American Finance Association

Internal Capital Markets in Financial Conglomerates: Evidence from Small Bank Responses to Monetary Policy
Author(s): Murillo Campello
Source: *The Journal of Finance*, Vol. 57, No. 6 (Dec., 2002), pp. 2773-2805
Published by: Blackwell Publishing for the American Finance Association
Stable URL: http://www.jstor.org/stable/3094543
Accessed: 24/11/2009 11:44

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THE JOURNAL OF FINANCE • VOL. LVII, NO. 6 • DECEMBER 2002

Internal Capital Markets in Financial Conglomerates: Evidence from Small Bank Responses to Monetary Policy

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ABSTRACT

This paper looks at internal capital markets in financial conglomerates by comparing the responses of small subsidiary and independent banks to monetary policy. I find that internal capital markets in financial conglomerates relax the credit constraints faced by smaller bank affiliates. Further analysis indicates that those markets lessen the impact of Fed policies on bank lending activity. The paper also examines the role of internal capital markets in influencing the investment allocation process of those conglomerates. My findings suggest that frictions between conglomerate headquarters and external capital markets are at the root of investment inefficiencies generated by internal capital markets.

CURRENT THEORETICAL RESEARCH HAS FOCUSED on the role of internal capital markets in influencing conglomerate investment. One line of argument, put forth by Alchian (1969) and Weston (1970), and extended by Gertner, Scharfstein, and Stein (1994) and Stein (1997), stresses the potential efficiency-enhancing role of internal capital markets. These markets can be useful in reducing information asymmetries between project managers and investors, and in providing for better allocation of funds across projects within the firm. A competing line of research, however, argues that internal capital markets can hinder investment efficiency. Scharfstein and Stein (2000) and Rajan, Servaes, and Zingales (2000), among others, emphasize the potential for agency problems and power grabbing to generate inefficient subsidization across projects. Whether internal capital markets enhance or hinder investment efficiency has become an important empirical issue.

Initial evidence on the existence of internal capital markets was based on correlations between investment and cash flows of different parts of the same conglomerate (Lamont (1997) and Houston, James, and Marcus (1997)). Subsequent empirical work addressed the more complex issue of allocation

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efficiency by comparing the investment patterns of conglomerate segments with those of stand-alone industry counterparts (Scharfstein (1998), Shin and Stulz (1998), and Rajan et al. (2000)). Most of these studies find evidence of inefficient cross-subsidization within conglomerates, a result that is consistent with prior work showing that diversified firms trade at a discount relative to comparable portfolios of industry pure-players.[1]

More recent studies have disputed the empirical findings of the cross-subsidization literature and their implications for the diversification discount. Chevalier (2000) emphasizes the potential role of selection biases in explaining results previously attributed to internal capital market inefficiencies. Examining a sample of merging firms, she finds patterns that are consistent with inefficient cross-subsidization even before the mergers take place.[2] The link between diversification and value destruction is also challenged by Hyland (1999) and Graham, Lemmon, and Wolf (2002), who show that diversified firms trade at a discount well before they choose to diversify. Campa and Kedia (2002) find that the discount disappears in experiments that explicitly control for the endogeneity of the diversification decision. Other studies point to methodological problems with the classification of "weak" and "strong" divisions based on Tobin's q proxies, and with comparisons between divisions in different lines of business.[3]

In this paper, I use data from financial firms to ask whether internal capital markets alleviate the impact of external financial constraints on investment and whether they promote investment efficiency. Data from financial institutions are particularly useful for this type of analysis for three reasons. First, financial conglomerates' divisions engage in very similar activities and follow the same stringent reporting standards. This, in turn, allows for detailed data gathering at the division level and makes across-division comparisons less problematic.[4] Second, in contrast to other industries, the existence of headquarters and divisions as separate entities in banking is largely determined by exogenous legal/political constraints rather than (endogenous) choice: Conditional on time and on location, some banks may expand their operations by simply branching out while other similar banks are forced to create complex organizational structures.

[1] See, for example, Comment and Jarrell (1994), Lang and Stulz (1994), and Berger and Ofek (1995).

[2] See also Maksimovic and Phillips (2002) on the issue of sample selection biases.

[3] Whited (2001) discusses in detail the problems associated with the use of stand-alone firms' qs as proxies for conglomerate divisions' qs. The evidence of inefficient cross-subsidization disappears when she replicates earlier experiments using measurement-error consistent estimators. See also Chevalier (2000).

[4] Studies using COMPUSTAT's segment data suffer from problems caused by differences in accounting practices across firms in different industries and from severe limitations on the availability of division-level information. Those studies also need to rely on SIC-based proxies to identify conglomerate divisions, even though the reported SIC segments very often do not represent actual business units. Maksimovic and Phillips (2002), Khanna and Tice (2001), and Schoar (2002) are among the few papers avoiding some of these difficulties.

The third reason why studying these data is particularly useful stems from the role of banks in the payments system and the ability of the monetary authority to influence bank lending via open market operations.[5] During a Fed-induced tightening, access to information-insensitive external funds such as insured deposits is constrained. Although, such a change in policy affects all banks in the system at the same time, not all banks respond in the same way. Because of informational frictions in the market for uninsured deposits, some banks are more affected than others in their ability to fund loans (see Kashyap and Stein (2000)). Since monetary policy is exogenous to financial intermediaries' decisions, and because it changes over time, it is thus possible to isolate cross-sectional differences in the path of the correlation between financial firms' investments and internal funds using monetary policy as a state variable. This setup provides for a unique opportunity to study how internal capital markets work; one can gauge the role of those markets in influencing conglomerate investment by looking at divisions' *responses* to exogenous shocks to *external* capital markets. I use such an approach in the current paper. This testing strategy is remarkably different from that of most previous studies in the literature.

In the first part of the paper, I examine whether cross-sectional differences in banks' responses to monetary policy can be explained by internal capital markets. I build on Kashyap and Stein's (1995, 2000) evidence on the ability of large banks to "undo" Fed policies,[6] and study the response of small banks to monetary policy. Specifically, my tests focus on the *differences* in loan–cash-flow sensitivities between two classes of small banks across different monetary policy regimes. Banks in the first class operate within multibank holding companies (BHCs) controlling at least one large bank. Those in the second class operate as stand-alones. I find that the funding of new loans by members of BHCs becomes less dependent on (affiliate-level) cash flow compared to the funding of new loans by independent banks as the Fed tightens the money supply. In other words, small banks are insulated from Fed actions when they operate jointly with large unconstrained banks under the same conglomerate. My results hold for various measures of monetary policy, even after controlling for factors influencing the demand for loans. Further tests suggest that internal capital markets in financial conglomerates lessen the impact of monetary policy on bank lending. These findings are noteworthy given the many obstacles

[5] This hinges on the "lending view" of financial intermediation. For a review of this literature, see Bernanke and Gertler (1995) and Kashyap and Stein (1995). Recent empirical evidence is shown in Kashyap and Stein (1995, 2000), Jayaratne and Morgan (2000), and Kishan and Opiela (2000).

[6] Large banks can offset Fed policies on the margin due to their greater access to nonreservable forms of deposits (e.g., uninsured CDs) at relatively low cost. Results in Section II confirm that the asset compositions of large banks are mostly insensitive to Fed policies.

imposed by bank regulators on the ability of BHCs to distribute funds among affiliates.[7]

One possible objection to my tests is that individual bank characteristics may somehow explain both the observed behavior of loan–internal-funds sensitivity as well as membership in a BHC. I address this concern in two different ways. First, I show that the level of capitalization of the large banks within the BHC affects the lending behavior of the small affiliates precisely along the lines one would expect if the internal capital markets hypothesis is true. Specifically, whenever the large bank's capitalization is low (high), the associated small bank's lending becomes more (less) conditioned by its own cash flows. Second, I isolate observations from independent banks that eventually merge into a large BHC during my sample period and compare their lending behavior with that of banks that remain independent. Those comparisons show no indication that premerging and nonmerging small banks respond differently to Fed policies.

In the second part of the analysis, I study the question of investment efficiency in conglomerates. Stein (1997) argues that conglomerate schemes can provide for greater efficiency even if headquarters (in my case, the BHCs) also face the same financial constraints faced by the divisions (banks) that they control. According to Stein, under certain conditions, headquarters of focused conglomerates would actively shift funds from projects with poor prospects towards those that are more promising. In contrast, Scharfstein and Stein (2000) show that division-level rent-seeking behavior coupled with agency problems between headquarters and external capital markets can lead to wasteful overinvestment in poor projects at the expense of good ones.

To assess which of these predictions carries more weight on the data, I look at differences in loan–cash-flow sensitivities between relatively efficient and inefficient affiliates of the same BHC across different monetary policy regimes. My testing strategy only supposes that the headquarters' ability to influence divisional investment through fund allocation increases with affiliates' need to borrow from internal capital markets. If there is "winner picking," one should see worse performing bank affiliates' loan growth becoming more sensitive to their own cash flow following Fed tightenings, while better performing affiliates' lending should become relatively less sensitive. Inefficient cross-subsidization should lead to the opposite outcome.

