Securitization by Banks and Finance Companies: Efficient Financial Contracting or Regulatory Arbitrage?

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Abstract

In this paper, we test two competing explanations for the increasing use of securitization by financial institutions. First, by reducing financial distress costs, securitization lowers the cost of debt finance, particularly for risky and highly levered companies. Second, regulatory distortions in the Basle Capital Accord may create incentives for highly levered banks to securitize assets in order to avoid binding or nearly binding capital requirements. We find that unregulated finance companies and investment banks are much more apt to securitize assets than banks, and that risky and highly levered financial institutions are more likely to engage in securitization than safer ones. At the same time, highly levered banks – banks with low capital ratios – are *less* likely than better capitalized banks to securitize. Thus, the evidence suggests that securitization is best understood as a contracting innovation aimed at lowering financial distress costs rather than an outgrowth of poorly structured regulations.

The Rise of Securitization:
Efficient Financial Contracting or Regulatory Arbitrage

1. Introduction

Securitization involves packaging financial promises and transforming their cash flows into a form whereby they can be freely traded among investors. Securitization has grown dramatically during the 1990s. From 1995 through 2001, the market for asset-backed securities (ABS) – traditionally defined to include home equity loans, credit cards, automobile loans and equipment leases –increased from $316 billion outstanding to $1.69 trillion outstanding at year-end 2003[1]. Securitization has been very popular with commercial banks, lending subsidiaries of industrial companies (such as General Motors Acceptance Corporation) and other specialized lending institutions (such as The Money Store) with approximately 60% of the residential mortgages now originated in the U.S and a similar fraction of revolving consumer credit (credit cards) securitized. In this paper, we examine the securitization activity by private sector financial companies to investigate alternate explanations for this phenomenon.

Using issuer-level data on all new securitizations by private-sector financial companies (i.e. non-government sponsored entities (GSEs)) from 1993 to 2002, we test two competing explanations for the dramatic growth in securitization. The first explanation, the efficient contracting explanation, views securitization as a financial engineering innovation. Asset securitization allows an intermediary to access debt finance without facing financial distress costs normally associated with borrowing. The cost of this alternative, however, may include a reduction in the tax benefits of on balance sheet debt finance and the fixed costs of setting up a securitization program.

[1] Source: The Bond Market Association.

The second explanation, the regulatory arbitrage explanation, stems from regulatory distortions in bank capital requirements. The capital-asset ratio is the key tool used by regulators to ensure that commercial banks hold a large enough buffer of capital to protect the deposit insurance fund from losses. Regulation of bank capital began to link required minimums to a bank's asset risk with agreement among international regulatory authorities in 1988 to the Bank of International Settlements (BIS) Capital Accord (implemented in 1992). Critics of the Accord, however, point out that commercial banks may attempt to reduce their required regulatory capital-asset ratio by securitizing low-risk assets (e.g. mortgages or loans to AAA-rated borrowers) and holding high-risk assets. Thus, capital regulation may be driving the increase in securitization.

Our empirical results provide strong support for the efficient contracting explanation for securitization, but no support for the idea that regulation has driven securitization. First, we find that for unregulated financial companies, those with greater risk, as measured by the capital-asset ratio and the bond rating, are *more likely* to engage in securitization. That is, financial institutions with greater likelihood of facing financial distress are most likely to fund their lending activities via securitization, rather than funding them by holding the assets on balance sheet and financing them with debt (and equity).

Second, unregulated finance companies and investment banks are the most likely of the financial institutions to securitize assets. Relative to *regulated* commercial banks, for example, *unregulated* finance companies are about eight percentage points more likely to securitize assets. Unregulated finance companies bear the potential costs of financial distress associated with high leverage. Hence, they have strong incentives to use securitization to avoid these costs. In

contrast, banks, with access to liabilities that are explicitly and implicitly insured by the government, do not bear any of these distress costs. Thus, their incentive to securitize is weak.

Third, while non-banks become increasingly likely to securitize assets as their leverage increases, commercial banks become *less likely* to securitize as their leverage increases. Regulatory arbitrage predicts just the opposite. Banks ought to be the most active issuers because they face the distorting incentives of capital regulation. Further, among banks, those with the highest leverage ought to securitize most aggressively because they face binding or nearly binding capital requirements, which may be mitigated by moving assets off the balance sheet. We suggest that pressure from bank supervisors leads relatively highly levered banks to avoid, rather than to seek, securitization.

The remainder of the paper proceeds as follows. Section 2 describes our data. Section 3 discusses explanations for asset securitization by financial companies in greater detail and describes the variables used to test these hypotheses. We present our empirical results in Section 4, and Section 5 concludes.

2. Data

2.1 Sample

Our sample of firms starts with all financial companies (one-digit Standard Industrial Code equal to '6') on *Compustat* for the period from 1993 to 2002. We drop companies that do not have publicly traded stock (with the exception of finance company subsidiaries) because stock return volatility is used in the empirical analyses. Next, we eliminate real-estate companies, mortgage brokers, surety and title insurance companies, insurance agents, and other

"niche" financial firms.[2] Finally, we drop the "government-sponsored enterprises" (GSEs) such as Fannie Mae and Freddie Mac even though GSEs are responsible for a large share of issuance activity in the market for mortgage-backed securities. Their special status allows them access to implicit support from the U.S. Treasury along with regulatory oversight by both the Department of Housing and Urban Development and the Office of Federal Housing Enterprise Oversight. This allows, among other things, for the GSEs to issue debt at a lower rate than comparably-rated commercial banks giving the GSEs a funding advantage. Thus, GSE securitization behavior likely responds very differently to firm and market characteristics than other financial companies.

