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## Capital Constraints, Asymmetric Information, and Internal Capital Markets in Banking: New Evidence

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### Abstract

A growing literature investigates the role of internal capital markets in mitigating financial constraints faced by the subsidiaries of a conglomerate. Most studies have relied on *indirect* tests based on correlations between the cash flows and the investment of the subsidiaries. In contrast, we avoid the widespread criticisms of such specifications by providing *direct* tests that focus on the mechanisms through which internal reallocations of funds occur. We find that internal capital markets are operative within multibank holding companies and that they are used to mitigate capital constraints faced by individual bank subsidiaries. It is shown that internal capital management within a multibank holding company involves not only the movement of capital from better capitalized to less capitalized subsidiaries, but also the movement of assets (loans) from less capitalized to more capitalized subsidiaries by means of loan sales and purchases among the subsidiaries. This internal secondary loan market allows banks in holding companies to avoid the “lemons” problem faced by stand-alone banks by making transactions with their affiliate banks. This second mechanism has been overlooked in the existing literature on the operation of internal capital markets within banking organizations. Ignoring this mechanism may seriously understate the volume of activity in the internal capital markets within banking organizations.

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# Capital Constraints, Asymmetric Information, and Internal Capital Markets in Banking: New Evidence

## 1. Introduction

A growing literature investigates the role of internal capital markets in mitigating financial constraints faced by the subsidiaries of a conglomerate. Much of this literature focuses on correlations between the investment and the cash flows of the different segments of the same conglomerate, as well as a comparison of those correlations with those of stand-alone firms in the same industries as the conglomerate subsidiaries. However, the findings of such studies provide only *indirect* evidence in support of the operation of internal capital markets, as well as being subjected to widespread criticism. In order to obtain *direct* evidence about the operation of internal capital markets, it is important to investigate the actual *mechanism* of capital allocation within a conglomerate.

This study provides direct evidence that internal capital markets are operative by investigating the mechanism through which resources are transferred among subsidiaries of a banking organization. Several features of the banking industry make it particularly interesting for studying the mechanisms through which internal capital markets operate. First, because we focus on the banking subsidiaries of banking organizations, we avoid the problems associated with relying on imperfectly measured Tobin's Qs for the various industries represented by a conglomerate's subsidiaries. Second, since bank subsidiaries have individual bank charters, the individual subsidiaries are well defined. Third, because balance sheet and income data are available for all banks, not just for those in publicly traded banking organizations, data are available for banks and banking organizations of all sizes and with differing degrees of transparency. This latter point is particularly important for distinguishing between the effects emanating from access to internal capital markets and those due to better access to external

capital markets due to the better transparency associated with being publicly traded. Fourth, Stein (1997) suggests that conglomerates that are relatively more homogeneous and less transparent have stronger incentives to operate internal capital markets. Multibank holding companies fit these criteria better than nonfinancial conglomerates, insofar as they consist primarily of banking subsidiaries and are deemed to be more opaque than nonfinancial firms (for example, Morgan 2002). Fifth, unlike manufacturing firms, banks face regulatory capital requirements, both at the conglomerate level and at the level of the individual bank subsidiaries. As a result, each bank subsidiary of a multibank holding company (MBHC) faces its own capital requirement, creating the need for within-MBHC (internal) capital management. Sixth, since bank capital requirements are expressed in terms of the *ratio* of a bank's capital to its assets, in order to satisfy the individual capital-to-assets ratio requirements of its subsidiaries, an MBHC can shift resources internally not only by moving capital from better capitalized to less well capitalized subsidiaries, but by moving assets (loans) from those less well capitalized subsidiaries to better capitalized subsidiaries.

Similar to shifting capital among a conglomerate's subsidiaries, this second mechanism also is based on using internal (secondary loan) markets to mitigate the financial constraints associated with asymmetric information. Asymmetric information between loan sellers and loan buyers creates a "lemons" problem in the secondary loan market, making it difficult to sell, and risky to buy, loans from unaffiliated banks. Thus, being affiliated with an MBHC confers an advantage on banks desiring to make transactions in the secondary loan market relative to stand-alone banks that must make transactions with unaffiliated entities. Thus, the internal loan sales market may be viewed as an additional mechanism through which internal capital markets

operate within banking organizations, insofar as it redistributes assets among the MBHC bank subsidiaries in a way that better utilizes the total capital capacity of an MBHC.

It is important to recognize that not only the differences in the capital ratios among the subsidiaries of an MBHC, but also differences in the loan origination opportunities across the subsidiaries may generate an internal movement of funds within an MBHC.<sup>1</sup> One might expect MBHCs to move capital from subsidiaries with weaker loan origination opportunities to those with better loan origination opportunities. Alternatively, MBHC subsidiaries with better loan origination opportunities may originate loans and sell them to their affiliated subsidiaries with weaker loan origination opportunities. However, it may be the case that increased (decreased) profitability associated with improved (deteriorating) local economic conditions raise (weaken) a bank's capital (through retained earnings) sufficiently to match the improved (deteriorating) lending opportunities so that it is not necessary for the MBHC to transfer additional capital from its subsidiaries with poor lending opportunities to those with better lending opportunities.

This study provides evidence that MBHCs actively use both capital transfers and loan sales in order to allocate funds among their bank subsidiaries. We find that bank subsidiaries receive more capital transfers the lower is their capital ratio and the higher is the capital ratios of the other banks in their MBHC. Similarly, the greater is their need for additional capital and the less the need of the other banks in their MBHC, as measured by the nonperforming loans ratio and the strength of local economic activity, the larger the capital transfers. Furthermore, the larger is the bank subsidiary's return on equity, the smaller is any capital transfer, consistent with

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<sup>1</sup> An additional motivation for banks to buy and sell loans is to diversify their loan portfolios. While Demsetz (2000) finds support for the diversification motive for bank secondary loan market activity, she finds no strong evidence that such banks increase their buying activity *relative* to their selling activity, or vice versa. Since we are concerned with *net* loan sales, the difference between loan sales and loan purchases, they should be essentially unaffected by the diversification motive. In fact, the inclusion of Demsetz's proxies for bank diversification incentives had neither qualitative nor quantitative effects on the main results of this study.

strong earnings providing the necessary capital for the bank. Finally, the smaller is the bank, the larger is any capital transfer, suggesting that it is easier to meet a subsidiary bank's capital needs the smaller is the bank relative to the conglomerate.

We also find that net loan sales of a subsidiary of an MBHC are negatively related to the subsidiary's own capital ratio, and positively related to the average capital ratio of the remaining affiliates of the MBHC, indicating that loans are moved from the less well capitalized to the better capitalized subsidiaries of the MBHC. Similarly, the larger is the bank's nonperforming loans ratio, the larger is any capital transfer, consistent with using net loan sales to help raise the capital ratio of a troubled bank subsidiary. Interestingly, a larger return on assets results in a bank subsidiary making more net loan sales, consistent with high-return banks either having better loan opportunities or having a comparative advantage at originating loans compared with their affiliates.

By comparing the patterns of loan sales and purchases of stand-alone banks with those of banks affiliated with an MBHC, we also provide evidence that internal secondary loan markets allow the affiliates of an MBHC to mitigate the asymmetric information problem associated with buying and selling loans in the external secondary loan market. In particular, it is shown that banks affiliated with an MBHC make considerably more loan sales and loan purchases compared to stand-alone banks. Furthermore, compared to the net loan sales of stand-alone banks, the net loan sales of banks affiliated with an MBHC are significantly more responsive to their bank capital ratio. These findings suggest that it is the asymmetry of information in the secondary loan market that prevents stand-alone banks from participating in that market more actively, and, therefore, makes the loan "production" of stand-alone banks relatively more constrained by their capital. Internal secondary loan markets, however, allow the subsidiaries of an MBHC to

mitigate the asymmetric information problem, thus making it possible for less well capitalized subsidiaries of an MBHC to originate loans and sell them to other, better capitalized subsidiaries of their MBHC.

