buys the mortgages and manages the cash flows. A real advantage of this is that assures MBS holders access to mortgages in the event of problems, in a way than on balance sheet activities cannot.

avoiding capital regulations, and make sense only because capital regulations are not really risk-based.<sup>23</sup> Securitization and regulation that are driven by accounting rules, rather than risk management, can lead to poor allocation of risk.<sup>24</sup>

## ***MM***

So where does Miller-Modigliani fit into this? In the pre secondary market world in the U.S. where banks (actually savings and loans) did the lending, deadweight losses and asymmetries were more or less the same for everyone. Capital structure was managed by regulation, and debt was primarily deposits, which were often inelastic in supply but subsidized by deposit insurance. In that model MM was violated because of regulation; holding less capital lowered all in costs to the banks because it allowed better exploitation of the deposit insurance guarantee. A price paid for this was that funding was forced through the deposit market, which is not the most efficient vehicle for funding fixed rate mortgages.

The advent of a new institution type, the GSE, didn't add or subtract much in terms of the existence of guarantees, but it changed the types of guarantees and the possible ways of operating and exploiting the guarantees, by allowing institutions to get access to a new market, the bond market, which has lower transaction costs, a more elastic supply of funds and is a better way of managing interest rate risk. But the GSEs were forced, because they were *secondary* markets, to take on some asymmetric information problems that banks did not have to take on. So MM was still violated, but it was violated in different ways.

So there was some *a priori* ambiguity as to who, banks or GSEs, would be the winner. It turned out in the U.S. that the secondary market has been dominant; but that is not inevitable, and, indeed GSE market share has been declining lately. Within the bond

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<sup>23</sup> For instance, until the late 1980s it was possible for savings and loans to sell loans with recourse and not have to hold capital. The regulations have been changed to force them to hold capital against the risk they retain.

<sup>24</sup> Much has been made of late of the size of Fannie and Freddie debt, as opposed to MBS. This is a silly distinction, which confuses balance sheet status with risk. Fannie and Freddie keep the credit risk in either case and the question is the amount of interest rate risk, which can be controlled and managed by stress tests and capital.

market framework, there are lots of ways of operating, straight pass-throughs, CMOs, over-collateralized or “covered” bonds and straight corporate debt (analogous to long term deposits), some or all of which can be done by banks. Also banks have access to the same hedging vehicles (e.g., interest rate swaps and swaptions) as do the GSEs. MM suggests that these vehicles are all close competitors and small differences among them can greatly change what the market looks like.

### **III. LESSONS FOR OTHER MARKETS AND COUNTRIES**

The mortgage business is an interesting, but not entirely clean, example of how securitization can work. It is clouded because there are subsidies in the form of guarantees for both of the competing structures, and it is not clear which subsidies are larger. Nonetheless, there appear to be some lessons that can be used to help think about securitization in other markets. Many markets and countries do not currently have effective ways of linking mortgage markets with capital markets. For emerging markets secondary markets can be a way of tapping international capital markets, particularly for long-term loans.

This can be a significant contribution to developing countries. One of the things that has characterized financial breakdowns, like the one in Asia in the late 1990s, has been reliance on short term international borrowing, which can be cut off rapidly if there a loss of confidence in the country(s) in question. A reason that foreign investors want short-term investment is lack of long term information, in particular, knowledge that they have good collateral. As a result they want a chance to reevaluate their position to get out fast if they need to (which, of course, they can't do if they all try to at once). Housing is potentially very good collateral and can be expected to be a way of getting more long-term foreign money, decreasing the dependence on hot money, *if* it really can be effective collateral. Moreover, a well-run secondary mortgage market can provide stimulus to bond market development in general.

### *Issues*

A key problem for secondary markets in developing markets is that the principal/agent issues are likely to be more formidable in developing markets, where asymmetric information is likely to be a bigger problem, because mortgage originators will have access to local information and perhaps access to credit. Underwriting will be left to originators who will inevitably be able to select the best loans for themselves. The problem is worse if foreclosure costs are high, in which case a house is not good security, and/or where borrower liability ends with foreclosure. Pushing secondary markets backed by implicit or explicit government guarantees in such circumstances invites distortions and bail out costs.