[Insert Table 1 here]

Table 1 reports the number of firms for each year. The final sample contains on average 1,051 financial firms per year over the 10-year period ranging from a minimum of 937 in 2002 and a maximum of 1,191 in 1994. We classify each firm into one of the following categories: commercial bank (SIC=602); savings institution (SIC=603); investment bank (SIC=62); finance company (SIC = 61); or, insurance company (SIC=63).[3] The category of finance companies includes the finance company subsidiaries of large manufacturing and retail firms such as GE capital, General Motors Acceptance Corporation, Ford Motor Credit, JC Penney, and Sears. As shown in Table 1, commercial banks comprise the largest category of financial firms in the sample, followed by savings and loan institutions. Investment banks and finance companies account for the smallest group of firms each year. The distribution of firms has remained stable

[2]Specifically, we drop firms with the following SIC codes: 609, 611, 616 635, 639, 641, 65, and 67.

[3]We code financial conglomerates that are subject to regulatory oversight by the Federal Reserve, such as Citigroup or JPMorganChase, as banks.

across sectors over time.

2.2 Measures of securitization

Data for individual issuance of asset-backed and mortgage-backed securities are taken from the Securities Data Corporation (SDC). For each issuer, we aggregate annually all of its securitizations. We use two proxies to measure securitization activity. The first proxy is an indicator variable equal to one if the firm issued any asset-backed or mortgage-backed securities during the year; securitization activity for firms not found in the SDC data in a given year is coded as zero. The second proxy takes account of the dollar amount of securitization relative to the size of the originating firm's balance sheet, equal to the volume issued divided by the book value of total assets.

Table 2 reports the percentage of firms that securitized any assets for each year in our sample period and the total dollar volume issued, relative to the firm's total on-balance-sheet assets (for those firms with positive issuance). The fraction of financial firms securitizing assets doubled over the ten-year period, from a less than two percent in 1993 to almost four percent of firms at the end of the sample period (Panel A). At the same time, the volume issued by securitizing firms also increased. For instance, in 1993 the average securitizing firm issued mortgage-backed and asset-backed securities worth about 20 percent of their assets. This volume rose to almost 40 percent of assets by 2002. Increased activity thus occurred on both the *extensive* margin (more securitizers) and the *intensive* margin (more dollars securitized per issuer as a share of assets). In our empirical models, we test how firm and market characteristics affect securitization behavior at the extensive margins in a Probit framework, where the dependent variable equals one if any securitization occurs in a firm-year. We model the volume of

securitization in a Tobit framework.

[Insert Table 2 here]

Table 2, Panel B reports the frequency of securitization by firm type. Commercial banks and finance companies comprise the largest groups of issuers over the sample period. Panel B also reports the large differences in the frequency of securitization across types of financial companies. Regulated commercial banks and unregulated finance companies are the most active issuers. Conditioned on the type of firm, however, unregulated finance companies clearly are the most active issuers. The percent of finance companies issuing asset-backed securities rises from about 18 percent in 1993 to about 33 percent by 2002. In contrast, only 1.6 percent of the commercial banks in our sample issued in 1993, with this percentage rising to 3.2 by 2002. While investment banks represent one of the smallest groups of issuers, the share issuing asset back securities rises from four percent in 1993 to almost seven percent by 2002.

3. Hypotheses and variable definitions

The descriptive statistics in the previous section show that securitization by financial firms is rising over time. In this section, we discuss two potential forces behind these trends and related testable hypotheses. We then describe how we will test these hypotheses empirically.

3.1 Securitization as an efficient financial contract

Gorton and Souleles (2004) describe how securitization allows higher-risk financial institutions to originate and fund risky financial assets (e.g. mortgages, consumer loans, business loans, etc.) with debt in a way that minimizes financial distress costs. These institutions can use special purpose vehicles (SPV) to remove loans from their balance sheet and place them in SPVs

such as asset-backed commercial paper (ABCP) conduits so that the loans payments flow through to bonds issued against proceeds from the ABCP conduits. SPVs are structured to remain "bankruptcy remote" from the originating firm, meaning that the creditors of the SPV have no claim against the originator's assets. Moreover, the bonds sold by the SPV are structured to make default and bankruptcy all but impossible (although there can be defaults on the underlying loans). This is accomplished contractually by forcing early amortization of the bonds issued by the SPV if cash flows from the underlying assets turn out to be lower than expected. With no possibility of default on the bonds, no claim against the originator when cash flows are low, and no decisions to be made by the SPV itself, the bonds sold by the SPV have side stepped both the agency costs of financial distress as well as direct and indirect costs of bankruptcy.[4] The downside of this financing strategy are the fixed costs of setting up the SPV, as well as a potential reduction in the tax benefits flowing from keeping the assets on balance sheet and financing them with debt.

As capital markets have deepened over time, the use of this contracting tool has become more popular. According to this efficient contracting explanation, financial firms facing greater expected financial distress costs, for example *firms with high leverage and risky assets*, are more likely to be active securitizers than other firms. Moreover, because they can borrow without bearing any financial distress costs (due to government insurance of deposits), banks and savings institutions ought to be *less likely* to securitize assets than investment banks and unregulated finance companies. Institutions facing high effective tax rates also may securitize less, all else

[4] While early amortization does not lead to a financial distress cost, it does impose losses on bondholders. Originators therefore often credit enhance the cash flows going into the SPV so that bonds can receive high ratings, and to mitigate the adverse selection problem associated with the originator's choice of which assets to sell to the SPV (Gorton and Souleles, 2004). In addition, the first loss position is generally born by the originator (Franke and Krahnen, 2004) or the master or special servicer (Sanders, 2004). To reduce the risk of early amortization further, there have been a number of documented instances in which originating financial institutions voluntarily enhanced

being equal.

3.2 Securitization as exploitation of regulatory arbitrage opportunities

A second explanation for the trends in securitization, the regulatory arbitrage explanation, stems from a regulatory distortion associated with capital requirements of commercial banks. As stated in the introduction, a bank's capital-asset ratio is a key variable that is used by regulators to ensure that commercial banks hold a large enough buffer of capital to protect the deposit insurance fund from losses.[5] Beginning with the passage of the 1998 BIS Capital Accord (implemented in 1992), regulation has explicitly tied required minimums of required regulatory capital-asset ratios to a bank's asset risk.

