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CREDIT CARD SECURITIZATION
AND REGULATORY ARBITRAGE**

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Abstract

This paper explores the motivations and desirability of off-balance-sheet financing of credit card receivables by banks. We explore three related issues: the degree to which securitizations result in the transfer of risk out of the originating bank, the extent to which securitization permits banks to economize on capital by avoiding regulatory minimum capital requirements, and whether banks' avoidance of minimum capital regulation through securitization with implicit recourse has been undesirable from a regulatory standpoint. We show that this intermediation structure could be motivated either by desirable efficient contracting in the presence of asymmetric information or by undesirable safety net abuse. We find that securitization results in some transfer of risk out of the originating bank but that risk remains in the securitizing bank as a result of implicit recourse. Clearly, then, securitization with implicit recourse provides an important means of avoiding minimum capital requirements. We also find, however, that securitizing banks set their capital relative to managed assets according to market perceptions of their risk and seem not to be motivated by maximizing implicit subsidies relating to the government safety net when managing their risk. Thus, the evidence is more consistent with the efficient contracting view of securitization with implicit recourse than with the safety net abuse view. Concerns expressed by policymakers about this form of capital requirement avoidance appear to be overstated.

I. Introduction

Between 1980 and 2002, the average annual growth rate of consumer credit (93% of which is in the form of credit card receivables) was over 12% (Federal Reserve statistics reported in Deutsche Banc Alex. Brown 2002). Growth rates prior to 1987 averaged upwards of 15%. After 1987, securitization became integral to credit card industry growth. Citicorp led the sector through the capital crunch of the early 1990s, increasing its credit card accounts 42% between 1990 and 1992 by securitizing nearly two-thirds of its \$33 billion portfolio (Card Industry Directory). Securitization helped restore the consumer finance sector to double-digit growth in 1993 and pushed growth to 18% in 1994 and 22% in 1995. By 1996, securitized credit card receivables exceeded \$180 billion, at which time credit cards comprised 48.4% of the non-mortgage ABS market. By 2001, credit card securitization had grown to \$339.1 billion. In 2001, credit cards accounted for 28.2% of the non-mortgage ABS market (Bond Market Association 2003), and securitized credit cards amounted to about half of all consumer credit.

It is well known that credit card banks have been among the most intensive and innovative users of new market-oriented tools for financing their loans. Credit card bank reliance on these innovations has been an entirely private matter. Unlike the mortgage market, there are no government-sponsored agencies (GSEs) purchasing credit card receivables.

A less well-known fact about the last decade's financing of credit card receivables by banks is the diversity of bank behavior. Some banks financed the vast majority of the credit card receivables they originated with off-balance-sheet finance, while others (roughly 275 of the top 300 issuers in 2000) retained all of the receivables they originated, financing them with bank equity and debt as they would other types of bank loans. Banks that retain the receivables on-balance-sheet, however, accounted for only around 40% of total outstanding receivables in 2000. Hence, credit card asset-backed securitizations (ABS) are relatively small in number but large in asset share.

Observers of the phenomenal growth in credit card securitization over recent years have pointed to numerous advantages that come from securitizing assets. These include (1) the carving up of risks into senior-subordinate tranches to better match the preferences of potential financing sources, (2) reducing the adverse-selection costs of financing receivables by isolating credit card accounts and placing them under the continuing scrutiny of market participants (including securities purchasers, ratings agencies, credit enhancers, and conduit trustees), and (3) reducing the costs of maintaining equity capital by avoiding the high regulatory equity capital requirements attendant to on-balance-sheet holdings of bank credit card receivables.

That last advantage has been questioned by regulators, who have become increasingly concerned that off-balance-sheet finance is often a form of undesirable “regulatory arbitrage.” Regulators have accused banks of overstating the value of their retained interests in securitized assets and of keeping the risks of securitized assets on their balance sheets by providing implicit recourse to securitization trusts. Regulators argue that securitizing banks have effectively reduced their regulatory capital requirements without commensurately reducing their asset risk.

The controversy over the equity capital savings resulting from credit card securitization – and, more generally, from bank securitization of all assets – revolves around the question of whether the level of capital maintained by securitizing banks is adequate in light of the assets originated and managed by those banks and the attendant risks the banks retain from their on- and off-balance-sheet activities. Regulators see securitization’s subversion of capital requirements as a threat to financial system risk and as an attempt to reap implicit subsidies from the federal safety net. Bankers argue that, for some classes of assets, regulatory capital requirements are too high relative to what should be required as equity capital backing. Banks financing credit card receivables, in particular, see regulatory arbitrage as a means of restoring efficiency to credit card intermediation by reducing capital requirements to more reasonable levels, not as an abuse of the safety net.

Our goals in this paper are to (1) measure the extent to which banks engage in regulatory capital arbitrage by retaining some risks from off-balance-sheet assets, and (2) evaluate the desirability of that regulatory arbitrage.

Section II reviews the alleged problem of regulatory arbitrage through securitization with implicit recourse. Regulators argue that if banks believe that regulatory capital requirements are excessive for credit card receivables, then banks should securitize those receivables through “true sales” and not retain risk in securitized assets through implicit recourse. The ability to retain risk opens the door to capital regulation arbitrage and abuse of the government safety net (purposeful reductions of capital relative to risk retained by the originating bank). The typical motivation for prudential minimum capital regulation is to protect against safety net abuse (Shadow Financial Regulatory Committee 2000). We review the evolution of the “safety net abuse” view of securitization with recourse and the attempts by regulators to limit the use of implicit recourse, which have been ineffectual to date.

In Section III, we show that, in theory, securitization with implicit recourse may be efficient, rather than an attempt to abuse government safety net protection by maintaining inadequate capital. We call this the “efficient contracting” view of securitization with implicit recourse. A combination of excessively high regulatory capital requirements, problems of adverse selection in valuing credit card receivables, and institutional prohibitions on non-bank credit card intermediation may make bank securitization with recourse the best available means of financing credit card receivables. Furthermore, the contracting structure through which implicit recourse is provided (i.e., where recourse from originators avoids the triggering of costly early amortization) can be seen as a means of ensuring credible, incentive-compatible increases in the allocation of risk to originating banks in bad states of the world, when adverse-selection costs make that reallocation of risk efficient. In a dynamic context, that voluntary form of assistance can also be an important means of signaling

credit quality by originators.

Section IV analyzes the asset characteristics of credit card banks and the relationship between capital structure and risk management decisions (in 1996 and 2000), both for those that securitize and those that do not. We distinguish between the empirical implications of the “safety net abuse” and “efficient contracting” views of securitization with recourse. We show that the behavior of securitizers is more consistent with the efficient contracting view than the safety net abuse view of securitization with implicit recourse. The amount of capital relative to risk retained by originating banks is determined by the market and is substantially above the minimum required by regulation. Rather than being set with the intent of extracting a subsidy from the government safety net, reductions in effective capital ratios through securitization with partial recourse seem to be the outcome of market judgments about capital adequacy relative to risk. Section V concludes.

II. The Regulatory Critique of Securitization

Regulators and ratings agencies have long recognized that securitizing credit card receivables may be profitable because the market requires less capital in support of these loans than do regulators and because securitization reduces other regulatory costs associated with on-balance-sheet banking (Office of the Comptroller of the Currency 1997).¹ Yet regulators, seeking to avoid abuse of the safety net through regulatory capital arbitrage, have argued that securitization should be pure in its transfer of risk; either banks should keep their loan risks on their balance sheet (and have their minimum capital regulated accordingly), or they should sell/securitize those assets without any hidden recourse allowing the transfer of losses to originating banks if securitized assets perform

¹ In addition to minimum bank capital requirements, another institutional incentive to finance credit cards off-balance-sheet was important for credit card banks owned by non-bank parents (CEBA banks). These banks, which often specialize in creating credit cards usable only for purchases of products from those parents, have become a large segment of the credit card industry (a group we will call “retail CEBA banks”). Retail CEBA banks faced special incentives to securitize prior to 1997 owing to an annual 7 percent limit on their on-balance-sheet asset growth (under

badly.