My results are consistent with inefficient cross-subsidization when I examine small banks operating under constrained BHCs. On the other hand, I find that the funding of loans across small banks operating under unconstrained BHCs tends to favor the best affiliates. That is, poorly performing affiliates of unconstrained BHCs are denied access to internal capital markets when they most need funds. These findings help identify the conditions necessary for internal capital markets to play an efficiency-enhancing role

[7] The Federal Reserve Act restricts some transactions among members of the same BHC, such as asset sales, fees, and dividend payments. Still, the down-streaming of funds may occur via direct deposits and short-term loans.

in investment decisions. My results agree with Scharfstein and Stein's (2000) claim that frictions between conglomerate headquarters and external markets are at the root of investment inefficiencies generated by internal capital markets.

To my knowledge, the only other paper that describes the functioning of internal capital markets in banks is Houston et al. (1997).[8] Their bank-level analysis is restricted to subsidiaries of publicly traded BHCs over a period of time when monetary policy was not restrictive and capital requirements were generally nonbinding. Those authors find that a bank's own earnings and capitalization are relatively less important in determining loan growth than other BHC-level variables, a result which they ascribe to internal capital markets. My analysis differs from theirs in a number of ways. First, my inferences are based on contrasts between cohorts of BHC members and independent banks as opposed to within-conglomerate cross-correlations between investment and cash flows. Second, I explicitly address the potential for endogeneity between lending behavior and BHC membership, and attempt to more fully control for loan demand factors influencing loan quantity. Third, I use exogenous shocks to banks' access to the supply of federally insured deposits to tackle simultaneity issues in the loan–cash-flow relationship. Finally, my analysis addresses the question of allocation efficiency.

The remainder of the paper is structured as follows. In Section I, I discuss the data and the methodology used. I also report the main results of the tests designed to identify internal capital markets in financial conglomerates, and provide various robustness checks. In Section II, I discuss the policy implications of my findings. In Section III, I address the question of efficiency in capital allocation by examining how different parts of the same financial conglomerate change their lending in response to monetary policy. Section IV concludes the paper.

I. Identifying Internal Capital Markets in Financial Conglomerates

Kashyap and Stein (1995, 2000) show that the lending behavior of large commercial banks is significantly less sensitive to monetary policy than that of small banks. They attribute this finding to the ability of large banks to issue uninsured liabilities at relatively low cost when the Fed tightens the money supply. Small banks, in contrast, need to rely more on their own funds to sustain loan growth when the Fed draws reserves from the system since informational frictions drive up their cost of uninsured funds.

I build on the evidence that differential access to nonreservable funds creates a wedge in banks' responses to Fed actions to identify internal capital markets in financial conglomerates. My testing hypothesis is that the sen-

[8] Two more recent papers that study the function of banks in the transmission of monetary policy taking the role of internal capital markets in financial conglomerates as given are Ashcraft (2001) and Ashcraft and Campello (2001).

sitivity of loan growth to cash flows of small banks that are affiliated with large banks should differ from that of small independent banks across different monetary policy regimes. Specifically, taking small independent banks' responses to Fed policies as a benchmark, I study the responses of small members of large BHCs to those same policies. If the argument that internal capital markets alleviate the external constraints faced by small banks is true, I expect to find small member banks' lending being more insulated from monetary policy.

A. *Data*

All bank-level data used in the analysis come from the Federal Reserve's Report of Condition and Income ("Call Reports"). I collect quarterly data on insured commercial banks, retaining only bank-quarters with nonmissing information on total assets, total loans, and equity. One must be careful with inconsistencies when forming time series using the Call Reports due to changes in accounting practices. Gaps in the data are also a problem. The Appendix provides a detailed discussion of the variables used. The data needed for my main tests can be consistently sampled only over the 1981:IV to 1997:II period.

I use information from the Federal Reserve's National Information Center (NIC) to identify bank mergers and exclude banks in any quarter in which they register a merger. I note, however, that the ownership structure of some banks—particularly small ones—may change without any recording in the NIC files, as mergers often occur at the upper levels of multitiered organizations. Thus, I also use the Call Reports to detect and drop bank-quarters showing changes in the identity of the ultimate institutional holder.[9] To prevent outliers from driving my results, I eliminate bank-quarters with asset growth in excess of 50 percent, those with total loan growth exceeding 100 percent, and those with total loans-to-asset ratios below 10 percent. The main variable in the estimations below, bank loans, is measured in growth terms and is regressed on four lags of itself. This specification requires banks in my sample to have at least five consecutive quarters of loan data. After these filters are imposed, 601,858 observations remain in the sample.

The monetary policy measures I use are fairly standard and are also described in the Appendix. Most of those proxies are constructed with series available from the Federal Reserve's data bank.

B. *Methodology*

To identify internal capital markets in BHCs I examine the investment patterns of the affiliates that most need those markets to alleviate the impact of exogenous shocks to their cost of external funds. I then contrast their behavior with that of nonaffiliates with similar characteristics. The contrast

[9] A bank's topmost BHC identity is determined by cross-checking the information contained in Call Report items RSSD9348, RSSD9364, and RSSD9365.

is useful since I can safely assume that the responses of the stand-alone banks cannot be attributed to internal capital markets. Using a test strategy that resembles the two-step procedure of Kashyap and Stein (2000), I rely on the differences in responses across those two groups of small banks to draw inferences about the role of internal capital markets in influencing conglomerate investment. This two-step approach better describes the dynamics of interest, and also reduces the likelihood of finding that internal capital markets matter when they really do not.[10]

B.1. Step 1

The first task is to characterize the groups of interest. As is standard in the banking literature, I classify small and large banks according to cutoffs based on the distribution of bank asset size. At each quarter, I rank banks in my data according to their total assets and identify those in the top percentile of the asset distribution as "large" and those below the 90th percentile as "small." Next, I split the small bank sample into three groups: (1) stand-alones, (2) those that operate under multibank BHCs that do not control any large commercial banks, and (3) those under multibank BHCs that control at least one large bank. I refer to small banks in category (1) as "independents," and to those in category (3) as "members of large BHCs." The tests of this section focus on comparisons between these two groups.

Summary statistics of basic balance sheet data for each of the small-bank categories are presented in Table I together with large-bank statistics. Compared to large banks, all three types of small banks share common features. On the asset side, small banks hold more liquid assets and make fewer loans, particularly commercial loans. On the liability side, small banks finance nearly 90 percent of their assets with deposits, compared to slightly over 70 percent for large banks, and preserve much higher capital-to-asset ratios than large banks. Small banks also show a low ratio of large CDs to total deposits compared to large banks. These differences in financing structure illustrate the difficulties faced by small banks in tapping into markets for nonreservable funds.

The last part of the first step consists of creating a time series of loan–cash-flow sensitivities for each of the two classes of small banks I want to compare (independents and BHC members). To obtain these series, on a quarterly basis, I regress bank loan growth on income from operations for all banks in each of those categories. At each pass, I save the estimated income coefficients from the two cross-sectional regressions and stack them in separate (time series) vectors.

[10] An alternative one-step specification—with equation (2) nested in equation (1)—would impose a more constrained parametrization and have more power to reject the null hypothesis of internal capital markets irrelevance. However, tests of coefficient stability indicate that the data strongly rejects those parameter restrictions. Another advantage of the two-step approach is that it allows for cross-sectional variations in local demand conditions to be accounted for in every period.

Table I

Summary Statistics by Bank Category

This table presents the total number of bank-quarters in each of the four bank categories described in the text together with means and medians for (within-category) distributions of various balance-sheet data items (see definitions in the Appendix). The data are collected from the Call Reports over the 1981:IV to 1997:II period.