The next section provides some background in order to place the current study in the context of the existing literature. Section 3 contains a discussion of the data and provides some preliminary evidence in support of the main hypotheses of this study. Section 4 provides a more formal description of the hypotheses, empirical specifications and the variables used in the hypothesis tests. Section 5 contains the empirical results, and Section 6 concludes.

## **2. Background**

In a Modigliani and Miller (1958) world with frictionless capital markets, firms that have projects with a positive net present value should be able to raise capital in financial markets to finance those projects. In practice, however, the asymmetry of information between a firm and a potential provider of funds to that firm makes external finance costly to firms, thus inhibiting the efficiency of corporate investment (for example, Myers and Majluf 1984; Myers 1984; Greenwald, Stiglitz and Weiss 1984).

For a subsidiary of a conglomerate, financial constraints imposed by the frictions associated with external capital markets can be mitigated by the subsidiary's access to the internal capital market of the conglomerate with which it is affiliated. The argument put forth by Alchian (1969) and Weston (1970), and extended by Gertner, Scharfstein and Stein (1994), Li and Li (1996), and Stein (1997), among others, is that internal capital markets mitigate the asymmetric information problem, thus providing for a better allocation of funds within the conglomerate. An alternative argument, however, is that internal capital markets may reduce

investment efficiency. For example, Scharfstein and Stein (2000) and Rajan, Servaes and Zingales (2000) argue that agency conflicts between division managers and the chief executive officer (CEO), as well as between the CEO and shareholders, may hinder investment efficiency inside conglomerates. Whether internal capital markets actively operate and whether they allocate corporate resources to their best use have become important empirical issues.

Recent empirical research on the operation of internal capital markets in the nonfinancial sector, following Fazzari, Hubbard and Petersen (1988), has primarily focused on investigating the degree to which a subsidiary's investment is correlated with its cash flow and/or the cash flows of other subsidiaries of the conglomerate. For instance, Lamont (1997) shows that the investment of non-oil segments of a conglomerate decreased as a result of a decline in oil prices that reduced the cash flow of an oil extracting segment of the conglomerate. Shin and Stultz (1998) also find that investment by a segment of a diversified conglomerate depends significantly on the cash flow of the conglomerate's other segments.

The findings of these studies and other such studies, although interpreted by the authors as evidence supporting the existence of active internal capital markets, may have alternative interpretations. For instance, Chevalier (2004) suggests that Lamont's (1997) finding that investment by a non-oil segment of a conglomerate falls in response to a reduction in the cash flow of the oil-extracting segment may not necessarily reflect the working of internal capital markets, but rather reflect the responses of these seemingly unrelated segments to a common shock (e.g., unfavorable local economic conditions, if both segments have the same geographic location). Other criticisms of the investment-cash flow literature are more general. For example, Kaplan and Zingales (1997) question whether such correlations are valid indicators of financing constraints, while Poterba (1988) argues that the significance of cash flows may be due to

measurement error in average Tobin's Q, and Cooper and Ejarque (2003) argue that the correlation is driven primarily by market power. In addition, Erickson and Whited (2000) find that the significance of cash flows disappears with the use of measurement-consistent GMM estimators. Thus, to provide more convincing evidence for the operation of internal capital markets and to avoid the widespread criticisms of the investment-cash flow literature, it is important to go beyond such correlations and focus on the mechanisms through which funds are allocated among the subsidiaries of a conglomerate.

Studies of the operation of internal capital markets in the banking sector have adopted strategies similar to those used for nonfinancial firms. Treating bank loan growth as an analogue to investment by a nonfinancial firm, the banking studies have concentrated primarily on investigating loan growth-cash flow sensitivities of the subsidiaries of an MBHC. In particular, Houston, James and Marcus (1997) provide evidence that loan growth at subsidiary banks is sensitive to the holding company's cash flow and to the loan growth of other subsidiaries within the holding company. Houston and James (1998) find that loan growth of banks affiliated with an MBHC is less sensitive to the bank's cash flow, capital ratio and liquidity, and more sensitive to local economic conditions, compared to stand-alone banks. Campello (2002) shows that when monetary policy tightens, loan growth of stand-alone banks is more constrained by their cash flow compared to the loan growth of banks affiliated with multibank holding companies.

As is the case with the studies for nonfinancial firms, these findings provide only indirect evidence for the operation of internal capital markets in banking, and have credible alternative explanations. In particular, the evidence in each of these studies may be related to the degree to which banks are able to access *external* capital markets. For example, as shown by Holod and Peek (2004), banks in publicly traded banking organizations have better access to external funds

in the form of large time deposits compared with non-publicly traded banks. Among other things, this allows publicly traded banks to hold relatively less liquid assets and to better insulate their loan portfolios from the effects of a tightening of monetary policy. A problem with the Houston, James and Markus (1997) study is that their sample of MBHCs includes only publicly traded MBHCs. Thus, it is not possible to determine the extent to which their results reflect the easier access to external funds arising from their being relatively transparent due to their status as publicly traded banking organizations.

While Houston and James (1998) do compare banks affiliated with an MBHC to stand-alone banks, the comparison is flawed because the contrast is between banks affiliated with publicly traded MBHCs and stand-alone banks that are for the most part non-publicly traded. Thus, how can one determine whether the differences that they find are due to the access to internal capital markets from the bank being affiliated with an MBHC or due to the bank having superior access to external funds due to the bank being affiliated with a publicly traded banking organization?

Campello (2002) faces a similar problem, since he compares banks affiliated with an MBHC that are predominately publicly traded (see his Table VI) with stand-alone banks that are predominately non-publicly traded. This problem is compounded because the observed differences in behavior are associated with changes in monetary policy. As shown by Holod and Peek (2004), it is precisely the difference between being publicly traded and being non-publicly traded that determines the ease with which banks can insulate their loan portfolios from a tightening of monetary policy. Consequently, Campello's (2002) finding that the lending of banks affiliated with multibank holding companies is less constrained by their income than the lending of stand-alone banks may merely reflect that, on average, the former have better access

to external sources of funds, such as large time deposits, rather than to the operation of the internal capital markets of the MBHCs. Thus, while both Houston and James (1998) and Campello (2002) show that banks affiliated with MBHCs behave differently than stand-alone banks, we can not be certain that those differences are associated with the operation of internal capital markets and not due to differences in their access to external funds.

In addition, these studies do not recognize a special characteristic of the banking industry relative to the nonfinancial sector. In the nonfinancial sector, insofar as firms need physical capital in order to produce output, funds can be transferred internally among the subsidiaries in order to allow the pattern of investment across subsidiaries to differ from that of cash flows so that those subsidiaries with the best investment opportunities can increase productive capacity. In contrast, banks do not necessarily need additional (physical or financial) capital in order to “produce” additional loans. Banks that do not have excess capital that can support additional loans on their balance sheet can still “produce” (originate) loans and then sell those loans. This feature of the banking industry creates an additional mechanism (relative to nonfinancial conglomerates) for the operation of internal capital markets. Rather than moving capital from high capital-to-assets subsidiaries to low capital-to-assets subsidiaries, MBHCs can move loans (assets) from low capital-to-assets subsidiaries to high capital-to-assets subsidiaries; that is, a low capital subsidiary of an MBHC can originate loans and sell those loans, as well as previously originated loans already held in their portfolios, to its better capitalized affiliate bank subsidiaries. Thus, in the banking industry, not only can capital be shifted to subsidiaries with better production opportunities, but the production of the subsidiaries with the best opportunities can be shifted to the subsidiaries with the excess capital capacity. In this sense, the internal loan sales market may be viewed as an additional mechanism through which internal capital markets

operate in the banking industry, insofar as it redistributes assets among the MBHC bank subsidiaries in a way that better uses the total capital capacity of an MBHC.