Critics of the Accord have argued that commercial banks have attempted to reduce their required regulatory capital-asset ratio through "regulatory arbitrage." In a "regulatory arbitrage" transaction, a bank securitizes low-risk assets (e.g. mortgages or loans to AAA-rated borrowers) and holds high-risk assets because the low-risk assets require the bank to hold more capital at the margin than is economically justified by their incremental effect on the probability of insolvency.[6] For example, under the 1988 Accord for every dollar held on balance sheet in a residential mortgage, a commercial bank would have to hold $0.04 in capital. For every dollar held in a loan to AAA-rated borrowers, $0.08 of capital would be required. If, instead, the bank securitized the mortgage or loan (without recourse), then required capital could be reduced

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the cash flows to preserve their reputation in the market going forward (e.g. Calomiris and Mason, 2002 and Higgins and Mason, 2004).

[5]Our measure of the capital-asset ratio is correlated with, but not equal to, the Basle risk-based capital ratio. However, we can not construct this risk-based ratio for financial companies our sample that are not regulated commercial banks.

[6]In response to such criticisms, regulators have been attempting to update the BIS Accord to better measure asset risk by, for example, linking required capital to the rating of a borrower. For details, see "The New Basel Capital

substantially or, perhaps, entirely, depending on the structure of the securitization.[7]

Given the above incentives, all else the same we would expect commercial banks to have the greatest incentive to securitize assets because only they face strong regulatory arbitrage incentives. Among commercial banks, those with capital ratios near the required minimum would face a greater incentive to securitize assets than other banks, all else equal.

A related question, which we do not address here, is the following: for those financial intermediaries engaged in securitization, which assets do they securitize and which ones do they continue to hold? Gorton and Souleles (2004) argue that implicit support of distressed assets by the issuer can reduce their incentive to sell low-quality assets to the SPV.[8] As evidence, they show that the pricing of bonds sold by SPVs reflect not only the rating of these bonds themselves, but also on the bond rating of the originating financial institution. Ambrose, Lacour-Little and Sanders (2003) show that banks tend to securitize their relatively safe mortgages and hold their riskier ones. This finding is consistent with the regulatory arbitrage hypothesis, which clearly predicts that banks have an incentive to remove low-risk assets from their balance sheet and retain high-risk ones. The reason is that the required capital is the same; hence, the cost of holding low-risk assets is greater because the incremental capital is not economically justifiable. Even without capital distortions, however, one would expect the same result. Assets that are harder for outside investors to value – i.e. risky assets – will be more costly to sell due to lemons problems (Akerlof, 1970). Hence, even absent regulations we would expect financial

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Accord, Third Consultative Paper," available at http://www.bis.org/bcbs/bcbscp3.htm.

[7]For example, a bank might hold the residual tranches of securitizations and be required to hold 100% capital against these assets.

[8] In their model, repeated interactions with investors give healthy issuers an incentive to support distressed SPVs to preserve their reputation. Issuers that are themselves financially distressed, however, may choose not to support SPVs.

intermediaries to sell or securitize their "better" assets, for which they can receive full compensation in the market, and hold their risky and low-quality assets, where prices would be rationally discounted by uninformed investors.

Variable definitions

In this section, we describe the variables that are used to test the efficient contracting and regulatory arbitrage explanations for asset securitization for financial firms. We also discuss the predicted sign of the relations between the variables and the likelihood of a firm securitizing its assets.

Proxies for financial distress

We use three variables as proxies for the likelihood of financial distress: capital asset ratio, asset risk and bond rating indicator variables. The capital-asset ratio is equal to the ratio of total book value of equity ("capital") to total assets and is used a measure of leverage.[9] Asset risk is measured by a firm's stock return volatility. Stock return volatility equals the standard deviation of the firm's stock return during the year, based on daily data. Volatility is normalized to reflect a full year by scaling this standard deviation by square root of 250 (the approximate number of trading days in one year). Holding leverage fixed, variation in the stock return volatility across firms will act as a close proxy for asset risk.

We include two indicator variables to control for a firm's debt rating. First, we construct an indicator variable equal to one if a firm has investment grade bond rating and zero otherwise. Second, because a little more than 80 percent of our observations do not have a debt rating, we

[9]We winsorize the capital-asset ratio at the 1st and 99th percentiles.

include an indicator equal to one for un-rated firms. Both of these coefficients are measured relative to the omitted category – firms with a speculative-grade rating.

According to the efficient contracting hypothesis, firms with lower capital-asset ratios (higher leverage) and greater stock return volatility (greater asset risk) will have a greater incentive to securitize because they have higher expected financial distress costs than firms higher capital ratios and lower stock return volatility. Also, under the efficient contracting hypothesis, we expect a negative association between the likelihood of securitizing and the investment grade indicator variable.

Notice that these predictions are the same as what we would expect to observe for banks under the regulatory arbitrage hypothesis. According to this alternative hypothesis, banks with binding or nearly binding capital requirements – i.e. banks with lower capital ratios, greater asset risk and lower bond ratings – would be more likely to securitize assets to soften that constraint. In contrast, the efficient contracting view suggests that banks ought to respond much less than other financial institutions to financial distress because of their ability to raise government insured deposits. In order to separate the two hypotheses, we test whether the effects of the financial variables differ for banks relative to other financial institutions in our regressions.

[Insert table 3 here]

Table 3 reports summary statistics for variables by firm type. On average, banks and savings institutions hold substantially less capital than the others firms, presumably because they enjoy access to government-insured debt (deposits). Finance companies and investment banks have higher measures of stock return volatility compared to commercial banks and savings

institutions. Finally, the percentage of firms with S&P rated debt varies from about four percent for savings institutions to about 37% for finance companies. Most of the rated debt is investment grade.

