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# The Long-run Demand for Labor in the Banking Industry

by Ben Craig

Ben Craig is an economist at the Federal Reserve Bank of Cleveland. He thanks Allen Berger, Michael Bryan, Rebecca Demsetz, and Joseph Haubrich for their valuable comments.

## Introduction

For years, banking was considered the paragon of stable employment. Since peaking in 1989, however, the industry's payrolls have shrunk—in marked contrast to the expansion of the U.S. labor force and the growth in overall employment (see figure 1). Furthermore, the contraction has been steady, apparently unaffected by the aggregate business cycle. Between 1989 and 1995, banking employment fell more than 6 percent, while aggregate output in the industry (measured by total assets) increased 15 percent in real terms. Clearly, this differs from the situation in the U.S. steel industry during the 1970s, when a decline in demand for the industry's output provided an easy explanation for the employment loss.

Ready explanations for the contraction in banking employment have not been lacking. Casual observation of industry patterns from 1988 to the present suggests that two important changes have coincided with the shift in demand for banking labor: Technology has revolutionized the way banking is done, and consolidation has transformed banking's industrial structure.

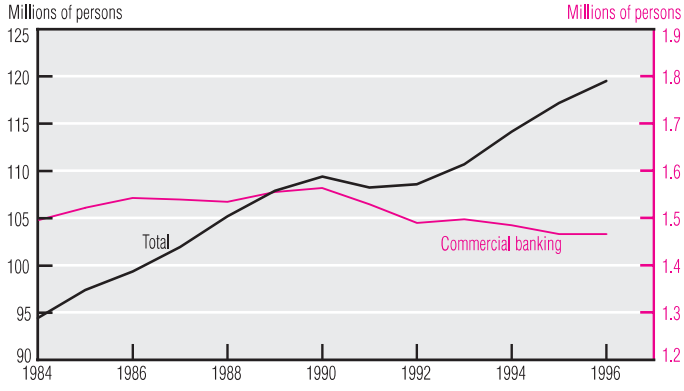
Technical progress may have obvious effects on labor demand. For example, all else equal, a firm may choose to employ fewer workers if the price of a substitute for labor goes down. The explosion in the number of ATM transactions in the 1980s is often cited as a primary reason for banking's dwindling payrolls (see figure 2). Even the name—automated teller machine—suggests the substitution use.

But a closer look suggests that the effect of technical progress may be more complex. Because they offer new opportunities to banks, ATMs may expand the range and amount of output that banks sell. The most visible effect of ATMs has been to transform the multitude of fully staffed branch offices that existed in the 1970s into today's sparsely staffed single branch. However, ATMs also offer services that were not easily obtainable 20 years ago, like allowing people to get cash easily, even at out-of-the-way places. Thus, it's possible that more bank services are being used, which should have a positive effect on employment.

Although ATMs are the most visible sign of technical progress to customers, they are not the only example of banks' adopting new technology. Some technical changes, like cash sorters and electronic readers, are embodied in

**FIGURE 1**

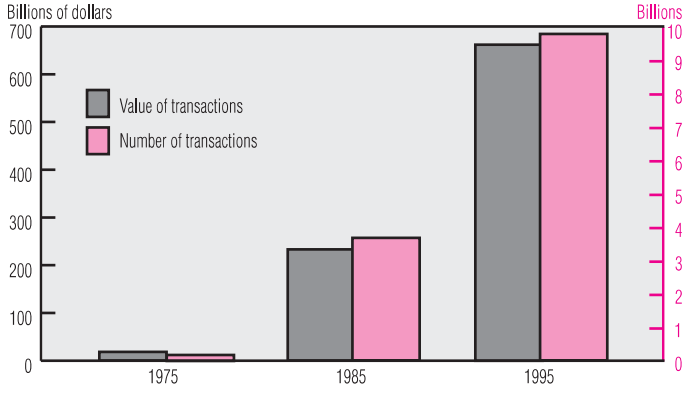
## U.S. Employment




SOURCE: U.S. Department of Labor, Bureau of Labor Statistics.

**FIGURE 2**

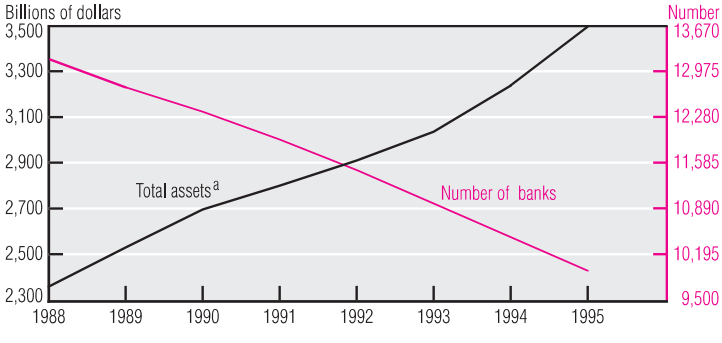
## ATM Use[a]




a. Based on Federal Reserve System estimates.
SOURCE: Board of Governors of the Federal Reserve System.