Because this second mechanism has been overlooked in the literature investigating the operation of internal capital markets in the banking industry, finding that a change in bank loans outstanding (on-balance-sheet loans) is sensitive to bank cash flows does not necessarily mean that the “production” of bank loans is constrained by their cash flows. Investigating only loan growth-cash flow sensitivities of the subsidiaries of an MBHC, while ignoring the possibility of loan sales and purchases among the affiliates of the same MBHC, may produce results that are misleading, or at least difficult to interpret, about the extent to which internal capital markets within banking organizations operate.

Another issue is whether internal capital markets move funds in the “right” direction. A common strategy in the empirical literature is to identify “good” and “bad” subsidiaries to determine whether conglomerates allocate relatively more funds to “good” subsidiaries. However, a banking organization has an additional reason to reallocate capital among its bank subsidiaries: each individual bank subsidiary of an MBHC faces a regulatory capital-to-assets ratio requirement. As a result, an MBHC should be expected to distribute resources in such a way that *each* bank subsidiary meets its capital requirement. This feature of the banking industry, whereby funds should flow from better capitalized to more poorly capitalized subsidiaries, makes it possible to identify the potential recipients and donors of funds within a conglomerate more precisely than in previous studies of nonfinancial conglomerates, where studies such as Shin and Stulz (1998), Scharfstein (1998) and Rajan, Servaes and Zingales (2000) that have found evidence of the inefficiency of internal capital markets have come under

criticism for their use of Tobin's Q as the measure of a segment's investment opportunities (for example, Whited 2001 and Villalonga 2004).

Still, differences in loan origination opportunities likely influence the internal movement of funds within an MBHC. While studies of nonfinancial conglomerates that have segments in different industries typically use the industry Tobin's Q ratio to measure investment opportunities of a particular segment, this is not applicable to a study of the banking sector, since all the bank subsidiaries are in the same industry. Instead, a measure of local economic conditions can serve as a proxy for loan origination opportunities of a bank. However, given that during our sample period the majority of MBHCs have bank subsidiaries in only one state or in only a few neighboring states that have fluctuations in local economic activity that are highly correlated, it may be difficult to isolate meaningful differences in loan origination opportunities among the subsidiaries of a given MBHC. Therefore, for most MBHCs, differences in capital positions among their affiliates are likely to represent the primary motivation for the internal movement of funds.

This study also addresses the role of internal secondary loan markets in "helping" the subsidiaries of an MBHC overcome the asymmetric information problem between buyers and sellers in the external secondary loan market, and, as a result, mitigating financial constraints faced by the individual bank subsidiaries. This is done by comparing the patterns of loan sales and purchases of stand-alone banks with those of banks affiliated with an MBHC. Theories of financial intermediation (for example, Diamond 1984; Boyd and Prescott 1986) that emphasize the special role of banks in evaluating and monitoring borrowers suggest that banks would have less incentive to perform those special functions for loans that they intend to sell. This moral hazard problem, coupled with the asymmetry of information between loan sellers and loan

buyers, may create a “lemons” problem in the secondary loan market, thus making it more difficult for banks to sell loans to, and riskier for banks to buy loans from, unaffiliated entities.

However, the moral hazard and asymmetric information problems are mitigated considerably if loan sales transactions are between the affiliates of the same MBHC. Therefore, unlike a stand-alone bank that may face difficulty selling and buying loans, a bank affiliated with an MBHC will actively buy loans from, and sell loans to, its affiliate banks. Furthermore, net loan sales of a bank affiliated with an MBHC, insofar as they are less constrained by the lemons problem, are likely to be more responsive to the bank’s capital-to-assets ratio compared to net loan sales of a stand-alone bank. Facing a capital constraint on its on-balance-sheet loans, a low capital subsidiary of an MBHC still can originate loans and sell them to another, better capitalized subsidiary of the same MBHC, while a low capital stand-alone bank would have more difficulty selling its loans in the external secondary loan market. This study shows that banks affiliated with an MBHC buy and sell more loans than do stand-alone banks, and that net loan sales of a bank affiliated with an MBHC are more responsive to the bank’s capital-to-assets ratio compared to the net loan sales of a stand-alone bank.

### **3. Data and Preliminary Evidence**

The individual bank-level data are taken from the Consolidated Report of Condition and Income database (Call Reports). Variables measured at the bank holding company level are constructed by aggregating individual bank-level data for each MBHC.<sup>2</sup> The sample includes all FDIC-insured commercial banks. The data needed to construct the series for the capital

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<sup>2</sup> Rather than aggregating individual bank data, one may use financial statements filed by the Bank Holding Companies (FR-Y9 forms). Unfortunately, only MBHCs with assets above \$150 million file their financial statements on a consolidated basis. Therefore, by using consolidated financial statements, one would have to exclude the smallest MBHCs from the sample. Aggregating individual bank data for each MBHC, on the other hand, allows consideration of all MBHCs, including the smallest ones.

transactions between a subsidiary and its parent MBHC are available only on an annual basis, because small banks (with assets below \$100 million) with no foreign offices reported capital transactions with their parent MBHC only in their fourth quarter report prior to 2001:Q1.<sup>3</sup> Given the large number of small banks in the sample and their importance for analyzing the operation of internal capital markets, it is crucial to include these banks in the analysis. Therefore, rather than using quarterly data for large banks only, it was decided to use annual data for all banks. Our annual sample covers the period from 1987 to 2004.

Bank holding companies may pursue different strategies to allocate capital among their subsidiaries. They may have their undercapitalized subsidiaries pay smaller dividends, while having subsidiaries with higher capital ratios pay more. Alternatively, they may have the same dividend requirements for all of their subsidiaries, but downstream capital to the least capitalized subsidiaries and upstream capital from the better capitalized subsidiaries by means of capital sale, acquisition, or other transactions. Therefore, the variable indicating capital transactions of a bank with its parent MBHC (*CapTrans*) is constructed as a comprehensive measure of capital transfers between a bank and its parent MBHC. *CapTrans* is measured as the sum of dividends (with a negative sign), bank capital sale and acquisition, and other transactions with the parent MBHC not included in the first two items. A positive value of *CapTrans* is associated with a transfer of capital to a bank from its parent MBHC, while a negative value indicates a transfer from the bank subsidiary to its parent MBHC.

The data on bank loan sales and purchases are available on a quarterly basis. The loan sales item in the Call Reports includes loans originated by the reporting bank that have been sold

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<sup>3</sup> Prior to 2001:Q1, banks with no foreign offices were required to file different reports, depending on their asset size (FFIEC 034 for banks with assets below \$100 million, FFIEC 033 for banks with assets between \$100 million and \$300 million, and FFIEC 032 for banks with assets above \$300 million). For small banks filing the FFIEC 034 report, Schedule RI-A, which shows changes in equity capital, were reported only in the December report. Beginning in 2001:Q1, all banks without foreign offices, regardless of their asset size, file the same report – FFIEC 041. As a result, currently all banks report Schedule RI-A quarterly.

or participated to others during the calendar quarter, while the loan purchases item indicates the volume of loans purchased by the bank during the calendar quarter. Both items exclude loans secured by one-to-four family residential real estate and loans to individuals, two types of loans that are often packaged into marketable securities. Unfortunately, banks were required to report their loan sales and purchases only during the period from 1987:Q2 to 1993:Q4.

Credit card banks and banks that are not active in the loan market, defined as banks with a maximum loans-to-assets ratio less than 5 percent, are excluded from the sample. In addition, *de novo* bank observations are eliminated by omitting the first eight quarters of a bank's life. The sample excludes foreign-owned banks, as well as banks located outside the continental United States. To avoid discrete jumps in the values of the variables associated with bank mergers, the bank-quarter observations in which a merger occurs, as well as the observations for the subsequent quarter of adjustment to the merger, are removed from the sample. Finally, the sample excludes observations with extreme values (outliers), defined as observations with values for the dependent and independent variables that deviate by more than four standard deviations from the variable's mean value. After applying these filters, the sample based on annual observations used to investigate the determinants of capital transfers within MBHCs includes a total of 42,667 observations, while the quarterly sample used to investigate the determinants of net loan sales includes 90,315 observations for banks affiliated with MBHCs, and a total of 296,266 observations when stand-alone banks are included.