Originator Type

We include a set of qualitative indicator variables for each type of financial company corresponding to the breakdown reported in Table 1: commercial banks, savings institutions, investment banks, finance companies and insurance companies.[10] The effects of these indicators on securitization allow us to test the two hypotheses directly to determine which is more important in driving the market. Recall that the efficient contracting hypothesis predicts that banks (and savings institutions) *securitize assets to a lesser degree* than other institutions because commercial banks and savings institutions do not bear the costs of financial distress (the deposit insurer does). In contrast, the regulatory arbitrage hypothesis predicts the opposite. According to this notion, commercial banks will *securitize assets to a greater degree* than other kinds of financial institutions because only commercial banks face the distorting incentives of the Basle Accord.

Taxes

Under the efficient contracting hypothesis, financial institutions facing high effective tax rates are more likely to securitize less, all else equal. (The regulatory arbitrage explanation makes no predictions about the relation between taxes and the likelihood of asset securitization.) We include the issuer's tax payments (tax expense minus total deferred taxes from the income

[10] Commercial banks are the omitted category throughout our regression models.

statement) as a percentage of total pre-tax income to capture difference in the average tax rates across financial institutions. In cases where tax payments or pre-tax income are less than zero, we set this variable equal to zero. We also winsorize this variable to reduce the influence of a few, very large, outliers.[11]

Taxes averaged from 23.35% of pre-tax income for finance companies to about 32% for all other firms in our sample. This variable is admittedly crude, but it is readily available for the full sample. In contrast, Graham's (1996) estimate of marginal tax rates is missing for about three-quarters of our sample. We have estimated our model using these marginal rates but find them not statistically significant in most cases.

Issuer Size

To the extent that small firms face proportionately higher financial distress costs, the efficient contracting hypothesis predicts that small financial institutions are more likely to engage in asset securitization. Larger firms, however, may be in a better position to bear the fixed costs associated with setting up a securitization program. Given the potential importance of fixed costs, it is difficult to test the contracting hypothesis with firm size. Instead, we include it in the regression mainly as a control variable. We measure firm size as the log of total market capitalization.[12] Commercial banks, finance companies, and investment banks are all, on average, similarly sized, whereas the average savings institution is an order of magnitude smaller than the others. Note, that we do not use alternative size measures based on the balance sheet

[11] The results without winsorizing the tax variable are such that firms with higher tax rates securitize assets less than other firms. However, the coefficient magnitude is very small. Hence, we chose not to report this finding. (Other coefficients are unaffected.)

[12]For the finance-company subsidiaries, we scale down the parent company's market capitalization by the ratio of subsidiary sales to total sales.

(e.g. total assets) because issuance directly reduces the size of the balance sheet, thus biasing down the true size relationship that we want to measure.

Other Controls

We include proxies for firm and market characteristics as additional control variables in the analysis. To control for firm profit (cash flow), we include the return on equity – the ratio of net income to book value of equity. ROE has large outliers, so we winsorize this variable at the 1^{st} and 99^{th} percentile, meaning that observations in the lower (upper) tail of the distribution are assigned the value at the 1^{st} (99^{th}) percentile of the distribution for ROE. Finance companies, savings and loans and investment banks have, on average, ROE measures of about seven percent, compared with 11 percent for commercial banks.

We control for market-wide trends in securitization by including a set of year indicators. These indicators will absorb not just trends but *any* common shock such as those associated with business cycles or market disturbances (e.g. the1998 Russian Debt/LTCM Crisis). Because we observe each firm in up to 10 years, we cluster the error by firm in constructing standard errors across all of our models.

4. Empirical Results

4.1 Univariate comparison of issuing and non-issuing firms

Table 4 compares average firm characteristics in cross section for issuers and non-issuers of asset-backed and mortgage-backed securities. The last column of table 4 reports p-values for tests of the equality of means of the two groups. As shown in table 4, issuers have higher market capitalizations and a higher fraction of rated debt. The average market capitalization for an

issuer is about $9.8 billion compared with about $1.3 billion for non-issuers. About 72 percent of the issuers have rated debt, whereas only about 12 percent of non-issuers have a debt rating. Conditioned on having rated debt, 68% of the issuing firms are A-rated compared with 41% of the non-issuers. In contrast, non-issuers have a larger fraction of AA-rated and BB-rated debt. Issuers also have higher levels of leverage than non-issuers (11.8% capital ratio for issuers vs. 15.3% for non-issuers) but lower stock return volatility. Consistent with trends in Table 2, more than 75 percent of the issuers are either banks or finance companies. Moreover, the frequency of finance companies in the set of issuers is *six times* as great as their frequency among the set of non-issuers.

[Insert Table 4 here]

4.2 Multivariate Results

To explore the hypotheses for securitization more systematically, we estimate Probit regressions to identify firm characteristics associated with the probability that a firm securitizes any assets in a given year. We also report Tobit models, where the dependent variable equals the amount of assets securitized during the year scaled by the firm's assets at the beginning of the year. In the Probit model, we report the change in probability associated with a unit change in the explanatory variable, centered on the mean for all continuous variables. For indicator variables, we report the change in probability associated with a change from zero to one. These coefficients (as opposed to standard Probit coefficients) allow us to interpret the economic significance in a relatively straightforward way. For the Tobit regressions, we report the Tobit coefficients.

We report first a reduced form model that includes only the beginning-of-period log of

market capitalization (our firm-size proxy), the firm-type indicator variables (bank is the omitted catetory), and the year indicators (Table 5). These models show that finance companies and investment banks are more likely to securitize assets than commercial banks, and that insurance companies are less active securitizers. There is no statistically significant difference between banks and savings institutions in either the Probit or Tobit models. Thus, consistent with efficient contracting, the unregulated financial companies, *without access to insured deposit,* are most apt to substitute debt with securitization.[13] On average, larger firms are also much more likely to securitize assets than smaller ones. For example, a one standard deviation increase in the log of market capitalization is associated with 0.5 percentage point increase in the probability of issuance.