**FIGURE 3**

## U.S. Commercial Banking




a. Includes total loans and securities; seasonally adjusted data.
SOURCES: Board of Governors of the Federal Reserve System; and Federal Deposit Insurance Corporation.

new machinery. Other advances are less obvious, but may be just as important. For example, an accurate formula for assessing a loan's risk may allow a bank to substitute a small amount of an unskilled employee's time for that of a highly paid loan officer. Clearly, technology enters into a bank's employment decision in subtle and complex ways.[1]

One of the purposes of this paper is to document the effects of technical change on the demand for banking labor. Technical change is difficult to measure, however, so I approximate it by using the variable *time* for the period between 1984:IQ and 1996:IVQ. Because the use of ATM machines seems to approach a linear function of time during this interval, time may be a good proxy for technical progress when other, more easily measured labor demand factors are held constant. I also address a number of other questions, such as, when faced with the same measured economic environment, how many workers are employed by a bank today compared with the same bank a decade ago? How much of the decline in labor demand can be traced to "technical progress?" And how does technical progress differ in its effect on large versus small banks?

The second major development in banking over the last 10 years is the dramatic shift in industry composition, which has radically transformed the nature of banking employment.[2] While banking output (measured by total assets) has steadily increased, the number of individual banks has steadily fallen (see figure 3). This compositional change could affect the industry's demand for labor in several ways. A smaller bank's being swallowed by a bank holding company could result in duplicate positions being eliminated in research, marketing, management, and so on. Moreover, entire branches with duplicate functions could be wiped out.[3]

This paper also addresses some intriguing questions about the impact of this compositional change on labor demand. How is a banking organization's total employment

■ **1** See Griliches (1995) for an examination of the complexity of technical change in empirical estimation.

■ **2** For a detailed look at the change in industry composition, see Humphrey (1993), Berger, Kashyap, and Scalise (1995), Boyd and Gertler (1995), and Humphrey and Pulley (1997).

■ **3** Much of the anecdotal literature on the impact of mergers concentrates on gross employment effects, rather than on the net effects examined here. Thus, a management purge aimed at making a takeover easier would not affect net employment if replacements (presumably more docile workers) were hired from the outside.

affected by an acquisition?[4] That is, how does the post-acquisition picture differ from the defacto organization made up of the sum of the banks involved in the takeover? And which banking organization is most affected by an acquisition—the acquiring bank holding company or its target?

The next section lays out some of the theoretical and empirical issues surrounding labor demand in the banking industry. Section II then reports estimates of labor demand when the observation unit is a single firm, and section III uses a sample of acquisitions to explore how consolidation may affect employment. Section IV summarizes and concludes.

## I. Labor Demand Estimation

Interpretations of the labor demand estimates reported here must be sensitive to a number of factors, including the formal static theory of labor demand implicitly assumed in the discussion, the limitations of the data used, and the way that industrial consolidation is handled. This paper adopts a static analysis. Thus, even though many short-run dynamics may be affecting labor demand, the issues of interest lie not in the dynamics of adjustment, but rather in the magnitude of long-run demand. I concentrate on the long-run elasticity of demand with respect to wages, the effects of changing prices of close substitutes for labor, and the effects of a change in banking's industrial structure.

The point of departure for most static input demand studies is the cost function (see Berger and Humphrey [1992, 1997]). These papers summarize a wide literature that estimates cost functions for the banking industry, often generated with the same call report data used in this paper. However, their emphasis is usually on efficiency (broken down by category), not on overall labor demand. Indeed, this literature is so focused on efficiency that, often, the coefficients of the cost function required to derive the labor demand elasticities are not even reported. Rather, the papers report efficiency statistics derived from the behavior of residuals from the estimated cost function.

If we had all the correct prices faced by individual firms, as well as their input amounts, then the cost function could be written as $C(Q, P)$, where $Q$ is a vector of outputs and $P$ is a vector of input prices. When viewed this way, unique problems posed by the banking industry become evident. For instance, what is an output and what is an input? Researchers have proposed several solutions to this question.[5] Outputs are usually multivalued, because it is unclear whether deposits, for example, represent inputs or outputs, and whether loans should be considered a primary output or be broken into separate categories. In the banking cost-function literature, $Q$ is often composed of four outputs: deposits and three categories of loans—commercial/industrial, real estate, and other. Inputs are usually composed of labor, physical capital, and funds available from sources other than deposits. The reason for this particular breakdown is not that it is the best possible statistical model of banking industry behavior. Rather, it represents a huge compromise forced on the researcher because of the available data.