Using the annual data for banks affiliated with an MBHC, the top panel of Table 1 shows the sample mean values of capital transfers (components and total) between a bank and its parent MBHC for three categories of banks based on their capital-to-assets ratio. The lower panel of Table 1, using the quarterly data for banks affiliated with an MBHC, shows the sample mean

values of bank loan sales, loan purchases, and net loan sales, defined as the difference between loan sales and loan purchases. All items in Table 1 are scaled by the value of bank assets in the previous period to make them comparable.

As revealed by Table 1, banks with high capital ratios tend to upstream more funds to their parent MBHC, compared to banks with low capital ratios. In particular, higher capital subsidiaries pay considerably more dividends to their parent MBHC, and lower capital subsidiaries receive relatively more capital through capital sale and acquisition and other transactions with their parent holding company. These patterns are consistent with the hypothesis that the internal movement of funds within banking organizations is driven by individual bank capital requirements. Thus, Table 1 provides evidence consistent with a functioning internal capital market within MBHCs, suggesting that MBHCs do move capital among their subsidiaries based on differing capital positions.

The patterns of loan sales, loan purchases, and net loan sales of the subsidiaries of an MBHC are consistent with the hypothesis that MBHCs use loan sales and purchases among their subsidiaries as an additional mechanism for the internal allocation of funds. As one can see from Table 1, lower capital banks sell more, and buy fewer, loans than do higher capital banks. Furthermore, banks with a capital-to-assets ratio below 6 percent appear to be net loan sellers, while banks with a capital-to-assets ratio above 9 percent are net loan buyers. Banks with a capital-to-assets ratio between 6 and 9 percent have a net loan sales-to-assets ratio close to zero. These patterns are consistent with the hypothesis that the low capital subsidiaries of an MBHC sell loans to the higher capital subsidiaries of its MBHC. Note, however, that loan sales and purchases reported by banks do not distinguish between loan sales and purchases made between affiliates of the same MBHC and those conducted with counterparties external to the MBHC.

Therefore, one might argue that the patterns observed in Table 1 may not necessarily indicate loan selling and buying *between* the high capital and low capital subsidiaries of the same MBHC, but rather indicate that low capital subsidiaries of an MBHC sell loans in the external loan market, while high capital subsidiaries buy loans in the external loan market. This issue will be addressed later.

One might argue that it is a bank's capital position *relative* to the average capital position of the other affiliates of its MBHC that matters, not just the bank's absolute capital ratio. Indeed, if all of the subsidiaries have approximately the same capital-to-assets ratio, regardless of the value of that ratio, there may be little need for a reallocation of funds within the MBHC. Thus, in Table 2, we group banks on the basis of the *deviation* of the bank's capital ratio from the average capital ratio of the remaining bank subsidiaries of its parent MBHC.

The patterns observed in Table 2 are similar to those in Table 1, indicating that MBHCs use both capital transfers and loan sales mechanisms to manage within-MBHC capital allocation. Comparing two banks at the ends of the relative capital ratio distribution, one can see that the difference in capital transfers between the least capitalized banks (banks with a deviation of their capital ratio from the MBHC average below -3 percentage points) and the best capitalized banks (with a deviation above 3 percentage points) is 0.65 percentage points (-0.28-(-0.93)). The difference in net loan sales between these two sets of banks is 0.53 percentage points (0.34-(-0.19)).

As was mentioned in the previous section, the asymmetry of information between loan sellers and buyers in the external secondary loan market, and the resulting "lemons" problem, should make it difficult for stand-alone banks to actively participate in that market. In contrast, access to the internal loan market of its parent MBHC should allow a subsidiary of an MBHC to

avoid the asymmetric information problem associated with buying and selling loans in the external secondary loan market, thus providing a substantial advantage to a subsidiary of an MBHC compared to a stand-alone bank in terms of its ability to sell and buy loans. Table 3 shows that this is the case. Using quarterly data, the table shows the mean values of loan sales, loan purchases, and net loan sales, each scaled by bank assets, for stand-alone banks, banks affiliated with an MBHC, and for MBHCs (aggregated across their bank subsidiaries).<sup>4</sup> Both banks and MBHCs are grouped into size categories.

Table 3 shows that banks affiliated with an MBHC make more loan sales and more loan purchases compared to stand-alone banks in each bank size category. This provides clear evidence that banks affiliated with an MBHC participate more actively in the secondary loan market compared to stand-alone banks. Interestingly, when loan sales and loan purchases are aggregated across banks for each MBHC, MBHC net loan sales and loan purchases are small relative to the total loan sales of the MBHC's banks, suggesting that most loan sales and purchases made by banks affiliated with an MBHC are made between the affiliates of the same MBHC. The exception is for banks in the largest size class, those with assets in excess of 5 billion constant (1983) dollars. These largest banks are considerably more active in the secondary loan market, especially on the loan sales side. They are much more likely to originate large loans and participate them out to smaller banks and to nonbank loan buyers. For such banks, loan sales activity is a line of business and is unlikely to be driven by the operation of internal capital markets. This makes the loan sales and purchases observations for such very large banks irrelevant for the analysis of internal capital markets.

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<sup>4</sup> Stand-alone banks include banks that are not affiliated with a bank holding company, as well as banks that are affiliated with a one-bank holding company.

Table 4 provides further evidence that it is access to the internal loan market of an MBHC, not better access to the external secondary loan market that explains the sharp differences in the patterns of loan sales and purchases between banks affiliated with an MBHC and stand-alone banks. In particular, Table 4 groups banks affiliated with a MBHC into two categories: banks affiliated with a publicly traded MBHC and banks affiliated with a non-publicly traded MBHC. If it is access to the external rather than internal secondary loan market that explains the more active participation of the subsidiaries of an MBHC in the secondary loan market, one would expect the subsidiaries of a publicly traded MBHC to participate in the secondary loan market much more actively compared to the subsidiaries of a non-publicly traded MBHC, since the former are less informationally problematic due to their relatively greater transparency.<sup>5</sup>

Table 4 shows that banks affiliated with a non-publicly traded MBHC tend to be more active sellers of loans in the secondary loan market than are banks affiliated with a publicly traded MBHC. In fact, for most size categories they buy and sell *more* loans than do banks affiliated with a publicly traded MBHC. This finding, coupled with the fact that both banks affiliated with a publicly traded MBHC and those affiliated with a non-publicly traded MBHC are considerably more active in the secondary loan market (compare Tables 3 and 4) than are stand-alone banks, suggests that it is access to the *internal* loan market of an MBHC that explains the differences in the patterns of loan sales and purchases between banks affiliated with an MBHC and stand-alone banks. The finding that banks affiliated with an MBHC participate more actively in the secondary loan market compared to stand-alone banks underscores the

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<sup>5</sup> Holod and Peek (2004) provide evidence that banks affiliated with a publicly traded MBHC have better access to external sources of funds, such as large time deposits, compared to banks affiliated with a non-publicly traded MBHC.

important role of internal secondary loan markets in “helping” the subsidiaries mitigate the asymmetric information problems between loan sellers and loan buyers.

This raises the question of whether access to the internal loan market mitigates the capital constraint on the subsidiary’s loan originations. If so, one would expect the relationship between a bank’s capital ratio and its net loan sales to be stronger for a subsidiary of an MBHC compared to a stand-alone bank. To address this question, Table 5 shows loan sales, loan purchases, and net loan sales for stand-alone banks and for banks affiliated with an MBHC, categorized by bank capital ratios. As revealed by the table, the strongest relationship between the capital ratio and net loan sales is observed for banks affiliated with an MBHC. Low capital banks affiliated with an MBHC are clearly net loan sellers, while high capital banks are net loan buyers. Banks in the medium capital group have a net loan sales ratio close to zero. In contrast to banks affiliated with an MBHC, stand-alone banks exhibit a considerably weaker relationship between their capital position and net loan sales. These patterns are consistent with the hypothesis that by having access to the internal loan market of their parent MBHCs, the low capital subsidiaries are able to originate loans and sell them to their higher capital affiliates, thus mitigating any capital constraint on their loan “production” (origination).