The difference in securitization between the depositories (banks and savings institutions) and the finance companies and investment banks is large quantitatively. For example, finance companies are overall about eight percent more likely to securitize than banks, and investment banks are about one percent more likely to securitize than banks. Note that if we estimate this model for the set of firms with rated debt (72% of issuers have rated debt), these difference increase to approximately 22 percent for finance companies and eight percent for investment banks.

[Insert Table 5]

Finance companies, in particular, look structurally most similar to commercial banks. Both of these types of intermediaries supply credit by making loans to risky households and businesses, and both fund themselves mainly with short-term liabilities (commercial paper for finance companies compared with deposits for banks). The key distinction between finance

[13] Insurance companies focus on the liability side of their business. That is, they tend not to originate new loans that could potentially be securitized; because their assets are dominated by marketable securities (corporate debt and

companies and commercial banks is that finance companies are unregulated and don't have government-backed debt (for a comparison of finance-company and bank loans, see Carey, Post and Sharpe, 1998). Hence, the large difference in the likelihood of issuance by finance companies and banks is *not* consistent with regulatory distortions claimed to encourage banks to securitize assets to avoid capital requirements. The securitization differences are, however, consistent with the efficient contracting explanation because financial distress costs will be felt directly by finance companies in the form of higher borrowing costs; banks (as well as savings institutions), with access to insured deposits, will not feel these costs. Thus, the incentive to use securitization as a vehicle to minimize borrowing costs is much larger for the finance companies than for the banks.

Tables 6-8 report the Probit and Tobit models with all of the explanatory variables described in Section 3. We lag each of the additional variables one period because firms presumably determine their operating and financial policies (e.g. their capital ratio and securitization activities) jointly. Therefore, our measures of leverage (the capital-asset ratio), the bond rating, and the stock return volatility (as well as the return on equity and tax variables) are predetermined with respect to the firm's choice of whether or not to securitize assets during a given year. Each regression is reported with and without the stock return volatility variable because we are not able to observe stock returns for the captive finance company subsidiaries such as GE Capital, Ford Motor Credit, etc.

Each model also includes interaction effects between the commercial bank indicator and the three variables related to financial distress (again, the capital-asset ratio, the bond rating, and the stock return volatility). These interaction terms allow us to test whether the distortions from the Basle Capital Accord leads to a different relationship between capital (and the other financial

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equity) they have little incentive to securitize.

variables) for banks relative to the other institutions.

Table 6 reports the results of the four specifications (Probit and Tobit, with and without stock return volatility) based on all of our data. Overall, the models are highly significant, with pseudo R^2s between 35 and 45 percent and p-values of the log-likelihood ratio below 0.01. All of these regressions include indicator variables for the sample years, and the regressions are estimated with robust standard errors, clustered by firm to control for heteroskedasticity as well as possible autocorrelation for across for the same firm.

[Insert Table 6 here]

Consistent with Table 5, the unregulated finance companies and investment banking firms securitize assets more aggressively than other financial companies (e.g., the finance company and investment banking indicators enter with positive coefficients). We also find that for non-banks, higher capital ratios (lower leverage) reduce securitization (especially in the Tobit models); and, non-banks with investment grade debt securitize assets less. For example, a standard deviation increase in the capital ratio for finance companies (an increase of 0.2) reduces the probability of securitization by about 0.4 percentage points. Stock return volatility also enters with a positive, though not statistically significant, coefficient. Thus, for non-banks the evidence supports the efficient contracting explanation for securitization: as the likelihood of financial distress rises, these firms finance themselves increasingly by securitizing assets rather than by holding them on balance sheet with debt.

The coefficients on the bank interaction terms further support the efficient contracting view of securitization. Among banks, there is no significant effect of the bond rating (or stock return volatility) on securitization (that is, the sum of the linear and interaction term on the investment grade indicator is not significantly different from zero). And, the effect of the

capital-asset ratio is *positive* and significant for banks. Thus, riskier banks are not more likely to securitize asset. In fact, the coefficient on bank capital suggests that, if anything, safer banks securitize more than risky ones.

While consistent with efficient contracting, these results – like the basic comparisons in Table 5 - run counter to the idea that the "regulatory arbitrage" drives banks to securitize their loans. Higher capital-asset ratios at banks are associated with more securitization by commercial banks, exactly the reverse of what one would expect according to regulatory arbitrage. Banks with low capital – banks with capital ratios near regulatory minima – do not appear to be driving asset securitization. A one standard deviation increase in a bank's capital asset ratio (an increase of 0.03) increases the probability of issuance of about 0.16 percentage points. For banks, lower capital ratios are associated with a lower likelihood of securitization, perhaps reflecting the actions of risk-averse bank supervisors working to constrain securitization by relatively poorly capitalized banks.

To see this difference even more clearly, consider the capital ratios of issuers and non-issuers for each type of financial entity. The average capital-asset ratio for issuing banks was 8.6 percent, compared to 8.7 percent for non-issuing banks.[14] In contrast, issuing finance companies held capital-asset ratio of 14 percent on average, compared to 20 percent for the average non-issuer.

To focus more specifically on the contrasting results for banks (subject to Basle Accord) relative to finance companies and investment banks, we drop the savings institutions and insurance companies in Table 7. In Table 8, we also drop the unrated firms. These results are offered both as a robustness tests on the basic model, and because they allow us to construct

[14]All else equal, non-issuers will hold more capital than issuers because they are much smaller. For example,

better estimates of economic significance by dropping the set of financial companies that are unlikely ever to securitize (insurance companies and unrated companies).