	Small Banks						Large Banks	
	Stand-alone Banks		Members of Small BHCs		Members of Large BHCs			
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Total assets (1992 $ millions)	69.9	47.1	92.8	66.8	120.2	98.0	23,652.7	11,607.2
% of banks located in MSAs	37.7	0.0	40.8	0.0	58.9	100.0	99.8	100.0
Liquid assets (% of total assets)	32.3	31.7	28.3	27.7	28.2	26.0	18.4	17.9
Total loans (% of total assets)	53.4	54.5	57.2	58.7	58.7	60.1	62.9	63.9
C&I loans (% of total loans)	19.0	16.1	19.5	17.0	22.4	20.4	33.5	32.8
Nonperform loans (% of total loans)	2.3	1.4	1.8	1.0	2.2	1.2	2.5	1.8
Total deposits (% of total assets)	88.4	89.2	88.6	89.6	87.1	90.1	71.5	73.7
Large CDs (% of total deposits)	10.8	8.7	10.7	8.7	11.5	9.0	15.8	12.7
Total equity (% of total assets)	9.5	8.9	8.5	8.1	7.6	6.9	6.4	6.1
Number of bank-quarters	413,568		102,398		25,703		5,721	

The cross-sectional model I fit at each quarter has the following form:

$$\begin{aligned}\Delta \text{Log}(Loans)_{i,t} = \eta &+ \sum_{k=1}^{4} \alpha_k \Delta \text{Log}(Loans)_{i,t-k} + \beta Nonperforming_{i,t-1} \\ &+ \kappa Capitalization_{i,t-1} + \lambda \text{Log}(Assets)_{i,t-1} \\ &+ \sum_{k=1}^{50} \Gamma_k State_k + \text{I}MetroArea \\ &+ \pi \Delta \text{Log}(Liquidity)_{i,t} + \delta Income_{i,t-1} + \varepsilon_{i,t}. \qquad (1)\end{aligned}$$

Lags of log loans change are included to control for bank-specific growth opportunities, while the beginning-of-period ratio of nonperforming loans to total loans (*Nonperforming*) controls for the effect of past losses on a bank's willingness to expand its loan portfolio. As is standard, the equity-to-asset ratio (*Capitalization*) and asset size are also added to explain variations in loan growth. Perhaps more important as a determinant of small bank loan growth are local demand conditions. Loan demand varies across markets as business investment and consumer spending grow disproportionately across different regions of the country. Moreover, even within regions, bank location may be associated with different types of loan demand.[11] To address these issues, I include a set of dummies for each of the 50 states in which the banks are located (D.C. is the omitted category) and another dummy that indicates if the bank is located in a Metropolitan Statistical Area (*MetroArea*).

Previous research has shown that the relationship between investment and cash flow may be underestimated if the model fails to control for investment smoothing that can be implemented with alternative sources of funds readily available to the firm.[12] Using aggregate bank data, Bernanke and Blinder (1992) find that banks' initial response to monetary tightenings consists primarily of securities sell-offs. Accordingly, if some banks use comparatively more stored liquidity to smooth loan growth during monetary tightenings, then one might observe a less significant impact of Fed policies on the loan-cash flow sensitivity of those banks. I address this potential concern by including the log change in the stock of liquid securities (*liquidity*) in the specification of equation (1). Because both lending and liquidity investment are decision variables for the bank, I instrument the latter variable with the lagged log level of liquidity.[13]

[11] For example, small banks in rural areas may not be able to expand their portfolios of consumer loans even if personal spending is growing at the national or state levels.

[12] This concern was first raised by Fazzari and Petersen (1993), who show that constrained manufacturing firms absorb negative shocks to cash flow with greater cuts in working capital than in fixed investment.

[13] The rationale for this instrumentation is that liquidity investment should depend negatively on the initial stock because of the decreasing marginal valuation associated with higher stocks of liquid assets.

My focus is on the sensitivity of loan growth to income from operations. *Income* is computed as the ratio of net income to (beginning-of-period) total loans.[14] The income coefficient, δ, should capture the extent to which frictions in the market for uninsured deposits create a wedge between a small bank's cost of internal and external funds. To reduce simultaneity, this regressor enters the specification in lagged form. The estimated income coefficients are interpreted as short-run effects, that is, effects over a period during which income can be taken as exogenous. As discussed below, my results are valid even if this assumption is violated.

B.2. Step 2

In the second stage, I regress each one of the resulting time series of first-stage coefficients—that is, the δ_t vectors—on eight lags of a measure of monetary policy that proxies for Fed tightenings, plus a time trend, seasonal quarter dummies, and a constant:

$$\delta_t = \eta + \sum_{k=1}^{8} \phi_k Policy_{t-k} + \sum_{j=1}^{3} \sigma_j Quarter_t + \rho Trend_t + u_t. \tag{2}$$

Since there is little consensus on the best measure of the stance of monetary policy, I use four alternative measures in all estimations performed: (1) the Fed funds rate (*Fed funds*), (2) the spread between the rates paid on six-month prime rated commercial paper and 180-day Treasury bills (*paper–bill spread*), (3) the negative of Strongin's (1995) measure of unanticipated shocks to reserves (*Strongin*), and (4) the negative of Boschen and Mills' (1995) narrative measure of monetary policy (*Boschen–Mills*). The economic and the statistical significance of the impact of monetary policy on the sensitivity of loan growth to income are gauged from the sum of the coefficients for the eight lags of the monetary policy measure ($\Sigma\phi_k$s) and from the p-value of this sum. I also report p-values for the rejection of the hypothesis that the lags of the monetary policy measure do not help forecast the sensitivity of loan growth to cash flow.

Because monetary contractions and recessions often coincide, I must distinguish between financial and real explanations for the observed relationship between bank loan growth and income; otherwise, my inferences could be questioned on the grounds that loan demand (rather than supply) drives the results. To check whether the measure of monetary policy retains significant predictive power after conditioning on macroeconomic factors, I also

[14] The cash flow proxy used by Houston et al. (1997) is similar, but also includes loan loss provisions. I disregard loan loss provisions because they are subject to managerial discretion and are thus endogenous to the firm. For instance, if a bank anticipates problems with its loans, it may both cut down loan growth and increase the provision for losses, creating a negative bias in the loan–income coefficient.

estimate an alternative version of equation (2) that includes eight lags of the log change in real GDP. All estimations use Newey and West (1987) heteroskedasticity- and autocorrelation-consistent errors.

C. Potential Biases and Limitations

To compare results across independent and BHC member banks, I compute the difference in the estimated responses of the loan–income sensitivity to monetary policy between the two groups of banks. Standard errors for each set of "difference coefficients" are estimated via a SUR system that combines the groups (p-values reported).

I focus on the *differences* between banks' responses rather than on the *levels* of those responses because I cannot control for unobserved bank/borrower characteristics that may influence the second-stage monetary policy estimates. In particular, I anticipate that those estimates will be negatively biased. The reason for this bias is that small banks' borrowers (typically small firms and individuals) tend to be very interest sensitive. Holding income constant, those banks' loan–income correlations might generally shift downwards following tightenings.[15] Of course, my approach may be flawed if there exists an endogenous relationship between bank profitability and borrower interest rate sensitivity that is more pronounced precisely along the lines of my partition scheme. This possibility is explored in detail below.

As for the first-stage regression estimates, note that the usual concerns with empirical biases in investment–cash-flow-type sensitivities are irrelevant under my approach. Such biases are inconsequential to the monetary policy *responses* of the first-stage estimates.

D. Results

Table II summarizes the distributions of the first-step δ_ts for small independent banks and small members of BHCs both for the overall sample as well as for subsamples for periods when Fed policies are markedly different. For the overall sample, both bank types display statistically identical δ_ts. The same is true for periods when monetary policy is considered either neutral or expansionary according to the Boschen and Mills (1995) narrative measure. However, when that measure signals a monetary contraction, the independent banks' δ_ts increase, while BHC members' δ_ts decrease. Differences across bank types become statistically significant during contractions.

Panel A of Table III shows the lagged impact of various alternative measures of monetary policy (across columns) on bank loan growth–income sensitivity for independent banks and for small member banks (across rows). These effects are computed using the two-step procedure described above,

[15] Such effects might be pronounced in my tests. Notice that because loans are quasi-commitment contracts, it is costly for banks to fully adjust their loan portfolios in the short run. Allowing for prolonged lagged effects of monetary policy, however, reduces the importance of those frictions in loan supply shifts.

Table II

Summary Statistics and Parametric Tests for First-Step δ_ts by Bank Category and across Monetary Policy Regimes

This table summarizes and compares the distributions of the estimated sensitivity of loan growth to operating income funds for small independent banks versus small banks affiliated with BHCs with at least one bank ranked at the top percentile of the asset size distribution. Means for the overall sample are computed over the 1983:I to 1997:II period. Breakdown by the stance of monetary policy is based on the Boschen–Mills narrative measure, which is only available up until 1996:I. Tests for mean differences relax the assumption of equal variance across data subsamples. Associated p-values are in parentheses.

First-Step δ_t	Overall Sample (58 Quarters) Mean (p-value)	Neutral or Expansionary Monetary Policy [Boschen–Mills ≥ 0] (34 Quarters) (A) Mean (p-value)	Contractionary Monetary Policy [Boschen–Mills < 0] (19 Quarters) (B) Mean (p-value)	Differences (A) − (B) Difference (p-value)
Independent banks	0.2160	0.1912	0.2956	−0.1044
	(0.000)	(0.000)	(0.000)	(0.070)
BHC members	0.0853	0.0921	0.0690	0.0231
	(0.191)	(0.291)	(0.563)	(0.875)
Differences:	0.1307	0.0991	0.2266	
Independents − BHC members	(0.132)	(0.310)	(0.074)	

both without (univariate) and with (bivariate) the inclusion of eight lags of changes in log real GDP in the second stage regressions. The table shows eight pairs of responses of the estimated δ_ts to monetary policy along with the associated SUR results for differences in responses across bank groups.