The concern of regulators about capital arbitrage is captured by James' (1987) analysis of deposit insurance-protected banks' desire to limit capital and retain risk to maximize the value of the put option inherent in the government safety net. Banks that reduce capital and increase risk (including via contingent, off-balance-sheet liabilities) can increase the value of their equity in the bank so long as deposit insurance premia do not increase commensurate with increased default risk. Prudential capital requirements are the first line of defense for protecting taxpayers or other banks (which finance the insurance fund) from such abuse. By reducing the risk of default, capital limits the gain banks can enjoy on the margin from abusive increases in risk. Also, higher capital can affect incentives through the risk aversion of bank stockholders; so long as risk-averse bank stockholders maintain a large stake in future losses (through their holdings of equity capital), they will have an interest in limiting risk taking by bank management (Shadow Financial Regulatory Committee 2000).

Implicit Recourse

The sale of loans and other collateral for the purpose of securitization is governed by FASB 140, which is generally reiterated by bank supervisors (see, for instance, Rosenblatt and Johnson 2001). Under FASB 140, the sale of loans from originator to a trust (special purpose entity, or SPE) must be a "true sale." A true sale may not contain terms whereby the issuer will be responsible for the subsequent performance or condition of the collateral. Otherwise, terms tying subsequent performance back to the original issuer would constitute recourse and require that the issuer hold regulatory capital against the full value of the collateral transferred.

The permissible exceptions to recourse in a "true sale" are those for "clean-up calls" and "removal of accounts provisions" (ROAPs). Clean-up calls are used toward the maturity of the issue

the 1987 CEBA statute).

to facilitate a smooth wind-down of the collateral principal in the event that repayments do not provide that wind-down naturally. ROAPs are commonly used on revolving transactions such as credit cards, allowing the issuer, for instance, to remove delinquent accounts from a pool to give the issuer maximum workout flexibility (but not simply to absorb a larger amount of losses). ROAPs also may be used to absorb losses associated with fraud. Finally, ROAPs may be *required* in the event that a credit card issuer maintains accounts under affinity relationships. If an issuer loses an affinity contract, it may have to remove those accounts to sell an affinity portfolio.

But, in practice, credit card securitization recourse has been far greater than these permissible exceptions. Concerns with implicit recourse as a means of regulatory capital arbitrage in credit card ABS began soon after the first securitization in 1987. By 1991 it became clear that issuers sometimes pushed the ROAP exceptions to bolster pool performance and avoid early amortization (see a more detailed discussion of early amortization in Section III). In May 1991, Citibank became the first known issuer to provide recourse to its credit card trusts in order to avoid early amortization. In September and October 1991, Sears followed by adding new, higher quality accounts to several series in the Sears Credit Account Trust and removed some early amortization triggers to keep these series from unwinding. Similar actions by other originators soon followed, and between November 1995 and March 1997 there were no fewer than 10 additional instances of originators undertaking implicit recourse. All of these cases were effected with the approval of bank regulators and without *de jure* violation of FASB 140 (Higgins and Mason 2002).

In late 1996, regulators began expressing concern over the preponderance of recourse and the possibility of regulatory capital arbitrage. Even at this early date, credit card banks and analysts already understood that these actions were in clear violation of FASB 140. A March 31, 1997 article from *Asset Sales Report* put the issue most directly and succinctly:

We have long been of the opinion that credit card securitizations are financing mechanisms rather than bona fide sales of assets...We certainly have no problem with banks using the

securitization markets as a source of funding. But pretending that the assets have really been sold is another matter. Banks want sales treatment because they don't have to put up capital against securitized assets, and they don't have to post loss reserves either. But clearly the risks of ownership have not passed to buyers of securitized paper. In theory, every securitization is supposed to stand on its own. The issuer puts up sufficient excess receivables or in some other fashion enhances the pool as to garner investor confidence. In fact, if buyers and sellers miscalculate, the seller has always made up the difference rather than expose the buyers to risk. Thus, the putative seller in fact passes on none of the risks of ownership.

We don't know how long the fiction of sales treatment will last. BancOne's prolonged discussions with regulators indicate to us that the regulators are starting to think about these issues. ("Will Sales Treatment Survive a Recession?").

Regulators were beginning to express their concerns more forcefully. In late 1996, OCC Bulletin 1996-52: "Securitization-Guidelines for National Banks" maintained that "providing post-sale enhancements to prior asset sales constitutes recourse and would require full risk-based capital support for the entire pool of assets..." The Comptroller's Handbook in November 1997 reiterated those principles. Nonetheless, regulators seemed unwilling or unable to restrict implicit recourse, and the practices continued.

In 1999, the OCC reiterated its concern in OCC Bulletin 1999-46: "Interagency Guidance on Asset Securitization Activities":

Recent examinations have disclosed significant weaknesses in the asset securitization practices of some insured depository institutions. These weaknesses raise concerns about the general level of understanding and controls among institutions that engage in such activities. The most frequently encountered problems stem from: (1) the failure to recognize and hold sufficient capital against explicit and implicit recourse obligations that frequently accompany securitizations... (p. 1).

OCC Guidance 2002-20, "Interagency Guidance on Implicit Recourse in Asset Securitizations," reiterates even more specifically, with explicit examples, actions that would be interpreted as implicit recourse:

Banking organizations typically have provided implicit recourse in situations where the originating organization perceived that the failure to provide this support, even though not contractually required, would damage its future access to the asset-backed securities market. An originating banking organization can provide implicit recourse in a variety of ways. The ultimate determination as to whether implicit recourse exists depends on the facts. However,

as discussed in detail later in this document, the following actions point to a finding of implicit recourse:

- Selling assets to a securitization trust or other special purpose entity (SPE) at a discount from the price specified in the securitization documents, which is typically par value;
- Purchasing assets from a trust or other SPE at an amount greater than fair value;
- Exchanging performing assets for nonperforming assets in a trust or other SPE; and
- Funding credit enhancements beyond contractual requirements.

By providing implicit recourse, a banking organization signals to the market that the risks inherent in the securitized assets are still held by the organization and, in effect, have not been transferred ...

Particular attention should be paid to revolving securitizations, such as those used for credit card lines ... where receivables generated by the lines are sold into the securitization. ... Once an early amortization event occurs, the banking organization could have difficulties using securitization as a continuing source of funding and, at the same time, have to fund the new receivables generated by the lines of credit on its balance sheet. Thus, banking organizations have an incentive to avoid early amortization by providing implicit support to the securitization. (pp. 3-4).

Notwithstanding the regulatory saber rattling, implicit recourse has continued with little regulatory action behind the strong talk. Although there were no explicit recourse events like those analyzed in Higgins and Mason (2002) from 1999 through 2002, recent events suggest that only the face of recourse has changed, and not its substance. Recourse was at the heart of events involving NextCard and First Consumers National Bank (owned by Spiegel) during 2001 and 2002. Cognizant of the regulatory risks of openly absorbing losses from delinquencies, these banks intervened into their securitization pools to absorb delinquency losses under the guise of absorbing “fraud loss,” which is legally permissible.

In fall 2001 regulators issued an order that NextCard reclassify fraud expenses as credit chargeoffs and ruled “...credit risk [was] not truly transferred in the securitization. This would mean that NextCard has been subsidizing the securitizations by deducting credit loss (previously fraud loss) If NextBank was subsidizing its securitization, it would not qualify as true-sale from a regulatory perspective” (“NextCard ABS Back on Books”). As a result, the securitized loans were placed back on NextBank’s balance sheet, resulting in a sudden 35% increase in risk-weighted assets

and a decrease in regulatory capital from 17.35% in the second quarter of 2001 to 5.38% in the third quarter. NextBank was subsequently seized by the FDIC and its securitizations, lacking a buyer, were allowed to enter early amortization.