[Tables 7 and 8 here]

Taken as a whole, the results in Tables 7 and 8 support the prior conclusions, but the coefficient magnitudes increase because we are dropping large numbers of observations, most of which are firms that do not securitize at all. In Table 7, for example, a standard deviation increase in the capital-ratio *reduces* the probability of securitization by about one percentage point for unregulated financial companies. In contrast, a standard deviation increase in capital *increases* the securitization probability by about 0.4 percentage points for banks.

In Table 8, the magnitudes are larger still (much larger). For example, among the set of rated firms, a standard deviation increase in capital (0.155) *lowers* the securitization probability by 13 percentage points; for banks, the same relative increase in capital (0.024) *raises* securitization probability by 8 percentage points. And, non-banks with an investment grade rating are about 36 percentage points less likely to securitize assets than their competitors with low-rated debt. For banks, however, there is no significant effect of the bond rating on securitization behavior.

5. Conclusion

In this paper, we document the growth of securitization for U.S. firms. Our results are consistent with the idea that securitization has emerged as an efficient contracting solution to the financial distress costs associated with traditional debt finance. As evidence, we show that risky financial institutions – i.e., those with relatively high potential expected distress costs because of high leverage (low capital) and low-rated debt - are more apt to securitize assets than safer

issuing banks are more than ten times as big as non-issuing banks.

competitors. Moreover, commercial banks, with access to government-insured debt, are much less apt to securitize assets than either unregulated finance companies or investment banks. Among banks, those with high capital ratios are more apt to securitize assets than those closer to regulatory minimum capital requirements. These last results both bolster the view that securitization is driven by concerns for debt-related distress, and they undermine the view that regulatory distortions stemming from the 1988 Basle Capital Accord have driven its growth.

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Table 1. Sample Summary Statistics

This table presents the frequency of sample firms. The sample includes all commercial bank (SIC=602), savings institutions (SIC=603), securities firms (SIC=62), finance companies (SIC = 61), and insurance companies (SIC=63).

		Fraction of firms which are:				
Year	**All firms (N)**	**Commercial Banks**	**Finance Companies**	**Insurance Companies**	**Investment Banks**	**Savings Institutions**
1993	1,166	486	62	74	191	353
1994	1,191	474	70	75	198	374
1995	1,154	449	78	82	203	342
1996	1,102	434	80	81	189	318
1997	1,014	418	73	77	162	284
1998	9,55	397	67	84	158	249
1999	9,96	425	65	92	144	270
2000	1,017	452	58	83	142	282
2001	979	450	54	76	135	264
2002	937	440	42	73	130	252
Average	1,051	443	65	165	80	299

Table 2. Summary of Securitization Activity by Financial Entities

This table presents the frequency of asset-back security (ABS) issuance by sample firms. The sample includes all commercial bank (SIC=602), savings institutions (SIC=603), securities firms (SIC=62), finance companies (SIC = 61), and insurance companies (SIC=63). Data on ABS issuance is from the Securities Data Corporation.

Panel A: ABS Issuance by year

			Issue amount/total assets			
Year	**N**	**Percent of sample**	**Average**	**Median**	**Min**	**Max**
1993	22	1.89%	0.1990	0.0843	0.0045	0.8374
1994	24	2.02	0.2275	0.0537	0.0025	2.2208
1995	30	2.60	0.1753	0.0449	0.0027	1.8006
1996	33	2.99	0.2612	0.0419	0.0008	3.6172
1997	42	4.14	0.3550	0.0304	0.0028	3.5975
1998	39	4.08	0.3079	0.0540	0.0016	3.3104
1999	40	4.02	0.3554	0.0509	0.0039	3.5497
2000	38	3.74	0.3139	0.0404	0.0035	4.9556
2001	31	3.17	0.3467	0.0716	0.0014	3.9479
2002	35	3.74	0.3823	0.0746	0.0064	4.1312

Panel B: Breakdown of issuance by type of firm

Year	**All ABS issuers**	**Commercial Banks**	**Finance Companies**	**Insurance Companies**	**Investment Banks**	**Savings Institutions**
1993	22	7	11	0	1	3
1994	24	7	11	0	1	5
1995	30	12	12	0	1	5
1996	33	14	14	0	1	4
1997	42	19	14	1	2	6
1998	39	14	15	1	3	6
1999	40	16	15	0	3	6
2000	38	19	12	0	3	4
2001	31	11	12	0	3	5
2002	35	13	13	0	4	5

Table 3. Selected characteristics for sample firms

Selected descriptive statistics for selected characteristics of the sample firms. A firms are classified as commercial banks (SIC=602), savings institutions (SIC=603), securities firms (SIC=62), finance and companies (SIC = 61). Data on ABS issuance is from the Securities Data Corporation. The capital ratio equals the book value of total shareholder's equity divided by the book value of total assets. Stock return volatility equals the standard deviation of the firm's daily stock returns over the year. Market capitalization is measured as the market value of the firm's common stock. Total assets equal the book value of total assets. Return on equity equals net income divided by the book value of total shareholder's equity.

	Type of Financial Institution			
Firm Characteristic	**Commercial Banks**	**Finance Companies**	**Savings Institution**	**Investment Banks**
Capital Ratio				
Mean	0.0874	0.2503	0.1057	0.4160
Median	0.0849	0.1706	0.0916	0.4108
Standard deviation	0.0318	0.2119	0.0520	0.2849
Stock return volatility				
Mean	0.4022	0.7417	0.3994	0.6677
Median	0.3582	0.6095	0.3587	0.5183
Standard deviation	0.2391	0.5179	0.2034	0.4687
Pct. with rated debt	16.34%	36.52%	4.08%	15.31%
Of which is investment	94.48%	81.01%	57.38%	93.44%
Taxes paid/pretax income				
Mean	0.3067	0.2355	0.3402	0.3132
Median	0.3253	0.1920	0.3558	0.3562
Standard deviation	0.1114	0.2408	0.1267	0.2333
Market Capitalization				
Mean	2,226.47	1,976.12	231.79	2,616.53
Median	138.99	78.82	48.79	189.83
Standard deviation	8,506.97	7,421.58	1,252.39	8,979.44
Return on equity				
Mean	0.1126	0.0690	0.0799	0.0736
Median	0.1245	0.1181	0.0840	0.1351
Standard deviation	0.0945	0.2341	0.0878	0.2641

Table 4. Univariate tests of differences in selected characteristics of issuers and non-issuers of ABS

A firm is defined as an issuer of ABS if during the sample period the firm has issued an ABS. Firm level means are calculated prior to calculating means for the two groups of firms. For the indicator variables measures the type of financial institution and credit rating, a firm mean is set equal to one if the indicator variable takes on a value of one during any sample period. p-values for the tests of the equality of means for the two groups of firms are reported in the last column. These tests assume unequal variances of the two groups if the null hypothesis of equal variances is rejected at the 10 significance level.