For each of the eight pairs, the impact of the policy measure is positive for independent banks. These coefficients are statistically significant at the 3.0 percent level or better for six of the estimations. In contrast, for small members of BHCs, the same sums of coefficients are negative in all cases. Most importantly, the SUR estimations show that the differences between the $\Sigma\phi_k$s of independent and BHC member banks are positive and statistically significant at the 4.4 percent (7.0 percent) level or better for six (all) of the estimated pairs. These results are central to the analysis. They support the argument that internal capital markets within large BHCs reduce the sensitivity of loan growth to cash flows of the constrained affiliates during monetary contractions.

To gauge the economic significance of these findings, note the SUR-estimated differences across bank types in the bivariate specification for Fed funds (= 0.239) in the table. Consider two small banks, one in each category, with profit ratios of 3.2 percent (the mean of the small bank

profit distribution as of 1997:II). Then, eight quarters after the Fed funds rate is increased by 100 basis points, the loan growth of the independent bank is expected to be 0.8 percent *lower* than that of the BHC member. In dollar terms, consider that both banks have $50.8 million in loans outstanding (the mean value of small banks' total loans as of 1997:II). On the basis of membership alone, one would then predict a gap of just over $406,000 in quarterly loan growth between the two banks eight quarters after the Fed tightens.

The exclusion test p-values show that monetary policy is relevant in predicting the sensitivity of small banks' loan growth to cash flows. In the bivariate estimations, the policy proxy has marginal predictive power at the 2.8 percent level or better in all but one case. This shows that Fed tightenings alone help forecast changes in loan-income sensitivities beyond what changes in macroeconomic activity would predict.

E. Robustness

E.1. Matching Samples

A potential concern with the group comparisons at the bottom of Panel A in Table III is that since legal restrictions on bank mergers have been abolished/amended at a different pace across states, BHC banks may have their operations more concentrated in some parts of the country than in others (Rhoades (2000)). In that case, regional differences that cannot be captured by the dummies included in equation (1) could partly explain differences in responses across bank groups. Another potential problem with those comparisons is that while small members of BHCs seem somewhat larger than independent banks (see Table I), this difference is ignored in my tests.

To address these concerns, I reestimate the two-step procedure above assigning the exact same sample of BHC member banks to one group, and a matching sample of small independent banks that both operate in the same state during the same quarter and that rank adjacent in the asset distribution to another group. The new results for cross-group differences are displayed in Panel B of Table III. In most cases, the estimated group differences are even larger when I use the location–size matching group as a benchmark.

E.2. BHC Access to External Finance

One concern with the approach I use is that the partitioning scheme itself might introduce biases that could potentially explain the observed differences in the impact of monetary policy on the lending behavior of independent and BHC member banks. For instance, suppose some banks are more profitable because they lend to riskier borrowers. If riskier borrowers are more interest-rate sensitive, then monetary tightenings could induce a less

Table III

Impact of Monetary Policy on Small Bank Loan Growth–Cash-Flow Sensitivity: Does BHC Affiliation Matter?

The dependent variable is the estimated sensitivity of loan growth to operating income for small independent banks versus small banks affiliated with BHCs with at least one bank ranked at the top percentile of the asset size distribution. All estimations are for bank-quarters ranked below the 90th percentile of the asset size distribution. In each estimation, the dependent variable is regressed on eight lags of a measure of monetary policy. All policy measures are transformed so that increases in their levels represent Fed tightenings. The sample period is 1981:IV to 1997:II (except for Paper–Bill (through 1997:I), and Boschen–Mills (through 1996:I)). In the bivariate regressions, eight lags of the log real GDP growth are added. The sum of the coefficients for the eight lags of the monetary policy measure are shown along with the p-values for the sum. Exclusion test rows report the p-values for the rejection of the hypothesis that the eight lags of the monetary policy measure do not forecast the sensitivity of loan growth to internal cash flows. Heteroskedasticity- and autocorrelation-consistent errors are computed with Newey–West lag window of size eight in each regression. The table displays (at the bottom) the differences between the sums of the eight lags of monetary policy of independent banks and BHC members, and the p-values for the test of the hypothesis that the sums are equal across categories. The standard errors for the difference of the sum of the coefficients are computed via a SUR system that estimates the bank categories regressions jointly.

		Monetary Policy Measure			
		Fed Funds	Paper–Bill	Strongin	Boschen–Mills
Panel A: Unmatched Samples					
Independent banks					
Univariate	Sum of coefficients	0.019	0.188	0.632	0.061
	Summation test (p-value)	0.025	0.003	0.013	0.307
	Exclusion test (p-value)	0.020	0.000	0.000	0.657
Bivariate	Sum of coefficients	0.022	0.223	0.658	0.025
	Summation test (p-value)	0.030	0.000	0.003	0.679
	Exclusion test (p-value)	0.012	0.000	0.000	0.577

BHC members					
Univariate	Sum of coefficients	−0.140	−0.888	−3.358	−0.600
	Summation test (p-value)	0.026	0.000	0.106	0.000
	Exclusion test (p-value)	0.137	0.001	0.003	0.003
Bivariate	Sum of coefficients	−0.217	−1.172	−3.584	−0.628
	Summation test (p-value)	0.021	0.000	0.099	0.000
	Exclusion test (p-value)	0.028	0.001	0.000	0.000
Differences: Independents − BHC members					
Univariate	Sum of coefficients	0.159	1.076	3.990	0.661
	Summation test (p-value)	0.034	0.021	0.040	0.044
Bivariate	Sum of coefficients	0.239	1.395	4.242	0.653
	Summation test (p-value)	0.023	0.016	0.065	0.070
Panel B: Location-Size Matched Samples					
Differences: Independents − BHC members					
Univariate	Sum of coefficients	0.189	1.466	4.702	0.518
	Summation test (p-value)	0.018	0.012	0.025	0.177
Bivariate	Sum of coefficients	0.274	1.774	4.858	0.448
	Summation test (p-value)	0.015	0.015	0.049	0.296

positive correlation between past profits and current loan growth for these banks. In turn, if profitability explains why small banks are merged into large BHCs, then the cross-sectional differences I find above may not be caused by the functioning of internal capital markets within BHCs, but rather by a sample selection bias.

I propose the following test to address this concern. If a BHC's ability to issue cheap forms of uninsured deposits does not explain the insensitivity of its smaller affiliates to Fed policies, then whether or not the BHC faces difficulties in raising such funds should not affect the loan–income sensitivity of those affiliates. Conversely, if the internal capital markets hypothesis is true, then the smaller bank affiliates should become sensitive to monetary policy whenever the larger partner in the BHC is unable to obtain external funds at a cost advantage.

To implement this test, on a quarterly basis, I compute the capital-to-asset ratio of all large banks in my sample. The underlying assumption is that the costs of uninsured funds should be negatively related to bank capitalization. I denote as "well-capitalized BHCs" those BHC-quarters with at least one large bank with a capital-to-equity ratio above the following cutoffs: 5.5 percent for the period prior to 1992:I, 6 percent for the 1992:I to 1992:IV period, and 7 percent for the 1993:I to 1997:II period.[16] I denote as "poorly capitalized BHCs" those BHCs for which none of their large banks meet those capital-to-asset ratio cutoffs. Next, I split the sample of small members of BHCs according to the capitalization of their parents, and reestimate my two-step procedure.

The results are displayed in Table IV. The impact of monetary policy on loan–income sensitivity is negative in all estimations for members of well-capitalized BHCs, but mostly positive in estimations for members of poorly capitalized BHCs. The differences across groups are statistically significant in nearly all cases and indicate that, regardless of their membership status, small member banks respond to Fed policies just as independent banks do when the larger banks in their conglomerates are less able to offset increases in the cost of external finance.

E.3. Premerger Patterns

Chevalier (2000) argues that previous research has overlooked the potential for biases stemming from unobserved differences between conglomerate divisions and stand-alone firms in explaining investment patterns attributed to internal capital markets. She examines a sample of merging firms over a number of years and finds that the relationship between these firms' investments and cash flows is consistent with cross-subsidization even before

[16] This recognizes the increasing regulatory pressure to raise capital standards. Minimum capital ratio cutoffs used for subsets of my sample period in other related work include: 5.5 to 6 percent (Houston et al. (1997)), 7 percent (Dahl and Shrieves (1992)), and 8 percent (Kishan and Opiela (2000)).

Table IV

Impact of Monetary Policy on Small Bank Loan Growth–Cash-Flow Sensitivity: Does BHC Capitalization Matter?