To summarize, the preliminary evidence suggests that MBHCs do move funds among their subsidiaries with differing capital-to-assets ratios. Not only do they move capital from better capitalized to less well capitalized subsidiaries, but they also use loan sales and loan purchases between their bank subsidiaries as a tool for moving loans from less capitalized to better capitalized subsidiaries. Furthermore, banks affiliated with an MBHC participate more actively in the secondary loan market, and their net loan sales are more strongly related to their capital ratios, compared to stand-alone banks. These observations reflect the better ability of

individual banks affiliated with an MBHC to mitigate the asymmetric information problems in the secondary loan market by having access to the internal loan market of their parent MBHC.

The subsequent sections focus on more formal tests of the main hypotheses of this study.

#### 4. Specifications and Hypotheses

The discussion in the previous sections can be formalized into three sets of testable hypotheses based on three equation specifications:

$$\begin{aligned} CapTrans_{it} = & \phi_i + \rho_t + \alpha_1(CapitalRatio_{it-1})_{Bank} + \alpha_2(CapitalRatio_{it-1})_{RestBHC} + \alpha_3(LRAssets_{it-1})_{Bank} \\ & + \alpha_4(LRAssets_{it-1})_{BHC} + \alpha_5(NPL_{it-1})_{Bank} + \alpha_6(NPL_{it-1})_{RestBHC} + \alpha_7(ROE_{it-1})_{Bank} + \alpha_8(ROE_{it-1})_{RestBHC} \\ & + \alpha_9(GSEmpl_{it-1})_{Bank} + \alpha_{10}(GSEmpl_{it-1})_{RestBHC} + \varepsilon_{it} \end{aligned} \quad (1)$$

$$\begin{aligned} NetLoanSales_{it} = & \theta_i + \omega_t + \beta_1(CapitalRatio_{it-1})_{Bank} + \beta_2(CapitalRatio_{it-1})_{RestBHC} + \beta_3(LRAssets_{it-1})_{Bank} \\ & + \beta_4(LRAssets_{it-1})_{BHC} + \beta_5(NPL_{it-1})_{Bank} + \beta_6(NPL_{it-1})_{RestBHC} + \beta_7(ROE_{it-1})_{Bank} + \beta_8(ROE_{it-1})_{RestBHC} \\ & + \beta_9(GSEmpl_{it-1})_{Bank} + \beta_{10}(GSEmpl_{it-1})_{RestBHC} + \sigma_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} NetLoanSales_{it} = & \mu_i + \kappa_t + \gamma_1 CapitalRatio_{it-1} + \gamma_2 LRAssets_{it-1} + \gamma_3 NPL_{it-1} + \gamma_4 ROE_{it-1} + \gamma_5 GSEmpl_{it-1} \\ & + MBHC_{it}(\nu + \delta_1 CapitalRatio_{it-1} + \delta_2 LRAssets_{it-1} + \delta_3 NPL_{it-1} + \delta_4 ROE_{it-1} + \delta_5 GSEmpl_{it-1}) + \tau_{it} \end{aligned} \quad (3)$$

The first two specifications are used to investigate the movement of funds within an MBHC, and, therefore, are estimated for the sample of banks affiliated with an MBHC. While the first specification uses annual data for the period 1987 to 2004, the second specification is estimated using quarterly data for the period 1987:Q2 to 1993:Q4. The third specification uses quarterly data for the period 1987:Q2 to 1993:Q4 to compare banks affiliated with an MBHC and stand-alone banks.

The first set of hypotheses, associated with equation (1), concern the movement of capital within an MBHC. The first hypothesis is that MBHCs move capital from better capitalized to less well capitalized subsidiaries in order to satisfy regulatory capital requirements. The second hypothesis is that MBHCs move capital from bank subsidiaries with weaker loan growth

opportunities to those with better opportunities. The second set of hypotheses, associated with equation (2), is related to those for capital transfers and concerns the net loan sales of banks affiliated with MBHCs. We hypothesize that MBHCs move loans from less well capitalized to better capitalized subsidiaries, and from bank subsidiaries with better loan origination opportunities to those with poorer opportunities.

The third set of hypotheses, associated with equation (3), concern differences in the behavior of banks affiliated with MBHCs from that of stand-alone banks with respect to net loan sales. We hypothesize that access to the internal loan market of a parent MBHC mitigates any capital constraint on a subsidiary's loan originations. Thus, net loan sales of a bank affiliated with an MBHC should be more responsive to a bank's capital-to-assets ratio compared to net loan sales of a stand-alone bank.

The dependent variable in specification (1) is the amount of capital transfers between a bank and its parent MBHC, scaled by the bank's previous period assets. As was described in the previous section, this variable includes dividends (with a negative sign), bank capital sale and acquisition, and other transactions with the parent MBHC not included in the first two items. The equation includes two pairs of explanatory variables related to an MBHC's need to transfer capital among its subsidiaries to satisfy regulatory capital requirements. First, one would expect a subsidiary's capital transfer from its parent MBHC to be negatively related to the subsidiary's (end of previous period) capital-to-assets ratio and positively related to the capital-to-assets ratio of the remaining subsidiaries of its MBHC.<sup>6</sup> By including not only the bank's capital-to-assets ratio, but also that for the (aggregated) other affiliated subsidiaries, we capture the relative need for, as well as the ability to provide, additional capital for the bank compared to that for the other

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<sup>6</sup> We use the (unweighted) leverage capital ratio rather than the risk-based capital ratio. The risk-based capital ratio is not available for much of our sample period, and it is important to measure the capital ratio consistently across time.

subsidiaries of its MBHC. Similarly, the nonperforming loans ratio (NPL), measured as nonperforming loans scaled by assets, is another measure of the need for additional capital. Insofar as nonperforming loans indicate a need to reserve for, and eventually charge off, problem loans, a higher nonperforming loans ratio indicates a greater need for capital, other things equal. Thus, we expect the bank NPL to have a positive estimated coefficient and the rest-of-MBHC NPL to have a negative coefficient.

Capital transfers should also depend on the loan growth opportunities of a bank relative to those of the other banks affiliated with its MBHC. We use two measures of a bank's loan growth opportunities. The first is the lagged value of state employment growth (*GSEmpl*) for the state in which the bank is headquartered. This variable controls for the bank's local loan origination opportunities. The corresponding measure for the rest of the MBHC is constructed as a weighted average of those for the other subsidiaries in the bank's MBHC. However, since the majority of the MBHCs in the sample are one-state MBHCs, and even for those operating in multiple states typically have most of their operations in neighboring states for which state economic conditions are highly correlated, it may be difficult to capture adequately any variation in local bank loan origination opportunities.

The second measure of a bank's loan growth opportunities is the lagged value of a bank's return on equity (*ROE*), which should reflect the profitability of loan originations by the bank. That for the rest of the MBHC is constructed as a weighted average of those for the other subsidiaries in the bank's MBHC. A high ROE may reflect either strong local loan demand or a competitive advantage in the local loan market relative to its competitors, due either to local market power or to the bank's expertise in evaluating loan applications and the subsequent monitoring of borrowers. We expect the bank's employment growth to have a positive

coefficient and the rest-of-MBHC employment growth to have a negative coefficient. However, the expected signs for the ROE coefficients are ambiguous. While one might expect capital transfers in the direction of high ROE banks, the fact that ROE contributes to a bank's retained earnings, and thus to additions to the bank's capital, means that the MBHC may not need to transfer additional capital to the bank over and above its retained earnings. In fact, if retained earnings are in excess of the capital needs of the bank, the bank could be a net provider of capital to the other subsidiaries of its MBHC.