	Issuers of ABS (N = 74)	Non-issuers of ABS (N = 1,812)	P-value Test of equal means
Market capitalization	9,549	1,284	(0.0000)
Capital Ratio	0.1181	0.1526	(0.0048)
Return on equity	0.1375	0.0799	(0.0000)
Stock return volatility	0.3911	0.4697	(0.0170)
Type of financial entity			
Finance Company	29.73%	4.63%	(0.0000)
Commercial Bank	48.64	39.86	(0.1307)
Insurance Company	1.35	14.72	(0.0000)
Investment Bank	12.16	6.62	(0.0638)
Savings Institutions	8.11	29.93	(0.000)
Credit ratings			
% with rated debt	72.37%	11.72%	(0.000)
of which:			
AAA-rated	2.32	2.39	(0.9779)
AA-rated	6.28	16.07	(0.0132)
A-rated	67.91	41.05	(0.0005)
BBB-rated	18.84	28.47	(0.1612)
BB-rated	4.65	12.01	(0.0725)

Table 5. Regression estimates of the likelihood of issuing asset-backed securities

Probit and Tobit regressions of the likelihood and amount of issuance of securitized assets. In the Probit model, we report the change in the probability of issuance per unit change in the relevant explanatory variables. For indicator variables, the coefficient represents the change in the probability associated with moving the indicator from 0 to 1. Regressions are estimated with robust standard errors and clusters to control for heteroskedasticity across firms. Ratio of coefficient to standard error reported in parentheses: *, **, and *** indicate significance at the 10, 5 and 1 levels, respectively.

Explanatory Variables:	*Probit:* Dep. Variable = 1 if any Assets Securitized	*Tobit:* Dep. Variable = Assets Securitized/Total Assets
Ln(Market capitalization)$_{t-1}$	0.004 (9.34)***	0.330 (12.63)***
Finance company	0.084 (6.19)***	1.555 (12.56)***
Investment Bank	0.006 (1.75)*	0.328 (2.89)***
Insurance company	-0.007*** (-4.15)	-1.545*** (-5.44)
Savings institutions	0.002 (0.391)	0.107 (0.370)
Log-Likelihood ratio	-665.53***	-782.50***
Pseudo R^2	0.4051	0.3171
Number of observations	8,196	8,196

Table 6. Regression estimates of the likelihood of issuing asset-backed securities

Probit and Tobit regressions of the likelihood and amount of issuance of securitized assets. In the Probit model, we report the change in the probability of issuance per unit change in the relevant explanatory variables. For indicator variables, the coefficient represents the change in the probability associated with moving the indicator from 0 to 1. Regressions are estimated with robust standard errors and clusters to control for heteroskedasticity across firms. Ratio of coefficient to standard error reported in parentheses: *, **, and *** indicate significance at the 10, 5 and 1 levels, respectively.

Explanatory Variables:	*Probit:* Dep. Variable = 1 if any Assets Securitized		*Tobit:* Dep. Variable = Assets Securitized/Total Assets	
Ln(Market capitalization) $_{t-1}$	0.003 (5.72)***	0.002 (5.72)***	0.216 (6.79)***	0.208 (6.80)***
Return on equity$_{t-1}$	0.008 (1.62)	0.009 (1.90)*	1.160 (2.70)**	1.413 (3.17)***
Book capital ratio $_{t-1}$	-0.020 (-3.03)***	-0.016 (-3.36)***	-1.699 (-3.99)***	-1.536 (-3.91)***
(Commercial bank)* (Book capital ratio) $_{t-1}$	0.074 (5.05)***	0.062 (5.70)***	7.002 (4.09)***	6.526 (4.29)***
Stock return volatility $_{t-1}$	0.002 (0.81)	-	0.254 (1.34)	-
(Commercial bank)*(Stock return volatility)$_{t-1}$	0.003 (0.64)	-	-0.091 (-0.17)	-
(Taxes paid/pretax income) $_{t-1}$	0.004 (1.42)	0.003 (1.01)	-0.031 (-0.12)	-0.170 (-0.66)
Investment grade rated debt $_{t-1}$	-0.003 (-2.16)**	-0.003 (-2.28)**	-0.742 (-3.52)***	-0.771 (-3.71)***
(Commercial bank)*(Investment grade rated debt) $_{t-1}$	0.016 (1.44)	0.013 (1.34)	0.702 (1.55)	0.712 (1.62)
Unrated $_{t-1}$	-0.017 (-2.77)***	-0.018 (-2.93)***	-0.862 (-3.89)***	-0.857 (-4.67)***
(Commercial bank)*(Unrated $_{t-1}$)	0.002 (0.44)	0.001 (0.22)	0.1033 (0.22)	-0.0429 (-0.10)
Finance company	0.532 (4.89)***	0.424 (4.97)***	2.476 (4.42)***	2.450 (5.28)***
Investment Bank	0.1912 (3.32)***	0.127 (3.33)***	1.519 (2.71)***	1.445 (3.10)***
Insurance company	-0.002 (0.04)	-0.001 (0.69)	-0.133 (-0.22)	-0.325 (0.62)
Savings institutions	0.040 (2.28)**	0.024 (2.05)**	0.960 (1.77)*	0.832 (1.86)*
Log-Likelihood ratio	-571***	-610***	-684***	-737***
Pseudo R^2	0.45	0.45	0.35	0.35
Number of observations	7,364	8,156	7,364	8,156