The dependent variable is the estimated sensitivity of loan growth to operating income for banks affiliated with well- versus poorly capitalized BHCs with at least one bank ranked at the top percentile of the asset size distribution. All estimations are for bank-quarters ranked below the 90th percentile of the asset size distribution. In each estimation, the dependent variable is regressed on eight lags of a measure of monetary policy. All policy measures are transformed so that increases in their levels represent Fed tightenings. The sample period is 1981:IV to 1997:II (except for Paper–Bill (through 1997:I), and Boschen–Mills (through 1996:I)). In the bivariate regressions, eight lags of the log real GDP growth are added. The sum of the coefficients for the eight lags of the monetary policy measure are shown along with the p-values for the sum. Exclusion test rows report the p-values for the rejection of the hypothesis that the eight lags of the monetary policy measure do not forecast the sensitivity of loan growth to internal cash flows. Heteroskedasticity- and autocorrelation-consistent errors are computed with Newey–West lag window of size eight in each regression. The table displays (at the bottom) the differences between the sums of the eight lags of monetary policy of independent banks and BHC members, and the p-values for the test of the hypothesis that the sums are equal across categories. The standard errors for the difference of the sum of the coefficients are computed via a SUR system that estimates the bank categories regressions jointly.

		Monetary Policy Measure			
		Fed Funds	Paper–Bill	Strongin	Boschen–Mills
Members of poorly cap. BHCs					
Univariate	Sum of coefficients	0.071	0.476	−0.222	0.709
	Summation test (p-value)	0.059	0.165	0.823	0.070
	Exclusion test (p-value)	0.006	0.149	0.001	0.001
Bivariate	Sum of coefficients	0.055	0.314	−0.749	0.551
	Summation test (p-value)	0.243	0.551	0.510	0.118
	Exclusion test (p-value)	0.004	0.391	0.159	0.269
Members of well-cap. BHCs					
Univariate	Sum of coefficients	−0.628	−4.757	−15.917	−3.279
	Summation test (p-value)	0.117	0.151	0.136	0.065
	Exclusion test (p-value)	0.000	0.001	0.274	0.191
Bivariate	Sum of coefficients	−0.934	−5.312	−18.418	−3.499
	Summation test (p-value)	0.075	0.214	0.149	0.024
	Exclusion test (p-value)	0.005	0.005	0.226	0.053
Differences: Poorly − well-capitalized BHCs					
Univariate	Sum of coefficients	0.699	5.233	15.695	3.988
	Summation test (p-value)	0.066	0.061	0.099	0.070
Bivariate	Sum of coefficients	0.989	5.626	17.669	4.049
	Summation test (p-value)	0.065	0.114	0.090	0.104

they merge, that is, when internal capital markets did not exist. Chevalier's findings emphasize the potential for endogeneity between investment and merging decisions to generate results that are misleading in their support of the internal capital markets hypothesis.

I address this type of problem in my analysis by comparing the loan–income sensitivity of independent banks that eventually become BHC members during my sample period with that of banks that remain independent. The comparisons are based on the same two-step procedure used above. If independent banks that are about to merge into a large BHC respond to Fed policies as if they were already part of the conglomerate, then the data might be more relevant to the question of why banks merge than to the question of how internal capital markets work in financial conglomerates. Because the number of banks that are still about to merge sometime between a given quarter and the last quarter of the sample period decreases over time, the regressions of step 1 can only be performed until 1995:I. This diminishes the power of the step 2 regressions.

The results for premerging and nonmerging small independent banks are reported in Table V. The loan–income sensitivity of independent banks that merge responds to Fed policies just as the loan–income sensitivity of nonmerging banks. Although the test statistics for the differences may lack the necessary power to reject the null of equal $\Sigma\phi_k$s across groups, note that banks which are about to merge show even greater responses of loan–income sensitivity to Fed policies than nonmerging banks. I find no evidence that small banks that are a part of large conglomerates differ in their responses to Fed policies for reasons other than BHC membership status.

II. Internal Capital Markets and the Monetary Policy Debate

According to the bank lending view of monetary policy, open market sales by the Fed will limit the supply of intermediated funds if banks are unable to insulate their lending activities from shocks to reserves via offsetting transactions. Most of the evidence in support of this view comes from time-series studies of aggregate data suggesting that changes in monetary policy are followed by changes in both loan quantities and macroeconomic activity (e.g., Bernanke and Blinder (1992)). Although consistent with the bank loan *supply* channel, this evidence is not conclusive. An alternative explanation for the observed movements is the traditional view that higher interest rates may depress economic activity, which in turn reduces the *demand* for credit.

To address this identification problem, Kashyap and Stein (1995, 2000) examine bank data that are disaggregated on the basis of size. Using the response of large (unconstrained) banks to Fed policies as a benchmark, they find evidence that small banks that do not accumulate sufficient liquidity are forced to reduce loan growth following a Fed tightening. However, a potential problem with the Kashyap–Stein approach is the implicit

Table V

Impact of Monetary Policy on Small Bank Loan Growth–Cash-Flow Sensitivity: Pre-Merger Comparisons

The dependent variable is the estimated sensitivity of loan growth to operating income for independent banks that do not merge versus banks that will merge in the 1981:IV to 1997:II period. All estimations are for bank-quarters ranked below the 90th percentile of the asset size distribution. In each estimation, the dependent variable is regressed on eight lags of a measure of monetary policy. All policy measures are transformed so that increases in their levels represent Fed tightenings. The sample period is 1981:IV to 1995:I. In the bivariate regressions, eight lags of the log real GDP growth are added. The sum of the coefficients for the eight lags of the monetary policy measure are shown along with the p-values for the sum. Exclusion test rows report the p-values for the rejection of the hypothesis that the eight lags of the monetary policy measure do not forecast the sensitivity of loan growth to internal cash flows. Heteroskedasticity- and autocorrelation-consistent errors are computed with Newey–West lag window of size eight in each regression. The table displays (at the bottom) the differences between the sums of the eight lags of monetary policy of independent banks and BHC members, and the p-values for the test of the hypothesis that the sums are equal across categories. The standard errors for the difference of the sum of the coefficients are computed via a SUR system that estimates the bank categories regressions jointly.

		Monetary Policy Measure			
		Fed Funds	Paper–Bill	Strongin	Boschen–Mills
Nonmerging independent banks					
Univariate	Sum of coefficients	0.012	0.105	0.401	0.094
	Summation test (p-value)	0.040	0.026	0.041	0.009
	Exclusion test (p-value)	0.015	0.018	0.000	0.019
Bivariate	Sum of coefficients	0.022	0.155	0.503	0.083
	Summation test (p-value)	0.004	0.002	0.001	0.027
	Exclusion test (p-value)	0.000	0.002	0.000	0.090
Premerging independent banks					
Univariate	Sum of coefficients	0.077	0.289	1.273	0.430
	Summation test (p-value)	0.029	0.288	0.453	0.072
	Exclusion test (p-value)	0.001	0.027	0.000	0.012
Bivariate	Sum of coefficients	0.090	−0.068	0.494	0.624
	Summation test (p-value)	0.185	0.908	0.794	0.006
	Exclusion test (p-value)	0.031	0.029	0.033	0.091
Differences: Nonmerging − premerging					
Univariate	Sum of coefficients	−0.065	−0.184	−0.872	−0.336
	Summation test (p-value)	0.275	0.689	0.689	0.381
Bivariate	Sum of coefficients	−0.069	0.223	0.010	−0.541
	Summation test (p-value)	0.393	0.693	0.997	0.194

assumption that large money center banks face the same type of borrowers that small retail-deposit banks do. If borrower type differs significantly across the two bank categories, then the differences in the demand for loans following a tightening could partially explain their results.

Evidence from internal capital markets can be used to advance this debate. In this section, I compare "first-order" changes in investment—rather than investment sensitivities—of small independent banks and small BHC banks following Fed-induced shocks to reserves. Given that both classes of small banks have very similar characteristics, the objection that differences in response to monetary policy across bank categories could be caused by loan demand factors rather than supply becomes less of a concern than in the Kashyap–Stein analysis.

To measure bank responses to monetary policy, I use the VAR approach of Bernanke and Blinder (1992). Rather than using data for the aggregate of the banking sector, however, the estimations are conducted separately for observations of small independent banks, small banks that are members of large BHCs, and large banks. Because of mergers and acquisitions, the aggregate figures for small banks change significantly throughout my sample period. I thus scale the balance-sheet variables (deposits, liquid assets, and loans) by total assets, implying that the results below refer to the composition of banks' balance sheets. Since those data are consistently recorded in the Call Reports for a longer period, I use series starting back in 1976:I.