Two things are noteworthy about this transaction. First, as late as fall of 2001, banks had assumed that they could avoid any regulatory discipline associated with implicit recourse by simply re-labeling delinquency losses as fraud losses. Clearly, regulatory discipline had not been an effective deterrent to recourse. Second, even after the NextBank debacle, regulators did not act to prevent the same practices from affecting their measures of regulatory capital in other banks. The balance-sheet treatment of NextBank's recourse was an aberration, not the beginning of a new regulatory rule. After the NextBank transaction, First Consumers' securitizations underwent a similar reclassification, but those loans were not placed back on First Consumers' balance sheet. First Consumers' securitizations did eventually enter early amortization owing to fundamental pool performance, but not because of regulatory discipline, as in the case of NextBank. First Consumers is not an exception. As of the end of 2002, it appeared that there existed other banks with suspiciously high reported fraud losses, suggesting such classification may be a source of more continuous recourse that has replaced earlier discrete recourse events of the type analyzed by Higgins and Mason (2002).

To summarize, regulators have been increasingly critical of implicit recourse. Nevertheless, despite a great deal of talk by regulators about the dangers of implicit recourse, there is little evidence that banks have been prevented from resorting to this means of reducing regulatory capital requirements by pretending that off-balance-sheet assets do not enjoy recourse. In our empirical analysis in Section IV, we find no evidence of any change in the ability of securitizers to engage in regulatory arbitrage through implicit recourse from 1996 to 2000.

III. Securitization with Implicit Recourse as Efficient Contracting

Thus far, the view that we have presented of securitization with implicit recourse has been the jaundiced perspective of those who have regarded securitization with implicit recourse as a means of undesirable regulatory arbitrage. But there is another view of securitization with implicit recourse. It is possible that this arrangement allocates risk and budgets capital more efficiently than pure securitization without recourse, intermediation by banks on their balance sheets, or any other feasible means of intermediating credit card receivables through non-bank intermediaries.

Three elements combine to explain the potential efficiency of this arrangement: (1) bank capital regulation, (2) adverse selection costs, and (3) other regulations that force banks to make recourse implicit and that prevent non-bank intermediaries from offering an alternative to bank securitization with implicit recourse. The efficiency argument begins with the efficiency gain from economizing on scarce equity capital by avoiding the high minimum regulatory requirements set for banks.² Because of adverse-selection costs, securitizing banks must retain much of the risk associated with securitized assets. Given current accounting and capital regulations, they can do so only by making recourse implicit (otherwise they would run afoul of FASB and the bank regulators). Of course, if other intermediaries (e.g., finance companies) could offer credit cards on equal terms with banks, they might be able to offer a superior contracting alternative. But an institutional constraint (the VISA-Mastercard duopoly) effectively limits credit card issuers to commercial banks. Otherwise, non-bank intermediaries would be able to securitize with explicit recourse or simply maintain lower (unregulated) capital ratios for their on-balance-sheet intermediation. In the presence of these various constraints, it may be that the most efficient means of intermediating credit card receivables is bank securitization with implicit recourse.

² Equity capital is a relatively costly form of finance because of adverse-selection premia charged by outside investors who are asked to purchase bank equity (see Myers and Majluf 1984 and Calomiris and Mason 2003).

It is conceivable that implicit recourse might even be more desirable than explicit recourse in the absence of legal impediments to explicit recourse. As we argue below, implicit recourse allows assistance by the originating bank to be made voluntarily ex post, and in some states of the world (when market access for the pool is not worth preserving) assistance would not be offered. The signaling gains from voluntary assistance may favor a reliance on implicit, rather than explicit, recourse.

Is it plausible to argue that adverse selection costs motivate the retention of risk by credit card originators? To understand this motivation for implicit recourse, it is necessary to review the information structure of credit card intermediation.

Asymmetric Information in Credit Card Origination

The banking literature has stressed banks' special role as information collectors and processors (for a review of this literature, see Calomiris and Ramirez 1996). In the case of credit card lending, however, one might doubt that banks possess private information about their customers. In business lending, bank information about firms is derived from screening and monitoring by the bank, and much of the information collected remains private. In contrast, in credit card lending, much of the information about customers' observable characteristics is shared publicly. Consumer credit reports (e.g., based on Fair Isaac Co. credit scores) offer detailed credit records on virtually all credit card holders, which are equally available to the issuer of the credit card, to its competitors, and to others with access to the reports.

There is, however, one important aspect of credit card lending that does result in private information retained by issuing banks: the means by which the bank attracted the customer. Unobservable characteristics of customers may make them more or less likely to choose some credit card marketing schemes over others. For example, some particular combinations of interest rate

discounts, frequent flier miles, and other perquisites (which are known only by the customer and the offering bank) may be more or less attractive to (otherwise unobservably) low-default risk customers.

There is significant heterogeneity across credit card banks in their strategies for attracting customers. Fitch (1996, p. 2) pointed out that some credit card banks – Advanta, Capital One, and First USA – specialized in attracting customers with low-price cards but consequently suffered a greater probability of attracting poor credit quality customers. Other banks – MBNA, Household, GM, Citibank, and Chemical – in contrast specialized in promoting affinity or co-branded cards, which tend to attract higher-quality customers. The recent histories of these two groups of banks confirm Fitch’s view of the lower portfolio quality associated with low-price cards.

The importance of unobserved determinants of default risk is emphasized by ratings agencies. Because these unobservable attributes are important for credit risk, ratings agencies penalize young (unseasoned) credit cards in the portfolios they rate. For example, Fitch’s credit card default model distinguishes between seasoned credit cards and new credit cards because of their concern about how the credit card customer was attracted. Fitch (1996, p. 7) writes:

Examining the credit limits and APRs of a portfolio...does not always give a true picture of the issuer’s total risk. Some issuers might be more aggressive in assigning high limits to lower credit quality borrowers. Some might not have well-developed scoring models. Finally, some may try to gain market share by offering very low interest rates, possibly at the expense of credit quality...

...since every credit card is not created equal, more attention must be paid to the dynamics of each variable stressed in context with that portfolio... For example, the stress test [Fitch performs on portfolios] applies to the Household Affinity Credit Card Master Trust...

Household’s underwriting criteria is strong, and, to date, the trust’s performance has been better than expected. However, since Household’s portfolio is not heavily seasoned and has not been tested during a recessionary environment, Fitch imposes a slightly more conservative chargeoff multiple. As the average age of the accounts increases, Fitch will revisit this stress and adjust it accordingly.

Fitch’s discussion mirrors the academic literature on adverse selection and the connection between adverse selection and the retention of risk by loan originators. In the context of corporate

loan sales, Gorton and Pennacchi (1995) show that if originating banks possess private information about their customers, loans sold will also suffer “undeserved” adverse selection discounts from the marketplace, and the discount will be increasing in the extent of the information problem and in the riskiness of the loan (for any given extent of asymmetric information). They show (theoretically and empirically) that higher-risk categories of loans (for which asymmetric information is relatively important) require greater credit enhancement from the originating bank than low-risk loan types. Banks are unlikely to find it cost effective to ask outsiders to bear credit risk if outsiders’ abilities to measure that risk are far inferior to those of the originating banks.

A corollary of the proposition that asymmetric information limits risk transference from banks is that as the bank’s asymmetric information problem is mitigated by market learning about customer characteristics over time, the lemons discount on the portfolio of receivables will also fall (see Diamond 1989 for a model of learning in such an environment). The decline in the lemons discount will be reflected in both the amount of risk securitized and the price paid for the securities. As that happens (as the bank’s comparative advantage in bearing default risk declines), it will become efficient for the bank to reduce its capital buffer, credit enhancement, or pledged collateral, and let the riskiness of the master trust’s debt rise. In practice, unseasoned credit card receivables tend to be placed in conduits where outsiders are forced to bear virtually no default risk, while seasoned receivables tend to be placed in trusts with longer maturity and riskier debt. Sophisticated outside investors skilled at pricing risk may purchase higher-risk tranches of debt, leaving the most senior debt for less sophisticated investors. As Fitch (1996, p. 11) shows, the segmentation of debt into different risk tranches is a common feature of credit card ABS.