The major source of firm-level data for the banking industry is the call report, which every bank in the United States is required to file on a quarterly basis. Included are details on an institution's balance sheet, earnings, and expenses, as well as the number of "full-time equivalent" employees at the end of the reporting period.[6] Because these data are collected for regulatory purposes, they have advantages and disadvantages for the empirical researcher. On the plus side, the data set is large, embracing the entire banking industry. Also, because the information is collected from the same forms, it is comparable across banks. On the minus side, the data are not collected for the purpose of input demand estimation. This leads to major problems, some of which can be illustrated by looking at the measurement of changes that occur within a single bank.

Differentiating the cost function with respect to an input price yields (through Shepherd's lemma) an *output constant* demand curve for its associated input:

$$(1) \qquad \frac{\partial C}{\partial P_i} = L_i(Q, P).$$

Here, the $i^{th}$ input is denoted as $L_i$. This is an incomplete demand curve in that it does not include the changes that might occur if the quantities associated with the output vector were allowed to vary. For example, a wage change could affect the firm's demand for labor in several ways. First, if labor costs increase, the firm

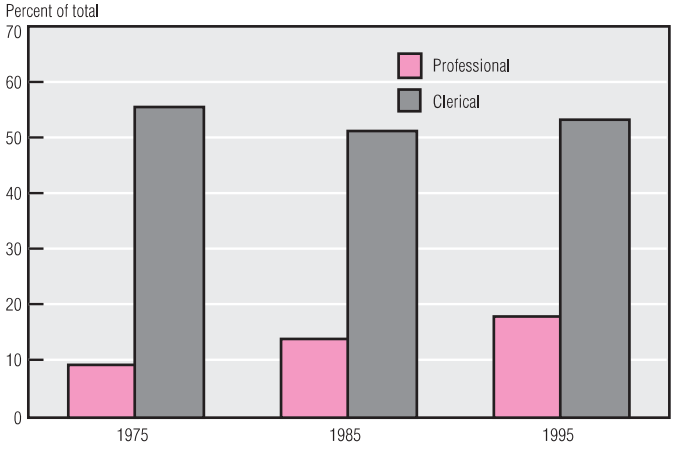
■ **4** An acquisition is distinguished from a merger in that a merger wipes out the charter of one of the banks, whereas an acquisition allows both the acquirer and the acquired firm to retain their charters.

■ **5** See Fixler (1992) for a discussion of the cost-function specification.

■ **6** A full-time equivalent number is obtained by adding up the appropriate fractions corresponding to part-time employment.

**FIGURE 4**

**Occupational Mix in Banking**




SOURCE: U.S. Equal Employment Opportunity Commission.

may decrease its output and thus reduce its use of the labor input. Second, even if output remains constant, the firm will substitute the now relatively cheaper inputs for the more expensive labor. Measurement of equation (1) tells us something only about the second effect.[7]

The output constant demand curve implies an estimating equation that poses some measure of labor employed by a firm as a function of wages, prices of physical capital and funds, deposits, and levels of the various loan outputs. Suppose we were to estimate the constant wage elasticity demand function

$$(2)\quad \ln L_{it} = \beta_1 + \beta_2 \ln W_{it} + \beta_3 \ln P_{kit} + \beta_4 t + X_{it}\gamma + \varepsilon_{it},$$

where $L$ is employment, $W$ is the wage rate, $P_k$ is the price of capital, $X$ is a row vector of other included variables in the demand equation, and $\gamma$ is a column vector of the parameters to be estimated. The parameter $\beta$ is often of chief interest. Equation (2), when fitted to call report data, must be interpreted with caution in light of recent developments in the banking industry.

Some of the important variables driving labor demand, including new techniques for evaluating loan applications, will not have an available proxy in the call report data. These variables are subsumed in the general interpretation of the coefficients of variables involving time. Perhaps more important are issues of aggregation. Many different labor types are combined into the single variable $L$, provided by the call report. Theory suggests that aggregation over a group of inputs, $i = 1...m$, requires the cost function to be written as

$$(3)\quad C(y, P_1, ...P_m, P_{m+1}, ...P_n) = C[y, \theta(P_1, ...P_m), P_{m+1}, ...P_n],$$

where $\theta$ is a price index that aggregates the prices $P_1, ...P_m$. A sufficient condition for (3) to be true is that the production function must be strongly separable between the group of inputs, $i = 1...m$, and all of the other inputs. There is some a priori evidence that this is not the case. For example, data from other industries suggest that skilled labor is complementary to capital inputs. Furthermore, technical change may be easier to accomplish if workers are more skilled. An examination of the occupational makeup of the banking industry suggests that workers are indeed more skilled than they were 20 years ago (see figure 4). Recent work by Demsetz (1997) reinforces this finding, showing that the skill set of bankers, like the skill set of workers in all financial, insurance, and real estate industries, has steadily increased over the last decade. Without more evidence, the direction of the bias for technical change estimates is hard to determine.