I estimate a six-variable VAR including four lags of the log real GDP, the change in log CPI, the Fed funds rate, bank deposits, liquid assets, and total loans. The orthogonalization is performed in that order, which implies that the Fed may respond to current-quarter movements in output and prices in setting the funds rate, but that the Fed's actions will not affect output and prices within the quarter. From the estimated VAR, I compute the impulse-response function (IRF) of a shock to Fed funds. The VAR coefficients themselves are not interesting and thus are omitted.[17]

Figure 1 shows IRFs for a 100-basis-point shock to the Fed funds rate. For small independent banks (Panel A), the negative shock to reserves is initially matched by a similar decline in loans and in liquid assets, but the decline becomes proportionately larger for loans compared to liquid assets just a few quarters after the shock. In other words, small independent banks seem to quickly reshuffle their asset portfolios from loans to securities after a Fed tightening. The same response, however, is not observed for small banks that operate within large BHCs (Panel B). These banks do not seem to cut their loan portfolio proportionately more than their portfolio of liquid assets following Fed tightenings. Panel C shows the same IRF for the largest U.S. commercial banks. The resemblance between Panels B and C is striking and suggests that large banks are able to shield their smaller BHC

[17] I obtain similar results for other policy measures. For brevity, I only discuss the Fed funds estimations.

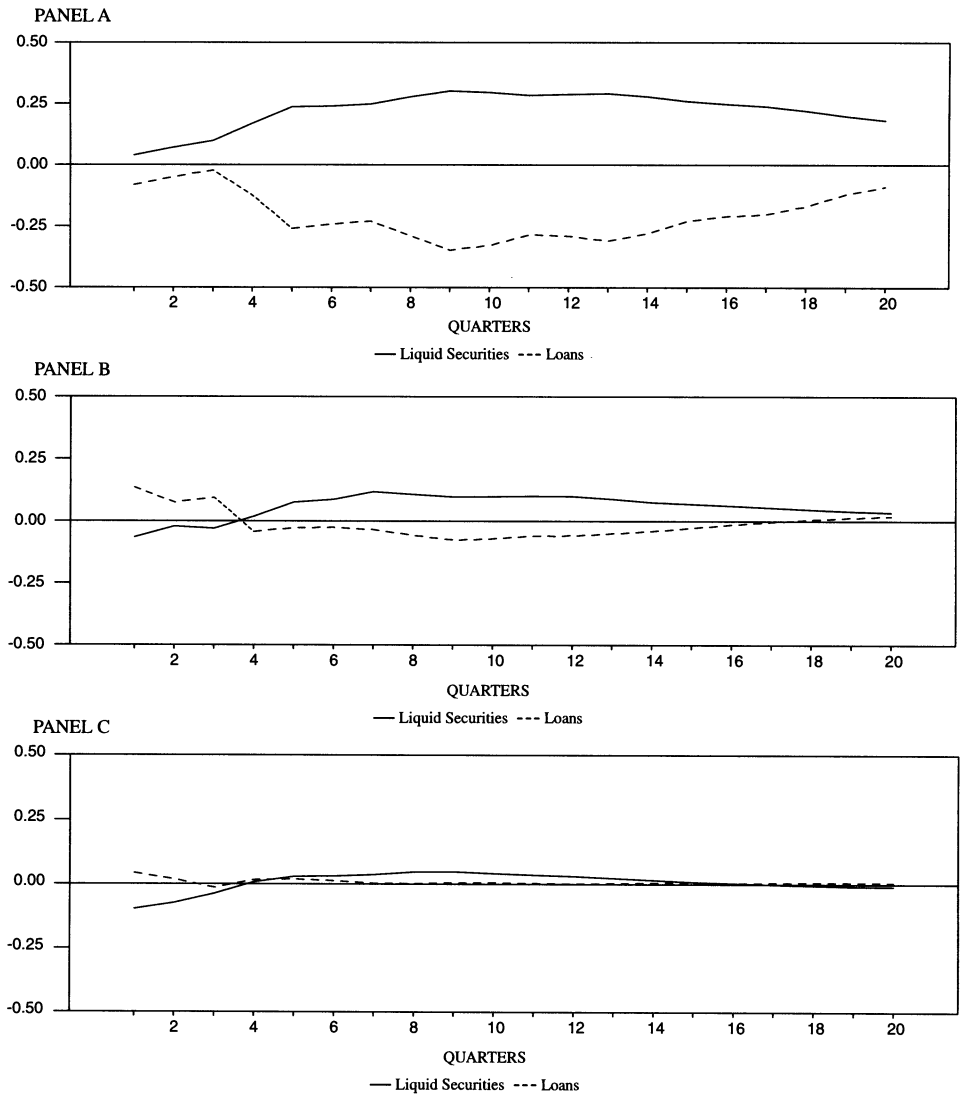

Figure 1. Small bank BHC-affiliation and the impact of monetary policy. Panel A: Small independent banks. Panel B: Small members of large BHCs. Panel C: Large banks. Impulse-response functions are estimated from a six-variable VAR that includes log real GDP, the change in log CPI, the Fed funds rate, bank deposits, liquid assets, and total loans (orthogonalization following this order). Four lags of each of the variables are used. Responses to a 100-basis-point shock to the Fed funds rate are computed separately for aggregate data on small independent banks, small banks that are members of large BHCs, and large banks. Bank balance-sheet variables are scaled by total assets. The sample period is 1976:I to 1997:II.

counterparts against negative shocks to reserves. These results show that internal capital markets in financial conglomerates have the potential of reducing the impact of monetary policy on bank credit supply.

III. Efficiency in Internal Capital Markets: Does Conglomerate Structure Matter?

Recent theoretical research has focused on the role of internal capital markets in investment efficiency in conglomerates. Stein (1997) analyzes the potential benefits of conglomerate schemes in which headquarters is endowed with residual control rights that allow for discretion over the allocation of funds across divisions. According to his theory, a headquarters' "winner-picking" ability may provide for the best projects to be funded even when it encounters the same capital market frictions faced by the projects under its control. Stein argues that because a focused strategy allows for better evaluation of divisional projects on a relative basis, internal capital markets can promote greater allocation efficiency when (imperfectly informed) headquarters monitor smaller sets of related divisions, funding these divisions according to internal rankings.

Scharfstein and Stein (2000), on the other hand, emphasize that internal capital markets may allow for cross-subsidies that are "socialist" in nature, that is, strong divisions subsidizing weak ones. These authors argue that, while a model featuring only division-level rent seeking can explain inefficient outcomes in managerial *wages*, one needs the extra condition that external capital markets delegate to headquarters the task of monitoring division managers, that is, one needs a second layer of agency, to derive implications for *investment* efficiency. The reason is that, because of the nature of the optimal contract between headquarters and outside investors, the former may not want to address the problem of divisional rent seeking with payments that the latter would prefer. In other words, headquarters may distort divisional fund allocation rather than managerial wages, thus generating investment inefficiencies.[18]

Data from the U.S. banking industry are particularly useful for investigating the question of allocation efficiency in conglomerates along the lines of the theory. First, note that exogenous, idiosyncratic factors contribute to the formation of the conglomerate structure itself. Second, financial conglomerates' divisions are in the same line of business and follow strictly enforced reporting standards, providing more detailed and comparable data than divisions of firms in other industries. Finally, survey evidence indicates that, while financial conglomerates operate as integrated firms, affiliate bank managers have considerable power over key operational decisions, such as setting loan quantities and prices.[19] In other words, BHC subsidiaries can be seen as comparable individual business units operating within well-defined conglomerates. In all of these accounts, data from banks provide for

[18] Using a different framework, Rajan, Servaes, and Zingales (2000) also emphasize the potential for distortions in divisional investment allocation in conglomerates.

[19] Blackwell, Brickley, and Weisbach (1994) report that 76 percent of subsidiary CEOs in their sample say that the "aggressiveness of lending policies" is determined at the subsidiary level. See also Whalen (1982).

a much cleaner test of the internal capital markets *efficiency hypothesis* than, for example, the business segment data from COMPUSTAT, which is the source of information for virtually all other studies on this topic.[20]

Another advantage of the banking framework is that it allows for an investigation of how internal capital markets work precisely when conglomerate divisions must compete for internal funds. To see this, note that small affiliate banks face a perfectly elastic supply of funds in times of neutral/expansionary monetary policy. During these periods, they can easily fund loan growth on their own. When the Fed tightens, however, small affiliates may need to rely on funds from internal capital markets to support their loan growth. During contractions, those affiliates' lending will likely become more conditioned by BHC's discretion over internal funds. Exploring this dynamic, one can study the issue of allocation efficiency in internal capital markets by looking at whether divisional performance influences differences in subsidiary-level loan–cash-flow sensitivities across periods of expansionary and contractionary monetary policies. These observations motivate the tests below.

A. Methodology

The test strategy used in this section requires only that: (1) divisions become more constrained in the face of negative shocks to external finance, and (2) the ability of headquarters to influence divisional investment increases with divisions' need to borrow from internal capital markets. As discussed above, these assumptions seem natural in a banking framework. The test is as follows: If BHCs engage in winner picking, then one should see better bank affiliates' loan growth being insulated from negative shocks to external finance *relative* to worse affiliates; in contrast, if internal capital markets promote inefficient cross-subsidization, then one should see the opposite effect.