Early Amortization Triggers, Time Varying Risk Allocation, and Signaling

Of course, “reverse seasoning” may also happen. Credit risk can become less transparent over

time as economic circumstances change, and delinquency risk rises, leading to the need for greater retention of risk by originating banks. Indeed, the means through which implicit recourse occurs in credit card master trust securitizations (i.e., the mechanism of early amortization) ensures that the extent to which originating banks absorb risk on the margin increases as delinquencies increase or other problems arise. Thus, the structure of implicit recourse not only leads to greater risk absorption on average but ensures that marginal risk absorption increases in uncontractable bad states of the world.

Early amortization clauses, in conjunction with implicit recourse, are the means through which banks absorb increasing amounts of risk as adverse-selection problems become greater. Standard contractual provisions and structures for asset-backed securities vary considerably across collateral types. Credit card deals are structured with a high risk of early amortization (payout), which can occur for a variety of reasons, including an increase in delinquencies. In early amortization, the securities are repurchased by the issuing trust according to the contractual terms. The trust may have to raise cash to fund the purchase by selling the loans. Because of the fundamental asymmetric information regarding the origination technology underlying the quality of the portfolio, the sale will be subjected to a substantial adverse-selection discount if purchased by any firm other than the issuing bank. If a bank subjects asset-backed security investors to such adverse-selection discount losses, those investors may become reluctant to purchase future ABS from the bank, effectively raising the bank's future funding costs. Thus, it may be less costly for banks to avoid early amortization by intervening (through implicit recourse) to improve the receivables pool and thereby avoid early amortization.

In effect, the early amortization provision provides a credible incentive for originating banks to assist their credit card pools (and absorb increasing amounts of risk) during high-delinquency (or other problem) states. Implicit recourse to prevent early amortization can also be seen as a means

for banks to signal that, despite the bad observable state of the world, their credit card loans remain a viable long-term investment. The reason implicit recourse may work as a signal is that it is not mandatory. The fact that banks step in to improve the asset quality of their ailing master trusts does not imply that banks are providing an *unconditional guarantee* to master trust debtholders. Many intermediaries, including uninsured intermediaries like commercial paper dealers, voluntarily bail out customers to preserve their reputations (see Boot, Greenbaum, and Thakor 1993). But in extreme default states (where the costs of a bailout are large relative to the value of a continuing reputation), such bailouts are not forthcoming. In other words, if banks were suffering general distress or if they believed that the profitability of future credit card securitization was low (owing to their beliefs about the riskiness of their credit card customers), one would not expect banks to provide assistance to their master trusts. Thus, early amortization can be thought of as an incentive-compatibility device that ensures efficient risk sharing in the presence of asymmetric information. The fact that banks sometimes voluntarily improve the quality of troubled credit card portfolios can be a profit maximizing strategy and need not imply an absence of some credit risk transference to the debtholders of the master trusts.

IV. Empirical Analysis of Credit Card Securitization

In our empirical work, we investigate whether the “safety net abuse” or “efficient contracting” views of securitization with implicit recourse offer a better characterization of the data. The two alternative theoretical views of regulatory capital arbitrage and implicit recourse have differing implications for the behavior of credit card banks.

According to the efficient contracting view, healthy banks with scarce capital (faster growing banks) will see the greatest advantage to off-balance-sheet finance. Furthermore, if banks are establishing contracts to satisfy the marketplace, they will be setting their capital adequately to

absorb risk, as measured by the market. Thus, banks may choose to maintain levels of capital in excess of their minimum regulatory requirements as a means of satisfying market requirements. Bank capital should vary with market perceptions of bank asset risk (including both on-balance-sheet and off-balance-sheet asset risks).

According to the safety net abuse view (following James 1987), if off-balance-sheet finance is motivated by the maximization of the deposit insurance subsidy, then banks that stand to gain the most from increasing the put option value of deposit insurance will be more likely to securitize and will securitize to a greater extent. Furthermore, if securitizing banks are seeking to maximize the put option value of the safety net, then they would tend to maintain capital levels close to their minimum regulatory requirements.

Thus, to distinguish between the safety net abuse and efficient contracting views, we analyze the characteristics of securitizing credit card banks and their capital structure choices.

Data

Our data set combines bank call report data, bank holding company Y-9 reports, and off-balance-sheet data on the quantity and quality of managed credit card receivables of credit card banks from Faulkner and Gray's *Card Industry Directory*. Our sample is confined to the chartered, non-CEBA, commercial banks listed as among the top 300 credit card receivables managers in Faulkner & Gray for 1996 and 2000. We chose these dates so that we could investigate the extent to which changes in the regulation of implicit recourse over time might affect our conclusions.³

³ Between 1996 and 2000 credit card ABS structures also changed in ways that could potentially affect capital structure and risk. Increasingly, credit card ABS were sold through master trusts (rather than discrete trusts), wherein the receivables sold this period may be intermingled with those sold in previous periods, adding time-series diversification to the master trust pool performance. Also, over time, master trusts came to use tiered structures, involving "secondary note trusts," which permit banks to transfer more of their residual tranches to other investors.

Because of consolidation within the credit card industry during the late 1990s and the rising importance of securitization as a means of finance, the composition and size of our sample of commercial bank credit card issuers changed dramatically from 1996 to 2000. In 1996, our sample consisted of 96 banks, 47 of which did not engage in securitizations. By 2000, our sample consisted of only 7 banks, all of whom were securitizers. Our sample is small in 2000 for various reasons. First, the consolidation of the credit card industry substantially reduced the number of credit card banks between 1996 and 2000. Second, consolidation and other factors limited our ability to construct consistent time series data for surviving credit card banks over that period.

Table 1 reports summary statistics for the pooled sample of 103 credit card bank observations for 1996 and 2000, which are separated into subgroups in two ways. First, we divide observations according to whether the issuer is involved in securitization or not (56 with and 47 without off-balance-sheet activity). Second, we construct a sub-sample of 77 observations for banks and bank holding companies that are relatively specialized in credit card banking. We constructed that sample of 77 banks by removing the quartile of banks with the lowest proportion of managed credit card receivables relative to total consolidated assets.⁴ Note, however, that “relatively specialized” does not mean that the bank or holding company is primarily a credit card bank; on average, the ratio of credit card receivables relative to total assets for bank holding company “specialists” is still only 8.7 percent.

The reason to divide the sample according to the degree of credit card specialization is that, to some extent, holding companies may target capital relative to the risk of the holding company as a

⁴ We constructed our measure of securitized credit card receivables for our sample of credit card banks by computing the difference between managed credit card receivables from Faulkner and Gray's *Card Industry Directory* for 1996 and 2000 and on-balance-sheet credit card receivables from call reports. Faulkner and Gray sometimes reports data at the holding company level. Where there existed no primary source of credit card lending within the holding company, the managed assets were assigned to the consolidated holding company, but not to any one of its subsidiary banks. To measure managed assets, we subtracted on-balance-sheet credit card loans from bank assets, then added Faulkner and Gray's managed credit card receivables to that measure of total balance-sheet assets less credit card loans held on the balance sheet.

whole (although, from a regulatory standpoint, both the bank and the holding company are subject to minimum capital requirements). Our unit of observation is the chartered “credit card” bank, not its holding company (which includes other banks and non-bank subsidiaries of the holding company). Dividing the sample according to the importance of credit card banking within the holding company allows us to investigate whether focusing attention on credit card banks within relatively “specialized” bank holding companies improves our understanding of credit card banks’ target capital ratios (which it does). Of the 77 credit card banks in 1996 and 2000 that are housed in relatively specialized bank holding companies, 47 securitize.