Strong foreclosure laws have been absolutely essential to the development of the U.S. secondary market. Absent such laws it is probably better to develop a market based on debt-funded local institutions (e.g., banks) with good local knowledge, underwriting mortgages as if they were (high cost) consumer credit rather than secured loans, than it is to develop secondary markets. *If you want people to have good housing, it helps to be able to take it away from them.*

There is no reason in principle for not simply equipping the private sector with a legal framework that will let it evolve and securitize as it chooses, competing with banks, perhaps in the form of specialized mortgage lenders, letting them sink or swim on their own. A problem, though, is that financial institutions (like many big European banks that do not have explicit deposit insurance) often have *implicit* GSE status anyway. Hence, new institutions will have the potential to require future bailouts and/or require new regulatory regimes, even if that is not the original intention. In that case explicitly chartered GSEs with accompanying regulation might be preferable. In cases where the GSE is meant to be a transition device, a rule for terminating the charter (a “sunset” provision might be valuable).<sup>25</sup> Even without a guarantee failure of financial institutions can have real social costs.

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<sup>25</sup> There is a tradeoff here. Sunset provisions make it difficult to engage in long term planning, which can be a problem. They also generate lobbying directed toward changing the sunset provision. Under such

There may well be an important role for government support, but it need not be in the form of creating a secondary market, or at least not one that looks like the one in the U.S. New systems, even with the best legal structure might lack credibility, e.g., because of unforeseen legal rulings or lack of political will to enforce laws when the system is under pressure. In those circumstances a compromise between the risks induced by guarantees and the need for credibility is to set up a system where private investors take normal or market risk but the government takes on the more systemic risks. Hence, some form of government guarantee directed toward systemic (rather than market) risk might be useful, particularly in attracting long-term foreign investment.

For instance, a nonsecondary market solution is to put the banks in a position to take the first loss on mortgages, according to estimates of a reasonable level for normal, market, losses (assuming the foreclosure laws work) with the government taking the risk beyond that, which the government is better prepared to accept, by covering losses due to unenforceability of the foreclosure laws and other catastrophic losses. Because of their first loss positions banks would have incentives to underwrite and price loans properly, which is a key factor in allocating capital properly.

There is no simple recipe for government support, via GSEs or otherwise; but if there is to be support, U.S. experience suggests five important issues:

1. *Risk Allocation.* A key element in setting any framework is the principle that what is most important is getting capital to flow to its most valuable use, and a key tool is balancing risk and return.<sup>26</sup> Given that information is inevitably asymmetric, it is important to set up structures in which those who best understand risks are the ones who take the risk. Because the government is less likely to understand risks than are private companies, it is probably a good idea that it stand at the end of the queue, taking on systemic type risks, which it is better able to handle, and it's

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circumstances direct government ownership could be preferable (assuming there is likely to be more support for terminating a government-owned institution).

<sup>26</sup> Note that it is the balance that matters. Minimizing risk is not an obviously desirable goal.

- advantage is in its ability to back up the system. The central problem in the savings and loans collapse in the 1980s was that the government took on too much risk that could have been taken privately.
2. *Ownership*: If you do GSEs, a GSE structure with private ownership and value-maximizing incentives is likely to be a more efficient long run way of providing guarantees and supporting a mortgage market than is a state-owned corporation. State ownership of financial institutions provides few incentives for cost minimization or moving with market forces. In the short run government ownership may be useful in limiting government liabilities that could come from private owners exploiting a guarantee and where the institution might need to perform some regulatory functions. A key question, then, will be the transition to private ownership (“sunset” provisions). Clearly a concern with any GSE type setup, or any government intervention, is the details of the charter, responsibilities, incentives, etc., which will be filtered through a political process that may not get everything right.
  3. *Subsidy content*. A rationale for GSEs has been that support is needed either to equate social and private returns to housing or to offset guarantees of other (depositories) financial institutions.<sup>27</sup> If that is the case then the subsidy content of GSEs should be kept in line with subsidies to other mortgage market institutions (e.g., banks), so that outcomes are more likely determined by underlying economics than subsidy differences. User fees, like deposit insurance premiums in the U.S., are a way of controlling both the level and structure of subsidies.<sup>28</sup>
  4. *Risk*. Safety and soundness concerns are important, as a way of keeping subsidies under control and limiting risk-taking, so as to achieve the right risk-return balance in allocating capital.
  5. *Participation*. Government support of financial institutions in the U.S. has been of two types: *restricted* (to two institutions in the mortgage market) with the GSEs and *open* with banks (there are on the order of 10,000 depository institutions in

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<sup>27</sup> Regarding the U.S., I have referred to this as “Dueling Charters” (see Van Order (2000a) and (2000b) and argued that there are comparable subsidies for both banks and GSEs. In this sort of situation sunset for Fannie and Freddie should also mean sunset for deposit insurance. Not everyone agrees with this.