To implement this test, I compare the responses of loan–cash-flow sensitivities to monetary policy across well and poorly managed affiliates operating within the same BHC. Since recent empirical research has uncovered a strong correlation between proxies for managerial quality (e.g., cost inefficiencies) and nonperforming loans,[21] I distinguish between "better" and "worse" bank affiliates using data on loan performance as follows. On a quarterly basis, for each BHC, I rank all small-bank affiliates based on the change in the ratio of nonperforming loans to total loans over the previous

[20] One example is Shin and Stulz (1998). The experiments of this section resemble those in their paper to the extent that I also gauge allocation efficiency by ranking subsidiaries in a conglomerate and then comparing their investments. However, differently from those authors, I avoid emphasizing subsidiaries' investment–cash-flow average *cross-correlations*. Rather, I look at each one of those subsidiaries *own* investment–cash-flow sensitivities' times-series path, emphasizing their *responses* to exogenous changes in external capital markets.

[21] See, for example, Wheelock and Wilson (2000) and Berger and DeYoung (1997).

four quarters.[22] I keep only the BHCs with at least four small banks. Next, I identify the affiliates ranked at the bottom quartile of the within-BHC loan loss ranking and separate these units (well-managed affiliates) from those at the top quartile (poorly managed affiliates). Finally, I estimate and compare the loan–income sensitivities of these two groups across different monetary policy regimes via the same two-step procedure used in Section I. The only difference this time is that I add an indicator variable for the BHC identity in the cross-sectional regressions of step 1 to control for unobserved BHC individual effects.

In the first set of tests of this section, I study the lending behavior of small banks operating under BHCs that do not control any large banks ("small BHCs"). That is, I study small focused conglomerates, where both divisions and headquarters are likely to be constrained when they need to raise funds via liabilities bearing credit risk (Stein (1997)). Notice that if internal capital markets are not at work in these conglomerates, then one should not be able to distinguish between affiliates' responses to external shocks on the basis of relative performance. To help ensure that my approach is not biased towards a specific outcome, I subsequently contrast the test results for these BHC members with those associated with conglomerates whose headquarters face no Fed-induced funding constraints.

While my focus is on the banking activities of BHCs, I note that deregulation has allowed those conglomerates to engage in nonbanking activities over the years. Although I purposely avoid ascribing cross-correlation results from subsidiary data to internal capital market effects, it may be worth gauging the relative importance of nonbanking activities for the conglomerates in my sample. To do so, I use Houston et al.'s (1997) approach of isolating nonbank activities by subtracting bank subsidiaries' accounting figures from BHC totals.

Consolidated BHC data ("Y-9 Tapes") are available from the Fed starting in 1986:II. For the cases for which I was able to match the Call Reports and the Y-9 Tapes—nearly 92 percent success rate—I find that nonbank subsidiaries' assets (cash flows) comprise, on average, only 3 percent (9 percent) of the smaller BHCs' totals. Besides being relatively unimportant, nonbanking subsidiaries of small BHCs are mostly credit-related businesses whose cash flows are likely to be correlated with the core banking activities. Examples of such subsidiaries are industrial banks, savings banks, leasing companies, mortgage banking companies, and consumer financing companies. As for large BHCs, nonbanking activities are relatively more important and complex. Table VI displays basic information on the two types of BHCs analyzed

[22] As explained in the Appendix, the accounting measure of loan losses I use is nondiscretionary to the reporting bank; it represents actual losses rather than loss provisions. Because local demand conditions may also contribute to differences in loan performance across the various affiliates of the same BHC, before ranking the BHC affiliates, I adjust that measure by subtracting the state's average from each observation.

Table VI

Summary Statistics by BHC Category

This table presents the total number of subsidiary banks for each of the two BHC types (small and large) after merging Call Report and Y9 Tapes for the first and last quarters these two data sets overlap in the sample period used (1986:II and 1997:II, respectively). It also displays the proportion of BHCs' total assets and cash flows attributed to nonbank operations and the proportion of BHCs in the matched sample with data also available in CRSP. Inside ownership refers to the proportion of common stocks held by officers and directors in the BHCs totals (public BHCs only). Ownership information is collected from Compact Disclosure/Spectrum. The number of analysts covering the BHC (i.e., issuing earnings forecasts) is from I/B/E/S.

	1986:II				1997:II			
	Small BHCs		Large BHCs		Small BHCs		Large BHCs	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Total assets (1992 $ billions)	1.5	0.9	25.2	13.8	1.8	0.7	75.4	44.0
Number of small bank affiliates	8.2	6.0	19.2	8.0	7.3	5.0	10.3	6.0
Nonbank assets (% of BHC total assets)	2.7	1.2	29.6	24.0	4.0	0.8	12.1	14.2
Nonbank income (% of BHC total income)	16.1	7.4	28.6	21.7	11.6	4.9	21.1	8.1
Number of BHCs	184		59		148		30	
Publicly traded (% of BHCs)	73.4		93.2		70.3		93.3	
Median inside ownership (% of shares)	6.7		2.2		7.3		2.1	
Median analyst coverage (number of analysts)	1		8		2		12	

for the first (1986:II) and last (1997:II) quarters for which BHC-level data are available for my sample period.

B. Results

Results for within-conglomerate responses to monetary policy are displayed in Table VII. Panel A concerns banks operating under small BHCs. Results in the panel suggest that, rather than engaging in winner picking, constrained BHCs promote inefficient cross-subsidization among bank affiliates. Estimates at the top of the table show that poorly managed affiliates do not become more dependent on their own funds to finance loan growth when the Fed tightens. In contrast, similar coefficients for the best affiliates show an increased loan–cash-flow sensitivity following Fed tightenings. All of the SUR-estimated differences between these sets of coefficients provide statistical support for the cross-subsidization finding. I also obtain qualitatively similar results when I study other commonly used measures of bank efficiency based on the number of employees per deposits, and on salaries and wages per deposits (not shown).

To ensure that my approach is not "hardwiring" the results and to highlight the conditions under which internal capital markets might lead to inefficient investment, I also examine how headquarters allocate funds when they are unconstrained. This can be gauged from the estimates in Panel B, where intra-BHC small bank comparisons are made for large BHCs. The results reported in this panel are the opposite of those in Panel A. They suggest that unconstrained BHCs use internal capital markets to impose investment discipline upon affiliates: Although internal resources are not scarce, only the best affiliates are able to expand their loans in excess of what their own cash flow would allow when the external funding constraint is binding.

It is difficult to pin down which specific differences between the two classes of conglomerates explain why internal capital markets seem to promote inefficient cross-subsidization in one group and efficient allocation in the other. Scharfstein and Stein (2000) propose that agency problems between conglomerate headquarters and investors are key to the types of inefficiencies generated by internal capital markets. Presumably, these problems should be less prevalent in smaller firms since investment decisions will be less influenced by conflicts of interests arising from the separation of ownership and control. However, as shown at the bottom of Table VI, most of the BHCs examined (both small and large) are public corporations. The table also shows that equity ownership by officers and directors is relatively small for both BHC types. These data make it difficult to argue that the fund allocation of smaller multibank BHC is less influenced by problems related to managerial incentives at the top of the conglomerate structure.

On the other hand, if factors such as regulatory monitoring, capital markets screening, and compensation/labor markets considerations exert greater influence on the top management of the largest BHCs relative to that of

smaller ones, then the contrasts across the two panels of Table VII might be taken as consistent with Scharfstein and Stein's (2000) arguments. This seems more plausible in the banking setting. For instance, notice that just like private investors, regulatory agencies face decreasing returns to monitoring efforts after some level. Accordingly, in practice, only the largest BHCs are more closely examined by regulators.[23] The same argument applies for data gathering and research efforts by capital market participants such as financial analysts, rating agencies, and fund managers. Table VI illustrates this last point, showing that financial analysts provide far more coverage for large BHCs than for their smaller counterparts.

The available empirical evidence on compensation/labor markets for bank CEOs also suggests that agency problems are lessened in the largest BHCs. Hubbard and Palia (1995), for example, show that more productive top executives are allocated to larger conglomerates and paid accordingly. Barro and Barro (1990) find that the use of high-powered incentive compensation schemes for bank CEOs is positively related to bank size. Moreover, larger BHCs are able to implement alternative monitoring mechanisms such as more independent boards when CEO pay-for-performance sensitivity is low (Mishra and Nielsen (2000)). Hadlock, Houston, and Ryngaert (1999) show that lower CEO ownership in banks is associated with a greater likelihood of CEO dismissal following a merger, suggesting that career concerns are likely to be more relevant in improving managerial performance in larger BHCs (where CEOs typically own less shares) than in smaller ones.

These arguments, of course, do not exhaust the discussion. Isolating the factors that explain patterns in allocation efficiency across different types of conglomerate structures is left for future research.