Findings

The average capital ratios reported in Table 1 are expressed in two ways: tier 1 plus tier 2 capital as a fraction of total on-balance-sheet assets, which we call $cap1n2ta$, and tier 1 plus tier 2 capital as a fraction of “managed assets” (the sum of on-balance-sheet assets and off-balance-sheet credit card receivables), which we call $cap1n2ma$. It is possible that banks in our sample also maintain other off-balance-sheet assets, which are not included in our definition of managed assets.

Minimum capital requirements for banks involve a combination of minimum requirements. “Well-capitalized” banks must satisfy both a maximum leverage requirement as a fraction of total assets and a risk-based capital requirement, which has two parts: tier 1 capital / risk-weighted assets > 0.04 , and tier 1 plus tier 2 capital / risk-weighted assets > 0.08 . Since risk-weighted assets are less than total (on-balance-sheet) assets, a capital ratio of 0.08 for $cap1n2ta$ implies that a bank is maintaining capital above all of its minimum required capital ratios. As a general rule (given the absence of explicit recourse in securitizations of credit card receivables), only on-balance-sheet assets are relevant for computing the minimum required ratios.

As Table 1 shows, credit card banks that securitize actually maintain higher average ratios of

capital to total on-balance-sheet assets (0.102) than credit card banks that do not securitize (0.092). Median capital ratios are also higher for securitizers. This is an important fact. Securitizers maintain far more than the minimum amount of capital required by regulation and tend to maintain a greater amount of “excess” capital (relative to regulatory requirements) than do non-securitizing banks.

Table 2 provides a more detailed comparison of different types of credit card banks’ capital ratios and compares credit card banks’ capital ratios to those of all banks. No matter which definition of capital one focuses on relative to on-balance-sheet assets (equity, tier 1, or tier 1 plus tier 2), securitizing credit card banks have higher average capital ratios (relative to on-balance-sheet assets) than either non-securitizing credit card banks or U.S. chartered banks as a whole.

These facts are not consistent with the “safety net abuse” view of securitization. If securitizers were trying to maximize the put option value of the safety net, they would maintain regulatory capital at or near the required minimum.

When one examines the ratio of capital to “managed assets” (on-balance-sheet assets plus off-balance-sheet credit card receivables), one sees that credit card securitizers do maintain capital ratios relative to the sum of on- and off-balance-sheet assets that are lower than those of non-securitizing credit card banks or of all banks. This is an indication of “regulatory capital arbitrage” – by securitizing, banks are able to reduce their capital relative to assets below what they would have to maintain if assets were retained on the balance sheet. The average and median capital ratio relative to managed assets for securitizers is 0.08, and many of these banks have capital ratios of less than 7% (as shown in Figure 1).

As noted before, there are two views of the motivations for regulatory capital arbitrage. According to the “safety net abuse” view, banks with low ratios of capital to managed assets are trying to maximize the put option value of the safety net. According to the “efficient contracting” view, banks are on a “market margin” that determines their risk-based capital (which explains why

their capital relative to on-balance-sheet assets is higher than that of other banks, since implicit recourse for off-balance-sheet assets requires that they hold higher capital to compensate for that risk).

The relatively low ratios of capital to managed assets for securitizers, according to this view, is the result of market perceptions that lower capital relative to managed assets is adequate for these banks. That market determination reflects a combination of two factors. First, securitizers with relatively low ratios of capital to managed assets may be originating lower-risk credit card receivables. Second, although implicit recourse involves the retaining of some risk on securitized receivables, securitizers are not retaining all the risk for securitized receivables, since there are states of the world in which other investors in securitized assets would not be fully protected by issuers. That implies that the amount of capital needed to stand behind securitized receivables should be less than the amount needed to stand behind receivables held on the balance sheet; hence, *ceteris paribus*, capital ratios relative to managed assets should be declining in the proportion of assets that are securitized.

To further investigate the determinants of credit card banks' capital ratios, in Table 3 we report OLS regression results for two sets of regressions in which capital ratios are the dependent variables: one set uses capital relative to on-balance-sheet assets to measure the capital ratio, while the other uses capital relative to managed assets. For each of the two categories of regressions, the first three columns include the entire sample of credit card banks, while the fourth column excludes the quartile of credit card banks whose bank holding companies were least involved in credit card banking.

If the market determines the risk-based capital maintained by credit card banks, then we should find four things to be true: (1) capital relative to managed assets increases as the riskiness of the receivables rises, *ceteris paribus*, (2) capital relative to managed assets is an increasing function of

the proportion of assets held as loans rather than government securities, *ceteris paribus*, (3) capital relative to managed assets decreases as the ratio of securitized assets relative to total managed assets rises, *ceteris paribus* (since the risk retained on securitized assets via implicit recourse is less than the risk retained for on-balance-sheet receivables), and (4) the regression fit should be better when using the “managed capital ratio” definition of capital relative to assets rather than the “regulatory capital ratio” (capital relative to on-balance-sheet assets). All four predictions are confirmed in Table 3. Interestingly, the standard deviation of past due credit card receivables seems to be a better indicator of credit card risk than the current level of past due receivables.⁵ The fit for the model is better when we exclude the quartile of banks whose holding companies are least involved in credit card intermediation.

The adjusted R-squareds are much higher for the managed capital ratio regressions than for the regulatory capital ratio regressions. Figure 1 shows graphically how much better the model is at explaining the managed capital ratio than the regulatory capital ratio, and that this is particularly true for securitizing banks. Notice that the line relating actual and predicted managed capital ratios for securitizers (Linear cap1n2ma (ABS)) is upward sloping, while the line relating actual and predicted regulatory capital ratios for securitizers (Linear cap1n2ta (ABS)) is flat.

We investigate two other questions in Table 3. According to the safety net abuse view, banks that raise more of their funds from insured deposits should face stronger motivations to keep capital small, since doing so would increase the put option value of deposit insurance. We include the ratio of insured deposits to total deposits, which according to the safety net abuse view, should enter

⁵ The standard deviation of the ratio of past due loans is derived from on-balance-sheet credit card receivables that are either past due by more than 90 days or in non-accrual, divided by total on-balance-sheet credit card receivables. We use all available annual data from December call reports, beginning in 1984 and ending in the sample year, to compute the standard deviation. We omit banks with fewer than three annual observations from our sample.

negatively. The estimated coefficients are negative but are insignificantly different from zero. We also test to see if banks' capital ratios are significantly different in 2000 (in response to greater regulatory criticisms of implicit recourse). Our 2000 sample is small, but there is no evidence for a significant change in capital relative to risk from 1996 to 2000 (see also Figure 2). The significant negative coefficient on the 1996 dummy in the regulatory capital regression appears to be a spurious result, reflecting the fact that all banks present in the 2000 sample are securitizers (which maintain higher regulatory capital ratios). The managed capital ratio regression is able to capture differences in capital targeting for securitizers and non-securitizers, and once those differences are captured, there is no significant difference between behavior in 1996 and in 2000.

One potential concern about the regressions reported in Table 3 is the endogeneity of the choice of whether to be a securitizer. To deal with this potential problem, in Tables 4 and 5 we construct a two-step procedure that corrects for selectivity bias (in the first-stage regressions, reported in Table 4) before estimating the determinants of the managed capital ratio (in Table 5). We employ two alternative first-stage models, a probit and a tobit. The probit model assumes that selection bias pertains to whether one securitizes or not; the tobit model also allows the extent of securitization (relative to managed assets) to be controlled for in the first-stage regression. We find the tobit model more informative, but we report both for purposes of comparison.

There are three "instruments" used in the first-stage regressions (variables that determine whether and how much one securitizes, which are assumed not to determine risk-based capital targets): the total amount of credit card receivables managed, the growth rate of managed receivables, and the growth rate of capital. The first two instruments we expected to be positively associated with securitizing, and the third we expected to be negatively associated with securitization. The first instrument reflects the importance of scale economies in securitization, owing to the high transaction costs of establishing conduits and marketing their securities. The last two instruments

reflect the importance of economizing on capital, which should be particularly relevant for a bank that is experiencing rapid growth in receivables relative to available capital. Our estimates confirm those predictions.