The best policy at this point is to use caution when interpreting estimates of labor demand based on call report data. Similar caveats apply to the physical capital variable, clearly an aggregation over many types and vintages. Buildings probably interact with labor in a fundamentally different way than an ATM does, so elasticities with respect to the capital variable computed from call report data should be viewed circumspectly.

A second way the firm's decisions will affect employment is more lumpy. The firm decides whether to open or close a plant, or, more drastically, whether to go out of business.[8] In the context of banking, this means that a bank decides whether to open or close a branch office, as banks generally reorganize through mergers or acquisitions rather than going out of business. Of approximately 9,000 banks operating in the United States during the mid-1990s, fewer than 20 failed each year. In addition, many new banks were chartered during the same period.

■ **7** Differentiation of equation (1) with respect to $P_j$ and a simple application of Young's theorem lead to the symmetry restrictions of convex analysis: $\frac{\partial L_i}{\partial P_j} = \frac{\partial L_j}{\partial P_i}$. These restrictions are usually rejected in cost function analyses of the banking industry. Given this, I concentrate on simple demand functions in what follows.

■ **8** Obviously, the latter decision is sometimes imposed on the firm from the outside.

TABLE 1

**Employment and Wages by Bank Size**

| Banks Assets:[a] | $0–$100 million | $100 million–$500 million | $500 million–$5 billion | More than $5 billion |
|---|---|---|---|---|
| **1984** | | | | |
| Number of banks | 6,014 | 1,775 | 385 | 47 |
| Employment/bank[b] | 39.8 (22.8) | 150.5 (89.2) | 1,106.3 (845.5) | 10,308.1 (12,940.3) |
| Wage[c] | 5.04 (2.01) | 5.15 (0.95) | 5.71 (1.16) | 6.96 (1.30) |
| Assets/worker[d] | 1,421 | 1,406 | 1,536 | 1,712 |
| **1987** | | | | |
| Number of banks | 6,645 | 1,914 | 417 | 67 |
| Employment/bank | 35.6 (20.2) | 138.4 (100.1) | 1,008.0 (785.4) | 8,400.1 (10,477) |
| Wage | 5.29 (1.20) | 5.45 (1.22) | 6.02 (1.48) | 7.49 (2.00) |
| Assets/worker | 1,493 | 1,600 | 1,795 | 1,928 |
| **1990** | | | | |
| Number of banks | 6,531 | 1,768 | 406 | 77 |
| Employment/bank | 34.2 (20.0) | 139.8 (82.9) | 1,005.7 (803.4) | 7,686.3 (8,970.8) |
| Wage | 5.32 (1.31) | 5.53 (1.98) | 6.09 (1.74) | 7.52 (2.41) |
| Assets/worker | 1,481 | 1,668 | 2,284 | 2,234 |
| **1993** | | | | |
| Number of banks | 6,641 | 1,637 | 401 | 75 |
| Employment/bank | 33.4 (21.8) | 137.7 (82.9) | 947.3 (810.4) | 7,950.4 (10,833.3) |
| Wage | 5.38 (1.34) | 5.64 (3.00) | 6.46 (3.65) | 8.09 (3.58) |
| Assets/worker | 1,451 | 1,615 | 2,647 | 2,128 |
| **1996** | | | | |
| Number of banks | 5,901 | 1,569 | 392 | 86 |
| Employment/bank | 33.2 (21.9) | 132.7 (80.1) | 845.2 (711) | 8,023.1 (9,617.7) |
| Wage | 5.54 (1.37) | 5.84 (1.80) | 6.69 (2.53) | 8.14 (3.55) |
| Assets/worker | 1,463 | 1,663 | 4,585 | 2,196 |

a. Real 1984 dollars.
b. Full-time equivalent employees per chartered bank.
c. Thousands of 1984 dollars per full-time equivalent worker per quarter.
d. Thousands of 1984 dollars per full-time equivalent worker.
NOTE: Numbers in parentheses are standard deviations. Footnotes b, c, and d apply to all years.
SOURCE: Author's calculations based on call report data.

This paper concentrates on the patterns surrounding bank acquisitions in order to examine the structural changes that have taken place in the industry. There are several compelling reasons for adopting this approach. First, acquisitions account for at least half the consolidation in the banking industry when measured by number of events. Recent evidence indicates that, relative to mergers, acquisitions are increasing in importance. Second, acquisitions do not destroy the target as a data-reporting organization, meaning that we can empirically observe both the acquirer and its target in the period following a takeover.

Thus, I examine changes in the long-run demand for banking labor using two approaches. The first concentrates on the behavior of a single firm as it minimizes costs subject to a changing environment. The second looks at two organizations—the acquiring bank holding company and its target—as they adjust to an acquisition. The next section looks at the behavior of single banks.