Table 7. Regression estimates of the likelihood of issuing asset-backed securities Drop S&Ls & Insurance Companies

Probit and Tobit regressions of the likelihood and amount of issuance of securitized assets. In the Probit model, we report the change in the probability of issuance per unit change in the relevant explanatory variables. For indicator variables, the coefficient represents the change in the probability associated with moving the indicator from 0 to 1. Regressions are estimated with robust standard errors and clusters to control for heteroskedasticity across firms. Ratio of coefficient to standard error reported in parentheses: *, **, and *** indicate significance at the 10, 5 and 1 levels, respectively.

Explanatory Variables:	*Probit:* Dep. Variable = 1 if any Assets Securitized		*Tobit:* Dep. Variable = Assets Securitized/Total Assets	
Ln(Market capitalization) $_{t-1}$	0.007	0.005	0.192	0.190
	(4.97)***	(5.03)***	(5.65)***	(5.73)***
Return on equity$_{t-1}$	0.024	0.023	1.281	1.525
	(1.57)	(1.78)*	(2.80)***	(3.22)***
Book capital ratio $_{t-1}$	-0.053	-0.039	-1.871	-1.694
	(-2.89)***	(-3.25)***	(-4.09)***	(-4.05)***
(Commercial bank)*	0.189	0.148	6.969	6.586
(Book capital ratio) $_{t-1}$	(4.87)***	(5.41)***	(3.99)***	(4.20)***
Stock return volatility $_{t-1}$	0.003	-	0.154	-
	(0.49)		(0.74)	
(Commercial bank)*(Stock return volatility)$_{t-1}$	0.011	-	0.044	-
	(1.06)		(0.08)	
(Taxes paid/pretax income) $_{t-1}$	0.010	0.006	-0.117	-0.230
	(1.27)	(0.93)	(-0.41)	(-0.82)
Investment grade rated debt $_{t-1}$	-0.007	-0.006	-0.587	-0.574
	(-0.95)	(-0.96)	(-2.23)**	(-2.14)**
(Commercial bank)*(Investment grade rated debt) $_{t-1}$	0.022	0.013	0.583	0.538
	(0.90)	(0.73)	(1.22)	(1.13)
Unrated $_{t-1}$	-0.028	-0.024	-0.623	-0.628
	(-1.46)	(-1.44)	(-2.56)***	(-2.51)**
(Commercial bank)*(Unrated $_{t-1}$)	0.002	-0.002	-0.210	-0.327
	(0.13)	(-0.04)	(-0.45)	(-0.70)
Finance company	0.609	0.438	2.312	2.226
	(4.00)***	(3.93)***	(4.18)***	(4.63)***
Investment Bank	0.234	0.129	1.358	1.256
	(2.65)***	(2.45)**	(2.43)**	(2.53)**
Log-Likelihood ratio	-484***	-520**	-595***	-644***
Pseudo R^2	0.42	0.42	0.31	0.31
Number of observations	4,096	4,547	4,096	4,547

Table 8. Regression estimates of the likelihood of issuing asset-backed securities Drop S&Ls, Insurance Companies & All Unrated Companies

Probit and Tobit regressions of the likelihood and amount of issuance of securitized assets. In the Probit model, we report the change in the probability of issuance per unit change in the relevant explanatory variables. For indicator variables, the coefficient represents the change in the probability associated with moving the indicator from 0 to 1. Regressions are estimated with robust standard errors and clusters to control for heteroskedasticity across firms. Ratio of coefficient to standard error reported in parentheses: *, **, and *** indicate significance at the 10, 5 and 1 levels, respectively.

Explanatory Variables:	*Probit:* Dep. Variable = 1 if any Assets Securitized		*Tobit:* Dep. Variable = Assets Securitized/Total Assets	
Ln(Market capitalization) $_{t-1}$	0.127	0.124	0.153	0.153
	(5.22)***	(5.37)***	(6.51)***	(6.85)***
Return on equity$_{t-1}$	0.235	0.257	0.442	0.356
	(0.81)	(0.94)	(1.45)	(1.20)
Book capital ratio $_{t-1}$	-0.868	-0.924	-0.120	-0.261
	(-1.96)*	(-2.05)**	(-0.42)	(-0.92)
(Commercial bank)*	4.566	4.883	5.042	5.811
(Book capital ratio) $_{t-1}$	(3.43)***	(3.85)***	(3.20)***	(3.90)***
Stock return volatility $_{t-1}$	-0.104	-	0.395	-
	(-0.40)		(1.36)	
(Commercial bank)*(Stock return volatility)$_{t-1}$	0.343	-	0.266	-
	(1.32)		(0.68)	
(Taxes paid/pretax income) $_{t-1}$	0.197	0.236	0.164	0.194
	(1.44)	(1.77)*	(0.93)	(1.15)
Investment grade rated debt $_{t-1}$	-0.357	-0.361	-0.525	-0.597
	(-2.35)**	(-2.53)**	(-4.37)***	(-5.52)***
(Commercial bank)*(Investment grade rated debt) $_{t-1}$	0.254	0.253	0.628	0.643
	(2.34)**	(2.36)**	(3.73)***	(4.16)***
Finance company	0.933	0.926	1.473	1.485
	(4.47)***	(4.98)***	(5.32)***	(6.95)***
Investment Bank	0.937	0.921	1.173	1.213
	(3.85)***	(4.21)***	(3.99)***	(5.51)***
Log-Likelihood ratio	-292***	-309***	-257***	-269***
Pseudo R^2	0.30	0.29	0.26	0.25
Number of observations	784	818	784	818