We also found that the ratio of insured deposits to total deposits is a significant positive predictor of securitization. That fact is consistent with the safety net abuse view of securitization but may also reflect other factors (e.g., banks that securitize may simply not need to rely as much on wholesale sources of on-balance-sheet finance like large-denomination CDs for their financing). The fact that the ratio of insured deposits has no significant negative effect on managed capital ratios in Table 5 contradicts the safety net abuse view of securitization with implicit recourse. Results reported in Table 5 are quite similar in Table 3 and Figure 1, indicating that selection bias has little effect on our estimates of risk-based capital targeting.

V. Conclusions

It is not controversial to point out that off-balance-sheet credit card banking saves capital, nor is it controversial to argue that credit card securitization involves regulatory capital arbitrage and implicit recourse. The controversial question is whether the pursuit of regulatory capital arbitrage through securitization with implicit recourse has been a desirable form of efficient contracting or an undesirable means to reap safety net subsidies. Disagreement among current observers revolves around whether the savings in capital from off-balance-sheet activities is value-maximizing or deposit insurance subsidy-maximizing.

According to the “safety net abuse” view of securitization with implicit recourse, the goal of securitization is to increase risk relative to capital to maximize the value of the safety net subsidy. According to the “efficient contracting” view, banks use securitization with recourse to permit them to set capital relative to risk in a manner consistent with market, rather than regulatory, capital

requirements, and to permit them to overcome problems of asymmetric information in credit card intermediation.

Our findings are consistent with the efficient contracting view. Our analysis of the cross-sectional determinants of the decision to finance credit card receivables off-balance-sheet and the relationship between off-balance-sheet finance and on-balance-sheet capital suggests that securitization is motivated by legitimate capital saving and that capital is being maintained in a manner commensurate with market perceptions of risk. Contrary to the safety net abuse view, securitizers maintain capital ratios far above their regulatory minima and cross-sectional differences in the value of deposit insurance protection do not explain cross-sectional differences in capital structure.

One caveat warrants emphasis. It would be inappropriate to use our evidence to argue that regulatory or supervisory concerns about abuse of the safety net are entirely unwarranted. It is possible that in the wake of substantial losses of capital and increases in credit card risk banks could abuse securitization in the manner regulators fear. The experience of the U.S. in the 1980s and the experiences of many other countries' banking systems in the 1980s and 1990s have taught that insolvent banks protected by safety nets change their behavior to maximize risk as part of resurrection strategies. Abuse of the safety net has not been the story thus far in credit card securitization, but under different, adverse circumstances in the future, potential abuse remains a possibility.

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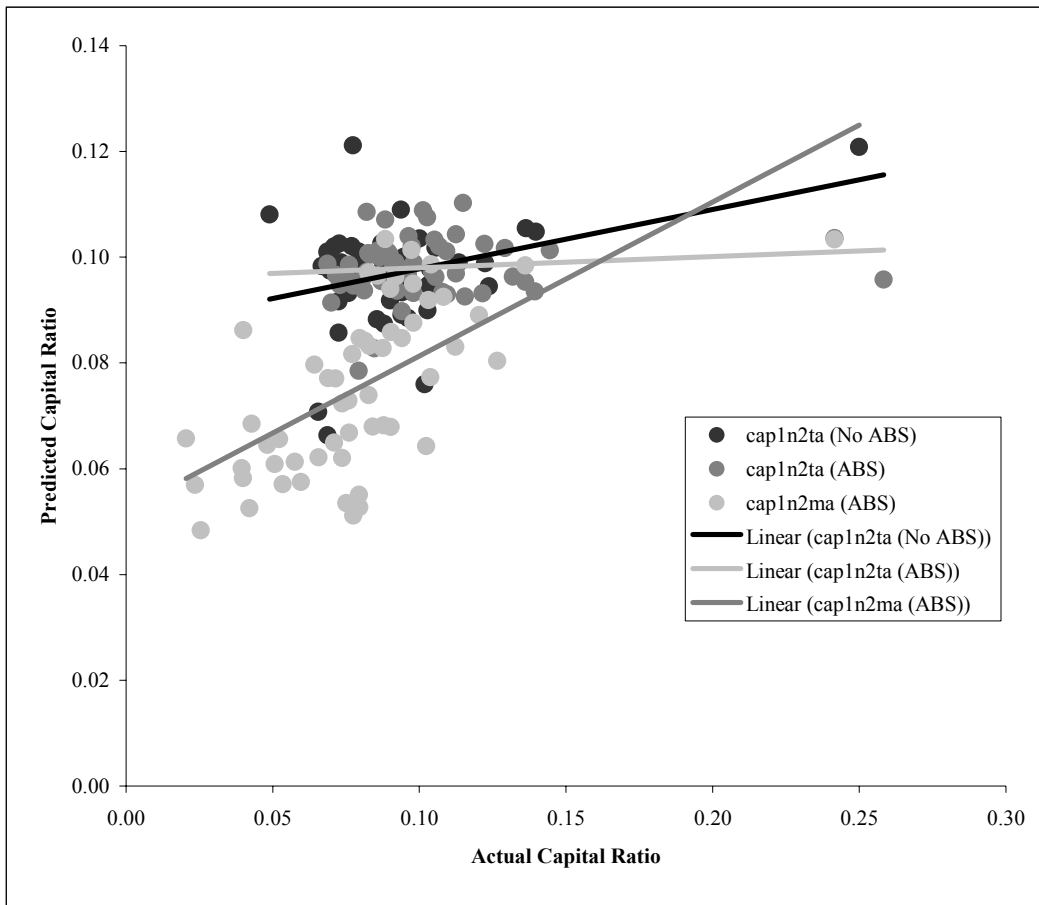
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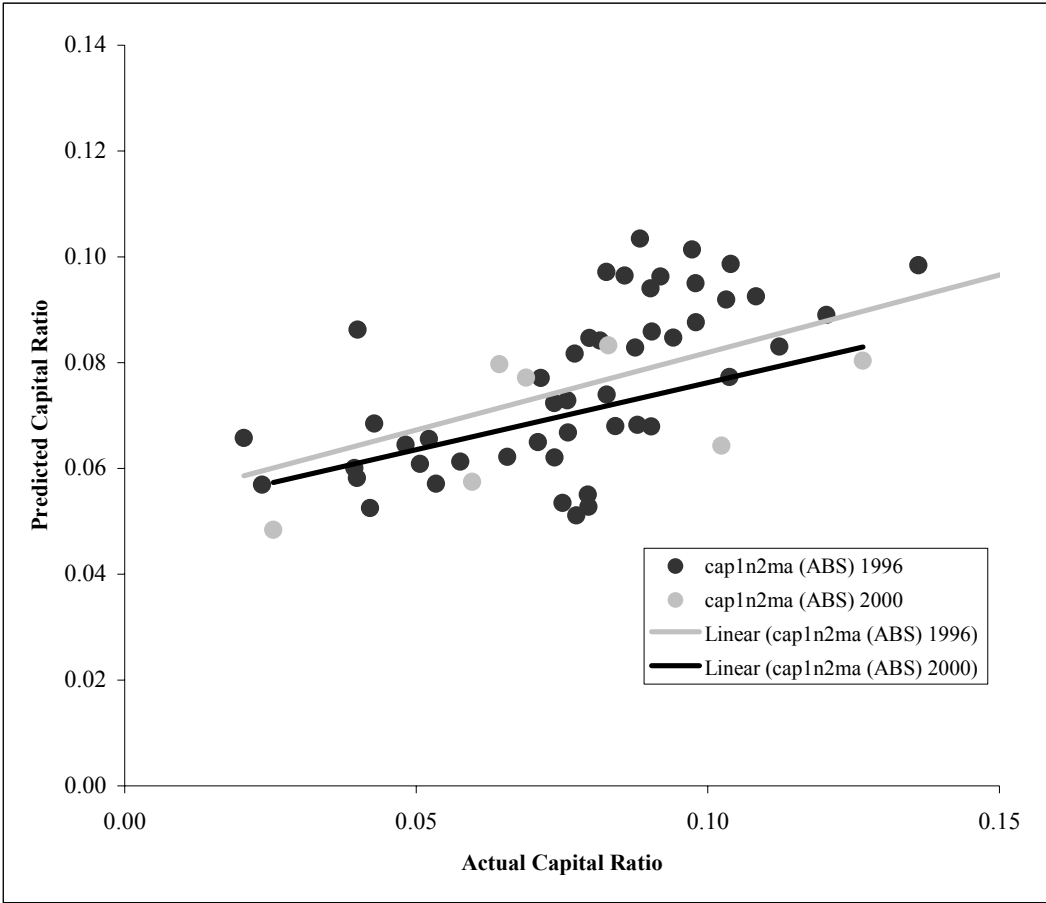
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Figure 1: Predicted vs. Actual Managed and Regulatory Capital Ratios of ABS and non ABS-issuing Banks