## II. Full-Sample Estimates

The call report data examined here embrace the entire U.S. banking industry, with more than 9,000 quarterly observations. Clearly, a data set this rich can be analyzed in several ways. I first look at raw averages computed for several classes of banks over different periods. These numbers are helpful in detecting broad patterns in the data. However, they are less useful in answering the question more relevant to policymakers, that is, how has banks' demand for labor changed, abstracting from the effect of other measured changes in their economic environment? If, for example, average employment has decreased and average wages have increased, then it is difficult to tell from simple averages whether the employment loss is due to higher wages or secular changes (such as technical progress) that are altering the labor demand curve. The discussion progresses from simple averages, to holding measured variables in the data set constant through regression analysis, to holding unmeasured individual characteristics of each bank constant through fixed-effect models. I start with the simple averages.

Table 1 summarizes the labor and wage data by asset class for each of the five years in the sample. Asset size is expressed in real 1984 dollars, so that the structure of the industry reflects

genuine growth in bank size rather than an artifice of inflation. Several patterns are evident. To begin with, larger banks are more important employers than smaller banks. Although firms in the smallest two asset categories accounted for 95 percent of all U.S. banks in 1984, they employed only about a third of the industry's workforce. This pattern was even more pronounced in 1996, when the smaller banks accounted for 94 percent of banks by number, but only 28 percent of total employment.

Another important finding is that in every year, larger banks pay a higher average wage. Furthermore, the large institutions differ from the small ones in the rate at which they have adjusted to the changes of the last decade. All bank categories paid a higher average real wage in 1996 than in 1984. However, the increase for small banks was only 10 percent, whereas for large banks it was 17 percent.[9] Also, banks in every size grouping saw their employment levels go down, but smaller firms still had an average employment of about 83 percent of 1984 levels, while larger banks trimmed their payrolls to 77 percent of their former size.

It is interesting to note that banks are getting bigger (in terms of total assets) and that larger banks have more assets per employee. However, the same trend is not evident for smaller institutions. Based on the data presented in table 1, it is hard to reject the notion that smaller banks may have reduced their employment because they have fewer assets to manage. The same cannot be said for the largest banks, particularly those in the $500 million to $5 billion category. Clearly, large banks are different institutions from the point of view of labor demand.

The patterns reported in table 1 must be considered when conducting a regression analysis. A simple labor demand function derived from the firm's static cost-minimization problem represented by equation (2) is reported in table 2. The data represent ordinary least squares (OLS) regressions of log labor on outputs and inputs, prices of substitute inputs, time, and structure variables. Of course, other specifications were tried, but the general pattern of results remained the same. First, the output constant wage elasticity of labor demand is about 40 percent; that is, for every 10 percent rise in the wage rate, the firm's demand for labor decreases by 4 percent. This is lower than many estimates for manufacturing (which cluster around unity), but is still well within the wide band of estimated elasticities reported for the service sector (see Hamermesh [1986, 1993]). Second, it is clear from the table that capital is a much-used substitute for labor. Its cross-price elasticity is quite high at 40 percent, indicating that the price of overnight funds does not affect the demand for labor.

All of a bank's outputs seem to require labor in the sense that the coefficients of outputs are positive. The easiest loans to service appear to be real estate and commercial/industrial loans. Core deposits are the most labor intensive input/output. Ceteris paribus, a 10 percent increase in deposits will boost the demand for labor by 3 percent. This is compatible with the view of banks as firms that use labor to service cheap deposits (relative to the funds market) and convert them into loans.

Although much of the recent research has focused on the structure of the banking industry, when it comes to employment variation, the prima facie evidence indicates that the unexamined seasonal component may be more important. Employment in the summer and fall quarters declines 2 percent relative to the spring (April–June) quarter. Belonging to a bank holding company is associated with an employment decrease of slightly less than 2 percent.[10]

The table 2 regressions show that labor demand has clearly shifted over the last decade. The coefficient of the time variable, which represents the number of quarters from the beginning of the sample period in 1984:IQ, indicates that employment at a firm having the same price structure and the same loan and deposit portfolio declines by half a percentage point per quarter. This stunning observation is the focus of the regression reported in the second column of table 2.

The second regression looks at the time pattern of labor employment by examining the coefficients on two variables defined as products of time and another variable. The first variable is time multiplied by the dummy variable for the firm's holding company status. In this case, the interpretation of the coefficient is the effect of time on banks that belong to bank holding companies, compared to the effect of time on the reference group of independent banks. The second variable is time multiplied by the logarithm of total assets held by the bank. Here, the interpretation of the coefficient is analogous: Compared to a bank with few assets, what is the effect of time on larger banks? A negative coefficient indicates that larger banks have experienced a greater percentage decline in employment demand.

■ **9** This occurred despite the fact that the largest banks were already paying their workers more in 1984 than small banks paid in 1996.

■ **10** The coefficient of this variable compares bank holding company members to a reference group of independent banks.