We also include the value of the logarithm of bank assets in constant 1983 dollars (*LRAssets*) in the previous period to control for the effect of bank size on a bank's capital transfer, and the logarithm of MBHC bank assets in constant 1983 dollars in the previous period to control for the size of the entire banking organization. While we have no a priori expectations about the signs of the coefficients on these two variables, one might argue that the smaller is the bank and the larger is its MBHC, the easier it is to make the necessary capital transfers (measured relative to the bank's assets), since it would require fewer dollars of capital for a smaller bank. Finally, the equation includes time fixed effects to control for the macroeconomic environment and random (bank) effects. The Hausman test did not reject the hypothesis of no systematic difference between the parameters estimated using bank fixed-effects and bank random-effects models. The estimated coefficients from the bank random-effects model are presented in the tables, since that model produces more efficient estimates of the parameters than does the fixed-effects model.

The dependent variable in equation (2) is the amount of net loan sales made by a bank in a particular quarter, scaled by the bank's previous quarter assets. This equation includes the same set of explanatory variables as equation (1) and the explanations for the expected signs on

the estimated coefficients parallel those for capital transfers. For example, we expect the bank's capital ratio to have a negative coefficient and the capital ratio of the remaining (aggregated) subsidiaries to have a positive coefficient. As with equation (1), this equation includes both time fixed effects and random (bank) effects.

The dependent variable in specification (3) is the amount of net loan sales made by a bank in a particular quarter, scaled by the bank's assets in the previous quarter. In this specification, a bank's previous period capital-to-assets ratio, as well as the other control variables, are interacted with *MBHC*, a (0, 1) dummy variable that takes a value of one if a bank is affiliated with an MBHC, and zero otherwise. The effect of the capital ratio on net loan sales is expected to be negative for both stand-alone banks and banks affiliated with an MBHC. However, net loan sales of a bank affiliated with an MBHC should be more responsive to the bank's capital ratio. In terms of the coefficients in equation (3), in addition to  $\gamma_1$  being negative, the differential effect,  $\delta_I$ , also is expected to be negative. The equation also includes the measures for bank size, the nonperforming loans ratio, ROE, and the growth rate of employment for the state in which the bank is headquartered. The equation includes both time fixed effects and random (bank) effects.

## **5. Empirical Results**

The results of estimating equation (1), shown in Table 6, provide strong evidence in support of the operation of internal capital markets within MBHCs. As expected, the evidence indicates that MBHCs respond to regulatory capital requirements for their individual bank subsidiaries by transferring capital from those subsidiaries with more abundant capital to those with a greater need for additional capital. First, a subsidiary's capital transfers are negatively

related to the subsidiary's capital ratio and positively related to the average capital ratio of the remaining bank subsidiaries of its parent MBHC. Second, a bank having a higher nonperforming loans ratio, indicating a potential need for additional capital to resolve problem loans, is associated with more capital transfers, while a higher nonperforming loans ratio for the other subsidiaries of the bank's MBHC is associated with smaller capital transfers to the bank.

The results also provide support for the hypothesis that MBHCs allocate additional capital to those bank subsidiaries with the best loan growth opportunities. As expected, faster employment growth in the state in which the bank is headquartered increases capital transfers to the bank, while faster employment growth in the states in which the other subsidiaries of the bank's MBHC are located decreases capital transfers to the bank. Thus, insofar as stronger economic activity strengthens local loan demand and enhances lending opportunities for the bank, the MBHC responds by allocating additional capital to support loan growth. At the same time, better lending opportunities for the other banks affiliated with the bank's MBHC result in less capital transfers to the bank.

The negative estimated coefficient on the bank's return on equity indicates that better performance by a bank results in smaller capital transfers. This result may be counterintuitive to the extent that a higher ROE indicates that the bank has either better lending opportunities, better than average expertise in evaluating loan applications and monitoring borrowers, or both. However, one must be careful in interpreting this result. While one might conclude that capital is being transferred to subsidize poorly performing subsidiaries, harming the efficiency of the conglomerate, it may simply be that the increased retained earnings associated with a higher ROE provides more than the necessary additional capital to the bank. In that case, the bank would have excess capital that can be redistributed to the other subsidiaries of its MBHC.

Finally, bank size has a negative estimated coefficient. While we did not have a strong prior expectation about the sign of this coefficient, this result is consistent with smaller banks receiving larger capital transfers relative to the size of their assets, other things equal, because the smaller size means that fewer dollars of capital will need to be transferred to have a given effect on the bank's capital-to-assets ratio. Thus, capital transfers to a smaller bank impose a smaller burden on the MBHC than is the case for a larger bank. In fact, as a given bank accounts for a larger and larger share of the MBHC's assets, it becomes increasingly difficult for the remaining (much smaller) subsidiaries to meet any additional capital requirements of the large subsidiary.

Table 7 contains the results from estimating equation (2). This evidence suggests that, unlike manufacturing conglomerates that rely only on capital transfers to reallocate funds among their subsidiaries, MBHCs actively use the second distinct mechanism of net loan sales to shift funds among their bank subsidiaries in order to more efficiently use the MBHC's overall capital capacity. We show two sets of results. The first column contains the results for all of the banks affiliated with an MBHC. The second column includes only those banks with assets below 5 billion 1983 dollars. We prefer these latter results, since loan sales (and thus net loan sales) at the largest banks are dominated by loan sales being a line of business rather than by considerations associated with reallocating funds within the MBHC (see Table 3). In fact, a comparison of the two columns indicates that the primary difference in the corresponding coefficient estimates is for bank size, consistent with the largest banks being much more active as net loan sellers. Thus, we focus only on the results that omit the largest banks for the remainder of the study.

Consistent with MBHCs reallocating funds in order to meet regulatory capital requirements at the individual bank subsidiary level, a lower bank capital ratio results in more net loan sales in order to reduce the bank's assets, and thus its capital-to-assets ratio. At the same time, if the other subsidiaries of the bank's MBHC have higher capital ratios, net loan sales of the bank increase, presumably because the bank's affiliates have more capital capacity available for supporting a larger loan portfolio. Similarly, a larger nonperforming loans ratio increases the bank's net loan sales, freeing up some of its capital capacity to be used to make the loan loss provisions needed to resolve the problem loans.

The results indicate that a higher ROE induces a bank to make more net loan sales. This is consistent with a high ROE indicating that a bank has good lending opportunities and has superior expertise in evaluating loan applications. Thus, such a bank might be expected to originate more loans than can be carried by its capital capacity and then selling many of those loans in the secondary loan market. We do not find significant effects on net loan sales from either measure of employment growth.

The results for equation (3) investigating differences in net loan sales behavior between banks affiliated with an MBHC and stand-alone banks are shown in Table 8. As expected, the capital ratio has a negative effect on net loan sales for both stand-alone banks and banks affiliated with an MBHC. More importantly, the effect of the capital ratio on the net loan sales of banks affiliated with an MBHC is almost three times as large (in absolute value) as that of stand-alone banks, and the difference ( $\delta_l$  in equation 3) is negative and statistically significant, as expected. These results provide strong support for the hypothesis that access to the internal loan market of an MBHC allows relatively poorly capitalized subsidiaries to improve their capital ratio by selling loans to other subsidiaries within the same MBHC, while allowing better

capitalized subsidiaries to utilize their excess capital capacity by buying loans from their less well capitalized affiliates. This finding stresses the role of internal secondary loan markets in helping the bank subsidiaries avoid the asymmetric information problems faced by loan sellers and loan buyers in the external secondary loan market, and, as a consequence, mitigating any capital constraint on a subsidiary's loan originations.