<sup>28</sup> Not that U.S. deposit insurance I, in detail, a good model to follow.

the U.S.). On the one hand restricting institutional participation raises question of monopoly and political power, but on the other hand experience with the savings and loans suggests that having too many institutions with little franchise value can lead to excessive risk taking and/or a lot of pressure on safety and soundness regulation, which can be hard to monitor if there is a large number of firms.

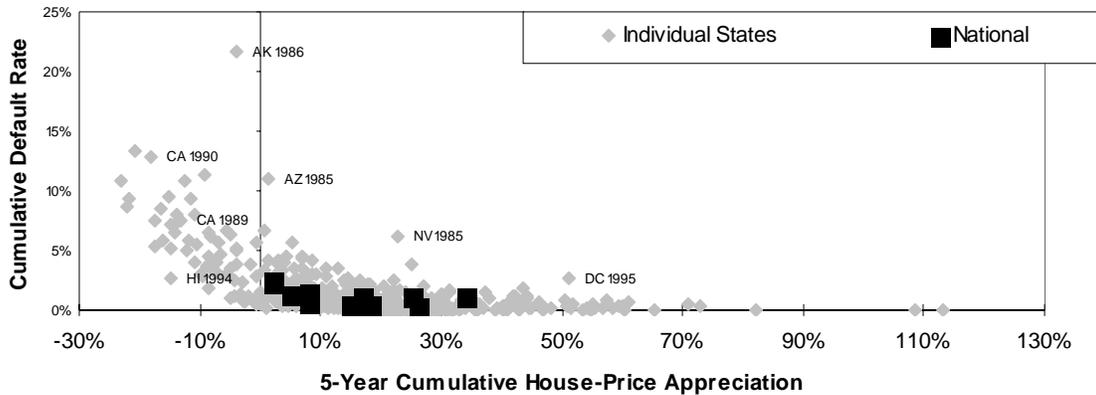
### *Some Important Lessons*

1. It is the *function*, connecting mortgage and capital markets, especially the long term market, rather than institutional (e.g., charter) details, that is important, and there are several different ways of getting the function done, securitization being one, but banks selling bonds is another. Creating a GSE is not the same thing as securitizing and *vice versa*.
2. While working on the “back end,” e.g., doing some deals and getting some mortgages off banks’ balance sheets may be a good idea, it is the getting the “front end” right that is the *sine qua non* of developing good mortgage markets. It is even more important to have proper registration, foreclosure and eviction procedures in setting up secondary markets because of the potentially severe selection problems.
3. Controlling safety and soundness requires serious consideration of risk-based capital, not like the old accounting capital ratios, but really risk-based standards that make companies hold more capital if they do things that increase risk to the company (and taxpayer stakeholders). The old Basle model cannot do this. The stress test-based standards currently being put onto Freddie and Fannie as well as the internal models approach being used to analyze capital requirements of banks are major improvements. It is important to stay away from simple accounting ratios and arbitrary balance sheet distinctions. Frequent audits and prompt response are also important. Securitization should sink or swim on its economic benefits and costs.
4. An important component of safety and soundness is controlling interest rate risk. Interest rate risk, particularly in the form of short funding a long term portfolio is a very good way of getting into trouble quickly, as was seen in the beginning of

the savings and loan problem in the late 1970s and Fannie Mae in the early 1980s. A thing that we have learned is that interest rate risk is relatively easy to measure (via stress tests), and so it should be controllable.