**TABLE 2**

## Log Labor Demand Regressions

| Variable | Ordinary Least Squares | | Fixed Effects |
|---|---|---|---|
| Intercept | −2.648 | −4.001 | −4.149 |
| | (317.8) | (329.0) | (51.4) |
| Log wage | −0.419 | −0.324 | −0.250 |
| | (223.9) | (474.7) | (34.8) |
| Log price capital | 0.408 | 0.476 | 0.112 |
| | (589.9) | (474.7) | (34.6) |
| Log price funds | −0.0005 | −0.0005 | −0.002 |
| | (0.478) | (5.31) | (2.4) |
| Log real estate loans | 0.0116 | 0.0149 | 0.009 |
| | (32.2) | (45.9) | (7.5) |
| Log commercial/ industrial loans | 0.0191 | 0.0123 | 0.0225 |
| | (43.1) | (30.7) | (10.7) |
| Log other loans | 0.185 | 0.055 | 0.0815 |
| | (232.1) | (66.2) | (15.5) |
| Log core deposits | 0.314 | 0.077 | 0.0814 |
| | (285.1) | (60.2) | (5.3) |
| Spring | 0.0055 | 0.0053 | 0.005 |
| | (4.79) | (5.18) | (16.1) |
| Summer | −0.0157 | −0.009 | −0.005 |
| | (13.2) | (8.7) | (13.4) |
| Fall | −0.0159 | −0.0044 | −0.004 |
| | (13.1) | (4.02) | (6.6) |
| Bank holding company | −0.0187 | −0.0177 | 0.0148 |
| | (18.7) | (10.1) | (3.5) |
| Bank holding company * time | | −0.0178 | −0.0005 |
| | | (10.18) | (3.5) |
| Time | −0.00570 | 0.00132 | 0.0110 |
| | (129.3) | (39.8) | (9.8) |
| Log total assets | | 0.509 | 0.535 |
| | | (286.8) | (30.4) |
| Log total assets * time | | −0.00135 | −0.00106 |
| | | (44.5) | (10.2) |
| Number of observations | 399,266 | 399,266 | 395,000 |
| Number of banks | 12,664 | 12,664 | 12,255 |

NOTE: Numbers in parentheses are $t$ ratios.
SOURCE: Author's calculations based on call report data.

This is exactly what is found—not a surprising result given the averages reported in table 1. An independent bank of average asset size (logarithm of total assets of 10) experiences no discernible employment decline over the sample period, holding wages and all else constant. A huge bank (logarithm of assets equal to 18) experiences a drop of nearly *40 percent.* Interestingly, larger banks seemed to have started the period with higher employment for the same variables than did smaller banks. Some of this decline may have resulted from a shift out of scale diseconomies.

The regressions reported in the first two columns of table 2 leave out many possible variables that might be included in labor demand. Some of these may exist in call report data. Others are measured poorly, if at all, by any data. An example of the latter is managerial taste in using new machinery. To the extent that this factor is correlated with labor demand and with an included variable (such as the price of physical capital), bias can result.

To compensate for this problem, I added a "fixed effect" to the error scheme. In a sense, this is necessary to maintain the interpretation of a firm's cost-minimizing labor demand. The coefficient of interest is the effect on a single firm's employment policy if a change occurs in a measured variable, such as wages. How do such measured environmental shifts affect the firm's decisions, holding all else constant? A fixed effect decomposes the unobserved error term into two terms:

$$(5) \qquad \varepsilon = \varepsilon_i + \varepsilon_{it},$$

where the firm fixed effect, $\varepsilon_i$, may be correlated with included observed variables. The fixed effect accounts for idiosyncratic elements facing the firm, such as local conditions, that remain somewhat constant over time.

The last column of table 2 reports the results from these regressions. The estimates are computed with consistent standard errors under a wide variety of assumptions, and are balanced to account for the possibly different number of time-series observations per bank. The standard errors and estimated coefficients are consistent, for example, if the nonidiosyncratic error for each observation, $\varepsilon_{it}$, is correlated through an autoregressive process with the error in the prior period, $\varepsilon_{it-1}$.

For the most part, the fixed-effects regressions yield similar estimates to the middle-column regression. However, there are some differences that may reflect how local conditions or management traditions are correlated

with the variable whose coefficient changes. First, the wage elasticity of demand is somewhat smaller for the fixed-effect estimates. Second, the cross-price elasticity of capital is much smaller. This may be because banks paying a higher price for capital in a cross-section also require more labor. This cross-sectional variation is less interesting than the average variation within a single bank's behavior because the latter is more useful in answering the question, "If a policy were to change the price of capital facing a single bank, how would that bank alter its employment?" The fixed-effect estimates indicate that the impact of a technical innovation that lowers the price of capital by 10 percent should reduce employment by only 1 percent.

The fixed-effect estimates differ from the OLS estimates most radically with respect to the bank structure variables. The coefficient of belonging to a bank holding company is now positive and significant, and the cross-time effect, though still negative, is much smaller. The total effect of being in a bank holding company is slightly positive at the beginning of the sample period and then decreases to a negligible amount by the end of the period. This contrasts with the OLS estimates, which imply a negative employment effect at the beginning of the sample period that increases to 70 percent by the end of the period.