One might argue that the finding that the response of net loan sales to bank capital is stronger for banks affiliated with an MBHC, compared to stand-alone banks, may not necessarily imply that the former buy and sell loans in their internal (within MBHC) loan market. It is possible that being affiliated with an MBHC somehow helps the affiliates buy and sell loans in the external secondary loan market, perhaps due to some reputational effect of the MBHC. To address this concern, MBHC net loan sales (aggregated across its bank subsidiaries) are regressed on the same set of explanatory variables defined at the MBHC level rather than at the bank level. If subsidiaries of an MBHC primarily buy and sell loans in the internal loan market of their MBHC, the aggregated net loan sales of the MBHC should not respond to the MBHC's capital ratio as much as the net loan sales of the individual subsidiaries, and should have a response similar to that for the net loan sales of a stand-alone bank.

The results for aggregated MBHC net loan sales are shown in Table 9. Comparing the results in Table 9 to those in Table 8, one can see that the reaction of the net loan sales of an MBHC to its capital ratio lies between that for a subsidiary of an MBHC and that for a stand-alone bank. The estimated effect for the MBHC is slightly more than one-half that for bank subsidiaries and is closer in magnitude to that for stand-alone banks. This suggests that the earlier results are associated with banks affiliated with an MBHC benefiting from their access to the internal, not external, secondary loan market.

To provide further evidence that it is access to the internal loan market of their parent MBHCs that mitigates capital constraints on the loan originations of the subsidiaries of an MBHC, we re-estimate equation (3) for the subsample of non-publicly traded banks. If the observed difference in the sensitivity of net loan sales to the capital-to-assets ratio between stand-alone banks and banks affiliated with an MBHC is due only to better access of the latter to the external secondary loan market, that difference should disappear once the sample is restricted to the relatively more opaque, non-publicly traded banks. The results are shown in Table 10. Even for this subsample of banks affiliated with non-publicly traded banking organizations, the effect of the capital ratio on the net loan sales of banks affiliated with an MBHC is still more than twice as large (in absolute value) as that of stand-alone banks, and the difference remains statistically significant. These findings provide additional evidence that access to the internal loan market of an MBHC mitigates any capital constraints on loan originations of the MBHC's subsidiaries.

## **6. Conclusion**

By investigating the *mechanisms* underlying capital allocation within banking organizations, this study provides more convincing evidence that internal capital markets are operative within banking organizations and that they are used to mitigate financial constraints faced by their bank subsidiaries. Recognizing that differences in the capital positions among its subsidiaries may generate incentives for internal capital management within an MBHC, this study shows that MBHCs do move funds among their subsidiaries in response to differing capital ratios, differing needs for additional capital, and differing loan growth opportunities.

Importantly, this study shows that internal capital management within an MBHC involves not only the movement of capital from better capitalized to less well capitalized subsidiaries, but also the movement of assets (loans) from less capitalized to better capitalized subsidiaries by means of loan sales and purchases among the subsidiaries of an MBHC. This second mechanism has been overlooked in the existing literature on the operation of internal capital markets within banking organizations. Ignoring this mechanism may seriously understate the volume of activity in the internal capital markets within banking organizations.

This study also provides new evidence on the role of internal secondary loan markets in helping the subsidiaries of an MBHC to avoid the asymmetric information problems faced by participants in the external secondary loan market, and, as a result, mitigating the financial constraints faced by the subsidiaries. It is shown that having access to the internal loan market of their parent MBHCs, the subsidiaries of MBHCs buy and sell more loans than stand-alone banks, which face a “lemons” problem associated with buying and selling loans in the external secondary loan market. Furthermore, it is shown that net loan sales of a bank affiliated with an MBHC are more responsive to the bank’s capital-to-assets ratio compared to the net loan sales of a stand-alone bank, and that this difference is not due to differences in transparency (and thus access to external capital markets) associated with being publicly traded. This finding suggests that access to the internal loan market of its MBHC mitigates the capital constraint on a subsidiary’s loan originations.

**Table 1. Capital transfers and net loan sales of bank subsidiaries with differing capital ratios**  
**Banks affiliated with an MBHC**  
**Mean values measured as a percent of assets**

	Capital-to-Assets Ratio (end of previous period, percent)		
	<6	6-9	>9
<i>Annually, 1987-2004</i>			
Number of observations	3,169	25,175	14,323
Dividends	0.32	0.68	0.93
Capital Sale & Acq.	0.06	0.02	0.00
Other trans. with HC	0.34	0.08	0.03
<b>Cap. trans. with HC</b>	<b>0.08</b>	<b>-0.59</b>	<b>-0.89</b>
<i>Quarterly, 1987:Q2-1993:Q4</i>			
Number of observations	10,495	57,841	21,979
Loan Sales	1.00	0.71	0.62
Loan Purchases	0.66	0.68	0.73
<b>Net Loan Sales</b>	<b>0.34</b>	<b>0.03</b>	<b>-0.11</b>

**Table 2. Capital transfers and net loan sales of bank subsidiaries, grouped by relative capital ratios**  
**Banks affiliated with an MBHC**  
**Mean values measured as a percent of assets**

	Deviation from the rest-of-MBHC Capital-to-Assets Ratio (end of previous period, percentage points)						
	<-3	Between -3 and -2	Between -2 and -1	Between -1 and 1	Between 1 and 2	Between 2 and 3	>3
<i>Annually, 1987-2004</i>							
Number of observations	2,211	2,407	5,503	21,040	5,418	2,650	3,438
Dividends	0.52	0.55	0.60	0.73	0.85	0.92	0.98
Capital Sale & Acq.	0.06	0.04	0.02	0.01	0.00	0.00	0.00
Other trans. with HC	0.18	0.14	0.12	0.08	0.04	0.04	0.05
<b>Cap. trans. with HC</b>	<b>-0.28</b>	<b>-0.37</b>	<b>-0.45</b>	<b>-0.64</b>	<b>-0.81</b>	<b>-0.87</b>	<b>-0.93</b>
<i>Quarterly, 1987:Q2-1993:Q4</i>							
Number of observations	3,348	4,068	10,520	47,845	12,341	5,691	6,502
Loan Sales	0.88	0.79	0.86	0.73	0.64	0.61	0.60
Loan Purchases	0.53	0.57	0.64	0.69	0.75	0.73	0.80
<b>Net Loan Sales</b>	<b>0.34</b>	<b>0.22</b>	<b>0.22</b>	<b>0.04</b>	<b>-0.10</b>	<b>-0.12</b>	<b>-0.19</b>

**Table 3. Loan sales and loan purchases, grouped by bank type and bank (or MBHC) size**  
**Mean values measured as a percent of assets for the 1987:Q2 to 1993:Q4 period**

	Assets (1983 \$ millions)						
	<25	25-50	50-100	100-500	500-1,000	1,000-5,000	>5,000
	Stand-alone banks						
Number of observations	89,218	59,676	37,921	20,033	903	671	10
Loan Sales	0.54	0.38	0.35	0.39	0.24	0.30	0.55
Loan Purchases	0.33	0.25	0.19	0.19	0.19	0.30	0.08
Net Loan Sales	0.21	0.13	0.16	0.20	0.05	0.00	0.47
	Banks affiliated with an MBHC						
Number of observations	21,230	21,519	19,730	20,875	2,786	3,151	1,024
Loan Sales	0.92	0.67	0.62	0.60	0.67	0.80	2.17
Loan Purchases	1.01	0.68	0.56	0.50	0.52	0.77	0.78
Net Loan Sales	-0.09	-0.01	0.06	0.10	0.15	0.03	1.39
	MBHCs (aggregated across their bank subsidiaries)						
Number of observations	862	2,459	5,063	7,701	1,495	1,890	1,160
Loan Sales	1.43	0.93	0.68	0.69	0.71	0.69	1.79
Loan Purchases	1.17	0.85	0.62	0.59	0.49	0.61	0.75
Net Loan Sales	0.26	0.08	0.06	0.11	0.22	0.08	1.04