IV. Concluding Remarks

This paper provides evidence on the functioning of internal capital markets in financial conglomerates. I find that, as monetary policy is tightened, if a small bank operates on a stand-alone basis, then its loan growth becomes significantly more dependent on its own cash flow in periods of tight money supply. In contrast, if a small bank operates jointly with a large bank under a BHC, then the small bank's loan growth becomes less sensitive to its own cash flow following a monetary contraction. The analysis further indicates that internal capital markets in financial conglomerates can potentially offset the impact of Fed policies on bank lending activity.

The paper also examines the role of internal capital markets in the investment allocation process of financial conglomerates. My results suggest that, within small BHCs, the funding of loans becomes less sensitive to affiliate-level cash flows for the worst affiliates relative to the best affiliates as the Fed tightens. In contrast, internal capital markets seem to play an

[23] Section 255.5(b) of Regulation Y determines that larger BHCs must report far more detailed accounting data and at higher frequency than smaller BHCs.

Table VII

Impact of Monetary Policy on Small Bank Loan Growth–Cash-Flow Sensitivity: Does Conglomerate Structure Matter?

The dependent variable is the estimated sensitivity of loan growth to operating income for relatively poorly and well-managed affiliates of the same BHC. All estimations are for bank-quarters ranked below the 90th percentile of the asset size distribution. In each estimation, the dependent variable is regressed on eight lags of a measure of monetary policy. All policy measures are transformed so that increases in their levels represent Fed tightenings. The sample period is 1981:IV to 1997:II (except for Paper–Bill (through 1997:I), and Boschen–Mills (1996:I)). In the bivariate regressions, eight lags of the log real GDP growth are added. The sum of the coefficients for the eight lags of the monetary policy measure are shown along with the p-values for the sum. Exclusion test rows report the p-values for the rejection of the hypothesis that the eight lags of the monetary policy measure do not forecast the sensitivity of loan growth to internal cash flows. Heteroskedasticity- and autocorrelation-consistent errors are computed with Newey–West lag window of size eight in each regression. The table displays (at the bottom) the differences between the sums of the eight lags of monetary policy of independent banks and BHC members, and the p-values for the test of the hypothesis that the sums are equal across categories. The standard errors for the difference of the sum of the coefficients are computed via a SUR system that estimates the bank categories regressions jointly.

		Monetary Policy Measure			
		Fed Funds	Paper–Bill	Strongin	Boschen–Mills
Panel A: Poorly versus Well-Managed Affiliates within Small BHCs					
Poorly managed affiliates					
Univariate	Sum of coefficients	−0.041	−0.448	−1.253	−0.559
	Summation test (p-value)	0.393	0.190	0.325	0.091
	Exclusion test (p-value)	0.913	0.014	0.408	0.084
Bivariate	Sum of coefficients	−0.116	−0.723	−1.503	−0.407
	Summation test (p-value)	0.071	0.038	0.416	0.468
	Exclusion test (p-value)	0.000	0.000	0.000	0.001
Well-managed affiliates					
Univariate	Sum of coefficients	0.120	0.816	3.158	0.445
	Summation test (p-value)	0.057	0.042	0.027	0.228
	Exclusion test (p-value)	0.107	0.000	0.000	0.415
Bivariate	Sum of coefficients	0.206	1.082	4.394	0.963
	Summation test (p-value)	0.011	0.061	0.025	0.024
	Exclusion test (p-value)	0.067	0.000	0.000	0.000

Differences: Poorly − well-managed					
Univariate	Sum of coefficients	−0.161	−1.264	−4.412	−1.005
	Summation test (p-value)	0.098	0.077	0.066	0.050
Bivariate	Sum of coefficients	−0.322	−1.806	−5.897	−1.370
	Summation test (p-value)	0.024	0.030	0.029	0.024
Panel B: Poorly versus Well-Managed Affiliates within Large BHCs					
Poorly managed affiliates					
Univariate	Sum of coefficients	0.206	1.716	6.630	0.156
	Summation test (p-value)	0.001	0.000	0.000	0.724
	Exclusion test (p-value)	0.028	0.000	0.000	0.000
Bivariate	Sum of coefficients	0.281	1.884	6.118	0.111
	Summation test (p-value)	0.009	0.001	0.000	0.826
	Exclusion test (p-value)	0.008	0.000	0.000	0.015
Well-managed affiliates					
Univariate	Sum of coefficients	−0.048	−0.796	−2.891	0.304
	Summation test (p-value)	0.299	0.034	0.017	0.411
	Exclusion test (p-value)	0.000	0.000	0.202	0.081
Bivariate	Sum of coefficients	−0.149	−1.514	−4.566	−0.091
	Summation test (p-value)	0.034	0.002	0.012	0.832
	Exclusion test (p-value)	0.000	0.000	0.000	0.019
Differences: Poorly − well-managed					
Univariate	Sum of coefficients	0.254	2.512	9.521	−0.148
	Summation test (p-value)	0.066	0.008	0.009	0.841
Bivariate	Sum of coefficients	0.430	3.399	10.683	0.202
	Summation test (p-value)	0.046	0.006	0.014	0.825

efficiency-enhancing role in large BHCs, as poorly managed affiliates are not cushioned from Fed tightenings even though Fed policies do not constrain large BHCs' access to uninsured funds. I interpret my evidence as consistent with the argument that frictions between conglomerate headquarters and external markets are at the root of investment inefficiencies generated by internal capital markets.

APPENDIX

A. Bank-Level Variables

Whenever possible, I follow the series definitions in Kashyap and Stein (1995, 2000).

Loans. Total loans are reported in the Call Report item RCFD2125. Starting in 1984:I, this item also includes lease-financing receivables. To ensure continuity, total loans must be computed as the sum of RCFD2125 and RCFD2165 (lease-financing receivables) for the period prior to 1984:I.

Nonperforming. The measure of loan performance I employ avoids managerial discretion in reporting losses (a similar proxy is used by Lucas and McDonald (1992)). It equals the ratio of loans over 90 days late (RCFD1407), plus loans not accruing (RCFD1403), to total loans.

Capitalization. The capital-to-asset ratio is computed as RCFD3210 divided by RCFD2170.

Assets. Total assets are taken from item RCFD2170.

Liquidity. My measure of bank liquidity eliminates cash in vaults since a greater portion of banks' cash is stored for purposes of reserve requirements. Up until 1983:IV, bank liquidity is computed as the sum of items RCFD0400 (U.S. Treasury securities), RCFD0600 (U.S. government agency and corporate obligations), RCFD0900 (obligations of states and political subdivisions), RCFD0380 (all other bonds, stocks, and securities), and RCFD1350 (Fed funds sold and securities purchased under agreements to resell). For the 1984:I to 1993:II period, liquidity is the sum of RCFD0390 (total investment securities), RCFD1350, and RCFD2146 (assets held in trading account). Finally, for the 1993:II to 1997:II period, it equals the sum of RCFD1350, RCFD1754 (securities held to maturity), and RCFD3545 (total trading assets).

Income. Net income comes from item RIAD4340.

Deposits. Total deposits are taken from item RCFD2200.

C&I Loans. Commercial and industrial loans are taken from item RCFD1600.

B. Measures of Monetary Policy

Fed Funds. I use the monthly series of effective annualized Fed funds rates provided in the Board of Governors' Release H.15. In an influential paper, Bernanke and Blinder (1992) show that this rate captures the stance of monetary policy well because it is sensitive to shocks to the supply of bank

reserves. The Fed funds rate is the prevalent measure of monetary policy in empirical work. However, the adequacy of this proxy has been questioned for periods when the Fed's operating procedures were modified (e.g., the Volcker period). For robustness, I employ alternative measures of monetary policy.

Paper–bill. This is computed as the difference between the rates paid on six-month prime rated commercial papers and 180-day Treasury bills. These series are available from the Board of Governors' Release H.15, but the paper series is discontinued in 1997:I. The paper rates are given as discount rates and the T bill as coupon equivalent rates. I transform both series into effective yield rates before computing the difference. Bernanke (1990) argues that paper–bill increases capture Fed tightenings since banks will cut loans and corporations are forced to substitute commercial paper for bank loans.

Strongin. Strongin (1995) argues that previous studies attempting to identify the stance of monetary policy fail to properly address the Fed's strategy of accommodating reserve demand shocks. *Strongin* measures the portion of nonborrowed reserves growth that is orthogonal to total reserve growth. It equals the residual of a linear regression of total reserves on nonborrowed reserves, where both series are normalized by a 24-month moving average of total reserves prior to the estimation. I perform this computation using data from the Federal Reserve's FRED data bank.

Boschen–Mills. This measure represents the "narrative approach" used by Boschen and Mills (1995), who classify the stance of monetary policy in five categories from "strongly contractionary" (coded −2) to "strongly expansionary" (coded +2). This measure is only available through 1996:I and can be obtained from Prof. Boschen's web address: http://business.wm.edu/homepage.asp?PID=416.

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