Note: All predictions from OLS models in Table 3.

Figure 2: Predicted vs. Actual Managed Capital Ratios of ABS-issuing Banks in 1996 and 2000



Note: All predictions from OLS models in Table 3.

Table 1: Summary Statistics for Sample Cohorts

Variable Abbreviation	Variable Definition	All CC Banks	CC Banks w/o OBS Activity	CC Banks w/ OBS Activity, 1996	CC Banks w/ OBS Activity, 2000	CC Banks w/o Low BHC Importance Quartile
n	Number of observations	103	47	49	7	77
		Mean Median (<i>Std Dev</i>)	Mean Median (<i>Std Dev</i>)	Mean Median (<i>Std Dev</i>)	Mean Median (<i>Std Dev</i>)	Mean Median (<i>Std Dev</i>)
abs	Dummy for whether bank securitizes	0.544 1.000 (0.501)	0.000 0.000 (0.000)	1.000 1.000 (0.000)	1.000 1.000 (0.000)	0.597 1.000 (0.494)
abs_prop	Proportion of managed credit card portfolio securitized	0.113 0.000 (0.228)	0.000 0.000 (0.000)	0.171 0.000 (0.267)	0.470 0.488 (0.189)	0.151 0.000 (0.252)
cap1n2ma	Tier 1 and 2 capital / managed assets	0.085 0.083 (0.032)	0.092 0.089 (0.030)	0.081 0.080 (0.034)	0.076 0.069 (0.032)	0.082 0.080 (0.031)
cap1n2ta	Tier 1 and 2 capital / on-balance-sheet assets	0.098 0.092 (0.033)	0.092 0.089 (0.030)	0.098 0.092 (0.028)	0.133 0.116 (0.057)	0.098 0.092 (0.032)
cngsta	Cash and government securities / on-balance-sheet assets	0.077 0.059 (0.063)	0.088 0.057 (0.077)	0.071 0.064 (0.049)	0.048 0.061 (0.029)	0.076 0.061 (0.060)
lmcln_1	Log of managed credit card portfolio, 1 period lag	11.993 11.471 (2.523)	10.642 10.296 (1.646)	12.676 12.541 (2.416)	16.286 16.497 (1.079)	12.665 12.253 (2.524)
cc90sd	Standard deviation of total loans greater than 90 days past due or in nonaccrual status / total loans	0.011 0.008 (0.009)	0.012 0.009 (0.011)	0.011 0.009 (0.008)	0.008 0.006 (0.007)	0.012 0.008 (0.010)
tl90ta	Total loans greater than 90 days past due or in nonaccrual status / total loans	0.011 0.009 (0.009)	0.009 0.007 (0.007)	0.012 0.009 (0.011)	0.013 0.015 (0.006)	0.011 0.009 (0.009)
dlnr	Growth of managed credit card portfolio over past year (log difference)	0.284 0.067 (1.179)	0.115 0.058 (0.403)	0.483 0.114 (1.649)	0.033 -0.001 (0.108)	0.332 0.074 (1.335)
dlcap	Growth of tier 1 and 2 capital over past year (log difference)	0.248 0.159 (0.458)	0.175 0.148 (0.180)	0.330 0.201 (0.632)	0.164 0.184 (0.142)	0.272 0.180 (0.519)
y1996	Dummy for year=1996	0.932 1.000 (0.253)	1.000 1.000 (0.000)	1.000 0.000 (0.000)	0.000 0.000 (0.000)	0.909 1.000 (0.289)
insstd	Insured deposits / total deposits	0.644 0.704 (0.216)	0.660 0.707 (0.198)	0.655 0.707 (0.199)	0.461 0.597 (0.372)	0.629 0.707 (0.234)
lbhcimp	Log (managed credit card portfolio / BHC on-balance-sheet assets)	-3.079 -3.498 (1.796)	-3.781 -4.376 (1.416)	-2.668 -2.995 (1.855)	-1.236 -1.088 (1.646)	-2.447 -2.592 (1.643)

Table 2: Managed and Regulatory Capital Ratio Comparisons

Variable Abbreviation	Variable Definition	All Banks	All CC Banks	CC Banks w/o OBS Activity	CC Banks w/ OBS Activity	CC Banks w/o Low BHC Importance Quartile
n	Number of observations	11,002	103	47	56	77
		Mean <i>Median</i> (Std Dev)	Mean <i>Median</i> (Std Dev)	Mean <i>Median</i> (Std Dev)	Mean <i>Median</i> (Std Dev)	Mean <i>Median</i> (Std Dev)
eqta	Equity capital / on-balance-sheet assets	0.084 <i>0.077</i> (0.032)	0.088 <i>0.081</i> (0.034)	0.085 <i>0.082</i> (0.030)	0.091 <i>0.081</i> (0.037)	0.087 <i>0.081</i> (0.032)
cap1ta	Tier 1 capital / on-balance-sheet assets	0.083 <i>0.076</i> (0.029)	0.083 <i>0.076</i> (0.030)	0.081 <i>0.076</i> (0.029)	0.084 <i>0.075</i> (0.031)	0.081 <i>0.075</i> (0.028)
cap1n2ta	Tier 1 and 2 capital / on-balance-sheet assets	0.097 <i>0.090</i> (0.034)	0.098 <i>0.092</i> (0.033)	0.092 <i>0.089</i> (0.030)	0.102 <i>0.094</i> (0.034)	0.098 <i>0.092</i> (0.032)
eqma	Equity capital / managed assets	0.076 <i>0.072</i> (0.028)	0.077 <i>0.075</i> (0.033)	0.085 <i>0.082</i> (0.030)	0.071 <i>0.070</i> (0.035)	0.072 <i>0.071</i> (0.030)
cap1ma	Tier 1 capital / managed assets	0.072 <i>0.068</i> (0.030)	0.073 <i>0.069</i> (0.032)	0.081 <i>0.076</i> (0.029)	0.066 <i>0.065</i> (0.033)	0.068 <i>0.067</i> (0.029)
cap1n2ma	Tier 1 and 2 capital / managed assets	0.084 <i>0.081</i> (0.028)	0.085 <i>0.083</i> (0.032)	0.092 <i>0.089</i> (0.030)	0.080 <i>0.080</i> (0.033)	0.082 <i>0.080</i> (0.031)