**Table 4. Loan sales and loan purchases of banks affiliated with publicly traded and non-publicly traded MBHCs, grouped by bank size**  
**Mean values measured as a percent of assets for the 1987:Q2 to 1993:Q4 period**

	Assets (1983 \$ millions)				
	<25	25-50	50-100	100-500	>500
	Banks affiliated with publicly traded MBHCs				
Number of observations	3,278	7,966	10,833	15,497	6,505
Loan Sales	0.84	0.58	0.59	0.62	0.94
Loan Purchases	0.82	0.62	0.57	0.48	0.66
Net Loan Sales	0.02	-0.03	0.02	0.14	0.28
	Banks affiliated with non-publicly traded MBHCs				
Number of observations	17,952	13,553	8,897	5,378	456
Loan Sales	0.94	0.71	0.65	0.52	1.04
Loan Purchases	1.05	0.72	0.55	0.56	0.82
Net Loan Sales	-0.11	-0.01	0.10	-0.04	0.22

**Table 5. Loan sales and loan purchases of banks with differing capital ratios, categorized by bank type**  
**Mean values measured as a percent of assets for the 1987:Q2 to 1993:Q4 period**

	Capital-to-Assets Ratio (end of previous period, percent)		
	<6	6-9	>9
	Stand-alone banks		
Number of observations	17,521	100,087	90,824
Loan Sales	0.58	0.51	0.35
Loan Purchases	0.31	0.30	0.23
Net Loan Sales	0.27	0.21	0.12
	Banks affiliated with an MBHC		
Number of observations	10,495	57,841	21,979
Loan Sales	1.00	0.71	0.62
Loan Purchases	0.66	0.68	0.73
Net Loan Sales	0.34	0.03	-0.11

**Table 6. Determinants of capital transfers  
Banks affiliated with an MBHC  
Annual observations, 1987 to 2004**

	CapTrans <sub>it</sub> /Assets <sub>it-1</sub>
(CapitalRatio <sub>it-1</sub> ) <sub>Bank</sub>	-0.1444** (0.00)
(CapitalRatio <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0274** (0.00)
(LRAssets <sub>it-1</sub> ) <sub>Bank</sub>	-0.0894** (0.00)
(LRAssets <sub>it-1</sub> ) <sub>BHC</sub>	0.0105 (0.06)
(NPL <sub>it-1</sub> ) <sub>Bank</sub>	0.0429** (0.00)
(NPL <sub>it-1</sub> ) <sub>RestBHC</sub>	-0.0144* (0.02)
(ROE <sub>it-1</sub> ) <sub>Bank</sub>	-0.0180** (0.00)
(ROE <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0006 (0.31)
(GSEmpl <sub>it-1</sub> ) <sub>Bank</sub>	0.0146** (0.01)
(GSEmpl <sub>it-1</sub> ) <sub>RestBHC</sub>	-0.0289** (0.00)
$R^2$	0.1601
Observations	42,667

Notes:  $p$  – values are shown in parentheses  
 \* indicates significance at the 5 percent level  
 \*\* indicates significance at the 1 percent level

**Table 7. Determinants of net loan sales**  
**Banks affiliated with an MBHC**  
**Quarterly observations, 1987:Q2 to 1993:Q4**

	NetLoanSales <sub>it</sub> /Assets <sub>it-1</sub>	
	All banks	Banks with assets < \$5 billion
(CapitalRatio <sub>it-1</sub> ) <sub>Bank</sub>	-0.0542** (0.00)	-0.0549** (0.00)
(CapitalRatio <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0235** (0.00)	0.0215** (0.00)
(LRAssets <sub>it-1</sub> ) <sub>Bank</sub>	0.0595** (0.00)	0.0057 (0.74)
(LRAssets <sub>it-1</sub> ) <sub>BHC</sub>	-0.0022 (0.81)	0.0010 (0.91)
(NPL <sub>it-1</sub> ) <sub>Bank</sub>	0.0205** (0.00)	0.0162* (0.03)
(NPL <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0086 (0.28)	0.0128 (0.12)
(ROE <sub>it-1</sub> ) <sub>Bank</sub>	0.0031* (0.03)	0.0035** (0.01)
(ROE <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0007 (0.65)	0.0004 (0.81)
(GSEmpl <sub>it-1</sub> ) <sub>Bank</sub>	-0.0305 (0.23)	-0.0099 (0.69)
(GSEmpl <sub>it-1</sub> ) <sub>RestBHC</sub>	0.0174 (0.60)	-0.0090 (0.78)
$R^2$	0.0092	0.0053
Observations	90,315	87,988

Notes:  $p$  – values are shown in parentheses  
\* indicates significance at the 5 percent level  
\*\* indicates significance at the 1 percent level

**Table 8. Comparing net loan sales of affiliated and stand-alone banks**  
**Bank observations with assets < 5 billion 1983 dollars**  
**1987:Q2 to 1993:Q4**

Dependent Variable: NetLoanSales <sub>it</sub> /Assets <sub>it-1</sub>			
	Banks affiliated with an MBHC	Stand-alone banks	Difference
CapitalRatio <sub>it-1</sub>	-0.0440** (0.00)	-0.0153** (0.00)	-0.0287** (0.00)
LRAssets <sub>it-1</sub>	0.0013 (0.93)	-0.0146 (0.17)	0.0159 (0.28)
NPL <sub>it-1</sub>	0.0164* (0.02)	0.0053 (0.10)	0.0111 (0.14)
ROE <sub>it-1</sub>	0.0033* (0.02)	0.0020** (0.00)	0.0013 (0.37)
GSEmpl <sub>it-1</sub>	-0.0149 (0.35)	0.0165* (0.03)	-0.0314 (0.07)
R <sup>2</sup>		0.0050	
Observations		296,266	

Notes: *p* – values are shown in parentheses  
\* indicates significance at the 5 percent level  
\*\* indicates significance at the 1 percent level

**Table 9. Determinants of net loan sales by MBHCs**  
**MBHC observations with assets < 5 billion 1983 dollars**  
**Quarterly observations, 1987:Q2 to 1993:Q4**

Dependent Variable: NetLoanSales <sub>it</sub> /Assets <sub>it-1</sub>	
CapitalRatio <sub>it-1</sub>	-0.0246* (0.02)
LRAssets <sub>it-1</sub>	0.0257 (0.28)
NPL <sub>it-1</sub>	0.0201 (0.10)
ROE <sub>it-1</sub>	0.0035 (0.08)
(GSEmpl <sub>it-1</sub> )WeightedAv	-0.0167 (0.44)
R <sup>2</sup>	0.0070
Observations	18,782

Notes: *p* – values are shown in parentheses  
\* indicates significance at the 5 percent level  
\*\* indicates significance at the 1 percent level

**Table 10. Comparing net loan sales of affiliated and stand-alone banks**  
**Observations of non-publicly traded banks with assets < 5 billion 1983 dollars**  
**Quarterly observations, 1987:Q2 to 1993:Q4**

	Dependent Variable: NetLoanSales <sub>it</sub> /Assets <sub>it-1</sub>		
	Banks affiliated with an MBHC	Stand-alone banks	Difference
CapitalRatio <sub>it-1</sub>	-0.0295** (0.00)	-0.0136** (0.00)	-0.0159* (0.03)
LRAssets <sub>it-1</sub>	0.0379 (0.10)	-0.0131 (0.29)	0.0510* (0.02)
NPL <sub>it-1</sub>	0.0144 (0.13)	0.0060 (0.07)	0.0084 (0.40)
ROE <sub>it-1</sub>	0.0041* (0.04)	0.0018** (0.00)	0.0023 (0.26)
GSEmpl <sub>it-1</sub>	-0.0201 (0.41)	0.0153* (0.05)	-0.0354 (0.16)
$R^2$		0.0044	
Observations		250,821	

Notes:  $p$  – values are shown in parentheses  
\* indicates significance at the 5 percent level  
\*\* indicates significance at the 1 percent level

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