The difference in estimates may be due to an underlying unobserved factor in a bank's labor policy that also makes it more likely to be part of a bank holding company. Although this unobserved factor is reflected in the simple OLS estimates, it is purged in the fixed-effect data. In predicting employment trends for the next decade, analysts must be more concerned about the effect of consolidation on a bank's employment policy than about the underlying policies of banks that happen to be consolidated.

This makes the fixed-effect estimate, which shows that consolidation has only a minimal impact on bank employment, more relevant. A Hausman–Wu test rejects the random-effects model at any reasonable level of significance with a $p$ value of $3 \times 10^{-7}$. Clearly, local conditions affect how a bank employs labor, and these conditions cannot be entirely accounted for through use of the simple measured variables employed here. They are correlated with wages, the price of capital, and especially the effect of bank structure over time in such a way that studies excluding unobserved local effects will yield misleading results. In particular, consolidation seems to matter little for labor demand. Below, I explore this issue more closely by looking at how participants in a sample of acquisitions reacted to consolidation.

## III. Effects of Acquisitions

We can observe the effect of consolidation more directly by looking at a subsample of banks acquired in the 1984–94 period. I collected data on 200 acquisitions, covering both the acquiring banking organization and its target bank. In all cases, the target institution was an independent bank. Such a criterion was much too restrictive for the acquirer, however, essentially ruling out all acquisitions except of one small rural bank by another. In the case of a bank holding company, I aggregated all of the banks in the organization (except for the target of the current acquisition) into a defacto "superbank." Both banks (the acquiring organization and its target) could then be compared before and after the acquisition. Note that the fictional organization of the acquiring bank holding company formed by the sum of its component banks stays constant throughout the comparison period. I look at the broad patterns suggested both by averages over the periods surrounding the acquisition and by regression analyses.

Table 3 presents some of these averages, comparing the post-acquisition institution with the same bank two quarters prior to takeover. The top number is the mean difference in log employment after the acquisition, the value in parentheses is the $p$ value for the hypothesis of no difference, and the bottom number is the total number of acquisitions included in the mean. Thus, the first entry under "acquiring bank" indicates that the acquiring banking organization increased its employment about 2 percent, on average, in the period two quarters before the acquisition to one quarter after (or nearly a year, if one includes the acquisition quarter). My sample includes 197 banks for this particular comparison, and the $p$ value indicates that the hypothesis of no change in the acquiring bank's employment would be rejected at any reasonable level of significance.

The patterns suggested by table 3 run contrary to the accepted wisdom regarding acquisitions and employment. Both the acquiring bank and its target expanded their payrolls rather than trimming them. This process took two or three years, but by the end of that time, both

**TABLE 3**

**Pre- and Post-Acquisition Comparisons**

| Quarters after Acquisition | Acquiring Bank | Target Bank |
|---|---|---|
| 1 | 0.0228 | 0.0150 |
| | (0.0002) | (0.15) |
| | 197 | 197 |
| 2 | 0.0316 | 0.0314 |
| | (0.00005) | (0.01) |
| | 199 | 199 |
| 3 | 0.0372 | 0.0475 |
| | (0.0002) | (0.004) |
| | 186 | 186 |
| 4 | 0.0379 | 0.0469 |
| | (0.000008) | (0.01) |
| | 174 | 174 |
| 6 | 0.0520 | 0.0586 |
| | (0.0000002) | (0.005) |
| | 158 | 158 |
| 8 | 0.0573 | 0.0586 |
| | (0.000007) | (0.02) |
| | 133 | 133 |
| 12 | 0.0725 | 0.0565 |
| | (0.00001) | (0.04) |
| | 113 | 113 |
| 16 | 0.0696 | 0.0481 |
| | (0.0006) | (0.126) |
| | 89 | 89 |

NOTE: The top number is the mean difference in log employment after acquisition versus two quarters before acquisition. The number in parentheses is the *p* value for the hypothesis of no difference. The bottom number is the total number of acquisitions included in the mean.
SOURCE: Author's calculations.

the acquirer and its target were employing between 5 and 7 percent more workers than in the period just before the acquisition.

This is not meant to suggest that the acquisition caused the employment gain. Indeed, the most plausible story is that banks in growing markets tend to get bigger—in part by acquiring other banks, which can then participate in the expanding market. The employment pattern of acquiring banks prior to acquisition shows that they are in fact generally growing before takeover. (The same is not true of the targets.) However, the evidence does refute the commonly held idea that acquisitions are usually accompanied by large employment cuts. Four years after acquisition, targets average nearly 5 percent *more* workers.