5. Finally, there is the lesson of diversification. Fannie and Freddie have benefited because they have been able to spread their risks across a variety of local economies, which are often larger than those of some countries. To illustrate this look at the attached figure, which depicts the incidence of default for various levels of house price appreciation in the U. S. across states from Freddie Mac data on 80% LTV loans. What the figure shows is that most of the time for most states (the light colored diamonds) default rates are low, but every once in a while, especially when house prices drop, they are large, large enough to generate bankruptcy for institutions with low capital levels concentrated in those states. On the other hand, consider the dark squares, which depict national experience for the same loan types and origination years. These squares are within the range of state experience, but, to a large extent because national house prices are not as volatile as state house prices, they are much more closely bunched; the national default rate has not come close to the worst experience of the states. This provides an important warning for small countries developing mortgage markets, particularly if they are extending guarantees to newly formed institutions. Emerging mortgage markets should be willing to place part of their risks with large international banks and/or insurance companies who are more diversified. Note, however, that this too involves principal/agent problems because third party insurers risk being selected against, and insurance does not make risk go away, it simply relocates it.

**Default Probability vs. House-Price Appreciation**  
**State/Origination Year and National/Origination Year Cohorts (1985-1995)**  
**80% Loan-to-Value, 30-Year Fixed-Rate Home-Purchase Mortgage**



#### IV. CONCLUDING COMMENTS

##### *Ideal Structures?*

There is no single structure that is always best at accomplishing the function of linking mortgage markets with long term financial markets. There are, however, two archetypes that are worth focusing on:

1. *Banks and Bonds.* Banks can simply originate mortgages and hold them, funding them by issuing long-term deposits or bonds (or if possible use forward and option markets to turn short funding into long term callable funding). With bonds the banks can attract funds by over-collateralizing the bonds, for instance by pledging \$125 in mortgages as collateral for \$100 in bonds. This makes the bondholders happy, but it requires the banks to raise \$25 either in capital or in deposits. Alternately, the bonds can simply be general liabilities of the banks. Government support can take the form of a guarantee on the bonds after the collateral has been used for instance in the form of a liquidity facility.
2. *SPVs and Securities.* In this case the bank can set up a special purpose vehicle (SPV) into which loans are sold (and taken off the banks balance sheet). The bank can set up as a senior/subordinated structure, with the bank retaining the subordinated part, which acts like the excess collateral above, with the bond market buying the senior part. Government support can take the form of a

guarantee of the senior part *after* it has taken on some risk, so that bond-holder losses are limited after some maximum loss level.

Both structures do much the same thing, and MM suggests there need not be strong *a priori* for supporting either. From a risk management perspective they both have the advantage that they put the government at the end of the queue, so that its role is more like protecting against systemic risk or promoting the creditability of the underlying legal structure. An advantage of the securitization structure is that it guarantees the investors access to the mortgages (bankruptcy remoteness) in a way that on balance sheet over-collateralizing might not, and it allows banks to get into the mortgage business without taking much interest rate and liquidity risk, and to the extent capital requirements are too high, it allows them to do this without holding too much capital. Both structures allow the institution that originates and manages the loans to take on the initial credit risk and pass through the interest rate risk to bond market investors. Neither requires the government guaranteeing individual loans, and both allow risk to be controlled by capital and stress tests.

The U.S. GSE system is like the securitization model, but because Fannie and Freddie guarantee the credit risk (that is a way of exploiting their subsidy for risk-taking) there is no need for a senior/sub structure, which is more common for jumbo or commercial loans. The implicit guarantee is at the end of the queue, with Fannie and Freddie's capital and other private guarantees ahead of it. To the extent that the GSEs have increased debt funding the system is also like the banks and bonds model. On the other hand, U.S. banks can be more like the banks and bonds model, and the ability to use derivatives makes it easier to do this with little interest rate risk (e.g., funding with deposits and swapping into long term debt). But the ability of banks to use the private label MBS market and keep the subordinated part of a senior/subordinated deal (e.g., using deposits to fund the sub part) allows them to employ something like the securitization model with subsidy and risk-taking depending on the amount of capital to be held against the subordinated part.

What U.S. experience has shown, both before and after the advent of securitization, is that with the right legal and regulatory framework (in particular the ability to foreclose and evict and a good system for recording title to property, which make it possible for houses to act as real collateral) and a reasonably stable macro-economy you can make money in single family mortgages. Linking mortgage markets with capital markets can be done with minimal (if any) subsidy if the key functions are performed properly. While government has provided a backup role for both the primary and secondary markets for some time in the U.S., it can be argued that this role has involved rather small subsidies (when the risk has been credit risk on single family mortgages), which are largely controllable.

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