Table 3: OLS Models of Managed and Regulatory Capital Ratios

Dependent Variable		Regulatory Capital Ratio=				Managed Capital Ratio=											
		Tier 1 and 2 capital / on-balance sheet assets				Tier 1 and 2 capital / managed assets											
		103		103		103		77		103		103		103		77	
n		103		103		103		77		103		103		103		77	
R2		0.058		0.146		0.065		0.071		0.281		0.283		0.283		0.341	
Adjusted R2		0.020		0.102		0.016		0.020		0.251		0.246		0.246		0.305	
Variable Abbreviation	Variable Name	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	
constant	Constant	0.102 *** (0.007)	0.140 *** (0.014)	0.110 *** (0.012)	0.105 *** (0.009)	0.099 *** (0.006)	0.105 *** (0.012)	0.104 *** (0.010)	0.099 *** (0.007)								
abs	Proportion of managed credit card portfolio securitized	0.000 (0.009)	-0.007 (0.009)	0.000 (0.009)	0.001 (0.010)	-0.041 *** (0.008)	-0.042 *** (0.008)	-0.041 *** (0.008)	-0.042 *** (0.008)								
cngsta	Cash and government securities / on-balance-sheet assets	-0.114 ** (0.051)	-0.099 ** (0.049)	-0.112 ** (0.051)	-0.139 ** (0.061)	-0.085 ** (0.045)	-0.082 ** (0.045)	-0.083 ** (0.045)	-0.096 ** (0.049)								
cc90sd	Standard deviation of total loans greater than 90 days past due or in nonaccrual status / total loans	0.504 * (0.373)	0.617 ** (0.359)	0.566 * (0.382)	0.266 (0.385)	0.766 *** (0.324)	0.785 *** (0.327)	0.804 *** (0.332)	0.595 ** (0.312)								
td90ta	Total loans greater than 90 days past due or in nonaccrual status / total loans	-0.125 (0.377)	-0.202 (0.362)	-0.189 (0.387)	-0.080 (0.424)	-0.364 (0.328)	-0.377 (0.330)	-0.404 (0.337)	-0.316 (0.343)								
y1996	Dummy for year=1996		-0.040 *** (0.013)				-0.007 (0.012)										
insdtd	Insured deposits / total deposits			-0.012 (0.015)				-0.007 (0.013)									

* (**) (***) statistically significant at the 10% (5%) (1%) level.

Table 4: Selection Models of Managed Capital Ratios-First-round Probit and Tobit Model Results

Dependent Variable		abs=				abs_prop=			
		Dummy for whether bank securitizes				Proportion of managed credit card portfolio securitized			
Model Type		Probit	Probit	Probit	Probit	Tobit	Tobit	Tobit	Tobit
n		103	103	103	77	103	103	103	77
Log likelihood function		-53.600	-52.994	-51.572	-33.960	-60.279	-59.846	-57.587	-45.537
Restricted log likelihood		-71.001	-71.001	-71.001	-51.902	-84.738	-84.738	-84.738	-65.014
Chi squared		34.802	36.014	38.858	35.884	48.918	49.784	54.302	38.955
Variable Abbreviation	Variable Name	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)
constant	Constant	-3.485 *** (0.854)	3.018 -1.78E+05	-5.188 *** (1.281)	-4.671 *** (1.231)	-1.677 *** (0.284)	-1.951 *** (0.413)	-1.998 *** (0.346)	-1.816 *** (0.366)
cngsta	Cash and government securities / on-balance-sheet assets	-1.868 (2.323)	-1.759 (2.317)	-2.221 (2.380)	-0.847 (2.853)	-0.160 (0.823)	-0.212 (0.823)	-0.189 (0.798)	0.215 (0.936)
lmccln_1	Log of managed credit card portfolio, 1 period lag	0.310 *** (0.072)	0.285 *** (0.076)	0.361 *** (0.080)	0.386 *** (0.096)	0.152 *** (0.021)	0.162 *** (0.024)	0.157 *** (0.021)	0.158 *** (0.026)
cc90sd	Standard deviation of total loans greater than 90 days past due or in nonaccrual status / total loans	-11.217 (16.254)	-11.238 (16.464)	-19.042 (17.023)	-16.063 (18.787)	2.540 (5.778)	2.396 (5.740)	0.362 (5.736)	2.606 (6.176)
tl90ta	Total loans greater than 90 days past due or in nonaccrual status / total loans	12.179 (18.264)	12.911 (18.233)	18.540 (19.431)	23.685 (24.290)	-2.466 (5.661)	-2.864 (5.641)	-1.359 (5.553)	-0.821 (6.417)
dlmr	Growth of managed credit card portfolio over past year (log difference)	0.441 * (0.319)	0.431 * (0.315)	0.466 * (0.333)	1.289 ** (0.566)	0.071 ** (0.037)	0.071 ** (0.036)	0.073 ** (0.035)	0.079 ** (0.037)
dlcap	Growth of tier 1 and 2 capital over past year (log difference)	0.028 (0.418)	0.069 (0.418)	0.320 (0.490)	-0.150 (0.412)	-0.219 ** (0.097)	-0.240 *** (0.099)	-0.158 * (0.098)	-0.210 ** (0.098)
y1996	Dummy for year=1996		-6.265 -1.78E+05				0.181 (0.193)		
insdtd	Insured deposits / total deposits			1.688 ** (0.869)				0.410 ** (0.233)	
sigma	Disturbance standard deviation (Tobit Model)					0.423 *** (0.044)	0.420 *** (0.044)	0.409 *** (0.042)	0.418 *** (0.048)

* (**) (***) statistically significant at the 10% (5%) (1%) level.

Table 5: Selection Models of Managed Capital Ratios-Second-round Heckman-adjusted OLS Models of Managed Capital Ratios

Dependent Variable	Using First-round Probit from Table 4				Using First-round Tobit from Table 4				
	Managed Capital Ratio= Tier 1 and 2 capital / managed assets				Managed Capital Ratio= Tier 1 and 2 capital / managed assets				
n	103	103	103	77	103	103	103	77	
R2	0.160	0.158	0.192	0.205	0.283	0.288	0.288	0.341	
Adjusted R2	0.117	0.106	0.142	0.149	0.246	0.243	0.243	0.295	
Variable Abbreviation	Variable Name	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)	Coefficient (Std Dev)
constant	Constant	0.111 *** (0.011)	0.122 *** (0.020)	0.118 *** (0.015)	0.107 *** (0.010)	0.094 *** (0.010)	0.101 *** (0.014)	0.097 *** (0.013)	0.100 *** (0.011)
abs	Dummy for whether bank securitizes	-0.040 *** (0.014)	-0.043 *** (0.016)	-0.044 *** (0.013)	-0.034 *** (0.012)				
abs_prop	Proportion of managed credit card portfolio securitized					-0.038 *** (0.010)	-0.038 *** (0.010)	-0.036 *** (0.010)	-0.042 *** (0.010)
cngsta	Cash and government securities / on-balance-sheet assets	-0.116 ** (0.056)	-0.115 ** (0.057)	-0.118 ** (0.057)	-0.120 ** (0.056)	-0.088 ** (0.046)	-0.086 ** (0.047)	-0.088 ** (0.048)	-0.096 ** (0.050)
ce90sd	Standard deviation of total loans greater than 90 days past due or in nonaccrual status / total loans	0.596 * (0.399)	0.608 * (0.405)	0.615 * (0.416)	0.462 * (0.361)	0.762 ** (0.333)	0.784 ** (0.341)	0.796 ** (0.348)	0.596 ** (0.315)
tl90ta	Total loans greater than 90 days past due or in nonaccrual status / total loans	-0.140 (0.425)	-0.134 (0.434)	-0.139 (0.440)	-0.148 (0.418)	-0.329 (0.341)	-0.334 (0.347)	-0.362 (0.355)	-0.318 (0.357)
y1996	Dummy for year=1996		-0.010 (0.015)				-0.009 (0.012)		
insdtd	Insured deposits / total deposits			-0.008 (0.016)				-0.008 (0.014)	
lambda	Inverse Mills ratio	0.023 *** (0.009)	0.025 *** (0.010)	0.027 *** (0.009)	0.012 * (0.008)	0.005 (0.008)	0.006 (0.008)	0.007 (0.009)	0.000 (0.009)

* (**) (***) statistically significant at the 10% (5%) (1%) level.