The regression analyses reported in table 4 support the notion that banks involved in an acquisition are generally expanding; however, the acquisition slows their growth. The fixed-effect estimates basically reinforce the OLS estimates. Acquisitions do cause a drop in employment, but the effect is small: Three years after a takeover, a bank may see its payroll shrink about 2 to 4 percent because of the acquisition effect. (Given that an acquisition has taken place, the sample average is three years from the takeover date.) By contrast, all of the small banks in the acquisition sample experienced secular *growth* in employment of 30 percent, even after accounting for the growth of measured variables included as inputs, outputs, or prices. Size alone, measured by total assets, accounted for 10 times more of the dynamic employment effect than did the time from acquisition.

Clearly, there is room for further research. My acquisition sample is small compared to the consolidation that has occurred in the industry over the last decade. Moreover, for all of the advantages offered by studying acquisitions, much is left out by excluding mergers. There is every reason to believe that a merger, which destroys a bank's identity, will have a different employment effect than an acquisition, which allows that identity to continue. Acquisitions may occur precisely because the acquirer wants to keep offices open under the target's old name. Thus, a merger may have a larger negative effect on employment. Future research can also improve the estimates by documenting the selectivity effects caused by consolidation.

## IV. Conclusion

The primary lesson of the call report data is that the decline in banking employment over the last 10 years is a large-bank phenomenon. A typical small bank experienced no employment loss when its loan portfolios and real wage were held constant, whereas the largest institutions saw their payrolls shrink by nearly 1 percent per quarter, all else equal. In 1984, the beginning of the sample period, larger banks employed more workers to service the same number of loans. By 1996, this differential had been wiped out. The effect on the

**TABLE 4**

## Fixed-Effect Regressions

| Variable | Acquiring Bank | Target Bank |
|---|---|---|
| Intercept | −4.453 | −4.628 |
| | (5.8) | (11.8) |
| Log wage | −0.192 | −0.233 |
| | (5.3) | (7.4) |
| Log price capital | 0.070 | 0.080 |
| | (7.1) | (7.1) |
| Log price funds | −0.011 | −0.0029 |
| | (0.28) | (0.674) |
| Log real estate loans | 0.0007 | 0.0258 |
| | (0.115) | (2.9) |
| Log commercial/ industrial loans | 0.004 | 0.0222 |
| | (0.382) | (3.2) |
| Log other loans | 0.122 | 0.0983 |
| | (4.1) | (3.3) |
| Log core deposits | 0.039 | 0.135 |
| | (0.938) | (2.1) |
| Spring | 0.0033 | 0.0072 |
| | (1.79) | (3.0) |
| Summer | −0.0012 | −0.002 |
| | (0.558) | (0.872) |
| Fall | −0.0007 | 0.0044 |
| | (0.229) | (1.4) |
| Post-acquisition dummy | −0.0007 | −0.002 |
| | (0.095) | (0.178) |
| Post-acquisition * time | −0.0017 | −0.0037 |
| | (1.69) | (3.0) |
| Time | 0.012 | 0.0168 |
| | (2.3) | (2.0) |
| Log total assets | 0.606 | 0.507 |
| | (7.43) | (7.2) |
| Log total assets * time | −0.00103 | −0.0017 |
| | (2.5) | (2.3) |
| Number of observations | 7,040 | 6,951 |
| Number of banks | 315 | 315 |

NOTE: Numbers in parentheses are *t* ratios.
SOURCE: Author's calculations.

industry as a whole has been dramatic, because large banks employ the lion's share of the banking workforce.

There are several possible reasons for the secular decline in employment within the nation's largest banks. One possibility, emphasized above, is that these institutions have been more effective at incorporating technical substitutes for labor than have small banks. A technical transition in one area of a large bank may provide important lessons for a transition in a different area. Also, the fixed costs of a transition may be amortized over a larger operation, justifying the technical transformation.

On the other hand, measurement error may supply just as cogent a reason for the secular decline in large-bank employment. Large banks may employ more-skilled workers, allowing them to hire fewer people. Some supporting evidence is offered by the fact that larger banks pay higher average wages than do smaller ones. In addition, large banks may be more able to use outside organizations to accomplish tasks that were once performed in-house. Thus, a small bank may hire a single person to do its accounting because the fixed costs of hiring an outside firm are prohibitive, whereas a larger bank may use outside consultants who do not appear on the company payroll. Clearly, further work is needed before the large-bank effect can be attributed solely to technical change.

The large-bank effect is big enough to swamp any of the other possible suspects in the employment decline. Consolidation's impact on the industry's payrolls amounts to about a tenth of the large-bank effect. Indeed, seasonal changes are responsible for more of the employment variation than is the impact of industrial structure.

It is fascinating that so little measurable effect on employment is observed for either the acquiring bank or its target. Equally intriguing is the dramatic impact of bank size in explaining the employment changes witnessed over the last decade. Given this marked empirical pattern, any research effort that attempts to properly measure scale economies in banking should have great relevance in predicting future employment trends.

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