Megamergers and expanded scope: Theories of bank size and activity diversity

Todd T. Milbourn [a,*], Arnoud W.A. Boot [b], Anjan V. Thakor [c]

[a] *Institute of Finance and Accounting, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, UK*
[b] *Faculty of Economics and Econometrics, University of Amsterdam, Amsterdam, The Netherlands*
[c] *University of Michigan Business School, Ann Arbor, MI 48109, USA*

Abstract

We point to the vast empirical literature in banking to argue that the current expansion of scale and scope in banking represents a puzzle. We then present two explanations that help us to understand why banks are getting bigger and doing more. Our explanations suggest that banks may be doing this to increase their shareholders' wealth and/or merely to enhance the reputation of their management (CEOs). The latter could lead to herd behavior involving banks that increase size and scope despite a dissipation of shareholders' wealth. Alternatively, increasing size and scope may offer *strategic benefits* (and hence increase shareholder wealth) in an environment with sufficient profitability in current operations and substantial uncertainty about future core competencies. We explore conditions under which either one of these competing explanations may dominate. © 1999 Elsevier Science B.V. All rights reserved.

JEL classification: G21; G24; G31; G34

Keywords: Consolidation; Strategic investments; Herd behavior

---

[*] Corresponding author. Tel.: +44 171 262 5050; fax: +44 171 724 3317; e-mail: tmilbourn@lbs.ac.uk; internet: http://www.lbs.ac.uk/faculty/tmilbourn/

1. Introduction

The global consolidation of financial services has been a phenomenon that has been underway for some time now. Its most striking aspect has been the ever-escalating *scale* of mergers in banking. In just the last few years, Chemical Bank Corporation has paid $14.5 billion for Chase Manhattan, and Nations Bank has paid $9.7 billion for Boatmen's Bancshares and $15.5 billion for Barnett Banks. Many of these mergers have led to a consolidation of money center banks (e.g., the Chase Manhattan and Chemical Bank merger) as well as regional expansion (e.g., the expansion strategies of Banc One and Nationsbank). In Europe, there have been numerous mergers between large domestic universal banks. A noteworthy example is the marriage of the Union Bank of Switzerland and Swiss Bank Corporation. And in Japan, the most spectacular merger of all has produced the new Tokyo-Mitsubishi bank with over $700 billion in assets.

A second striking aspect of the global consolidation in financial services has been the expanding scope of banks, particularly in the US. As the Glass–Steagall Act restrictions on banks are increasingly relaxed, there is a growing number of bank holding companies (BHCs) that are joining the ranks of those with expanded (Section 20) powers. These BHCs are seeking to acquire brokerage houses and investment banks as an alternative to expanding their scope organically into non-banking activities. Recent examples are the union of Salomon Brothers and Smith Barney through the acquisition of Salomon by Travelers, and the spectacular cross-industry merger announced by Citicorp and Travelers.

While these developments represent broad trends, there are exceptions. For example, (the former) Continental Bank and Bankers Trust voluntarily limited their activities to the corporate middle market. And Citibank has until recently focused largely on retail banking. By contrast, European banks typically do not display such focus in their domestic markets.

All of this raises some important questions that we aim to answer in this paper:
- Why are banks so interested in increasing their size?
- Why are so many banks expanding the scope of their activities? When is it optimal for banks to narrow their scope?
- Does a bank's choice of scope depend on the competitive environment? Can we explain the cross-sectional differences in banking scope across countries?

The popular financial press offers simple answers to these questions. Banking is becoming more competitive. Banks thus need to improve their cost efficiencies to compete more effectively. This leads them to grow bigger to exploit economies of scale. Moreover, competition squeezes margins in traditional commercial banking, making it attractive for banks to look for other sources of profitability, and these are perceived to be outside commercial banking; hence,

the rush to expand scope. And expanding scope means banks can offer customers a greater diversity of financial services under one roof, possibly at lower cost (scope economies).

This seems plausible since it is in harmony with the pronouncements of bank CEOs and consultants. But there is a fly in the ointment. From a theoretical standpoint, the cost efficiency arguments are difficult to reconcile with the expansion of scope because such expansion is incompatible with sticking to one's "core competencies" (Hamel and Prahalad, 1990). Further, empirical evidence could hardly be viewed as providing strong endorsement.

Consider first the evidence on the size issue. Even though the literature finds that average X-inefficiencies are about 20–25% of the costs in the banking industry [1] – suggesting that the *potential* exists for achieving cost efficiencies through mergers – bank mergers do not seem to be terribly effective vehicles for reducing these cost inefficiencies. The overall conclusion of both simple cost ratio studies [2] and X-efficiency studies [3] is the same. There appears to be little or no improvement in cost efficiency on average from US banking mergers of the 1980s, with changes in efficiency on costs on the order of 5% or less. Moreover, the cost efficiency improvements that did occur were *not* well predicted by the ex ante factors – relative efficiencies of merging banks, degree of market overlaps, etc. – that are theoretically linked to efficiency improvements (see Berger, 1997).

The literature also suggests that there is potential for improved risk diversification through bank mergers. Greater diversification would allow banks to adopt a higher-revenue product mix – by increasing the ratio of loans to securities in the asset portfolio – without the market demanding additional capital or higher interest rates on uninsured liabilities, [4] thereby improving profitability. However, the empirical evidence on this issue is *mixed*. Some studies have found that bank mergers improve accounting profitability ratios (e.g., Cornett and Tehranian, 1992; Spindt and Tarhan, 1992), whereas others have found *no* improvement in these ratios (e.g., Berger and Humphrey, 1992; Akhavein et al., 1997; Chamberlain, 1997). The results of studies that have used market-value-based performance measures rather than accounting profitability ratios are also mixed. Some studies have discovered that mergers increase the combined market values of the merging entities (e.g., Cornett and Tehranian, 1992; Zhang, 1995), whereas others have found *no* improvement associated with merger announcements (e.g., Hannan and Prager, 1996;

---

[1] See Berger and Humphrey (1992), Savage (1991) and Altunbas et al. (1995). Berger and Humphrey (1997) find that X-inefficiencies are slightly lower.

[2] See, for example, Rhoades (1986, 1990) and Pilloff (1996).

[3] See, for example, DeYoung (1997) and Peristiani (1997).

[4] See Benston et al. (1995), Hughes et al. (1996), Akhavein et al. (1997), and Demsetz and Strahan (1997).

Houston and Ryngaert, 1994). Moreover, the post-merger performance improvement of merged firms has been found to be insignificantly related to the stock-market response to merger announcements (Pilloff, 1996). [5]

The effect of bank mergers on *bank lending behavior* is also *mixed*. Mergers between small banks appear to increase lending to small businesses, but mergers between larger banks generally decrease this type of lending or leave it unaffected. [6]

Thus, based on the scientific evidence, it is hard to make a compelling case for banks to merge to get bigger, either to reduce costs or improve profitability, although economic efficiency gains from mergers seem to be greater in the 1990s than in the 1980s. [7]

Similarly, there is also lack of empirical evidence that expansion of scope in banking has been beneficial (see Berger et al., 1993). The general empirical evidence on the shareholder value implications of loss of focus through scope expansion and mergers shows us that focus dilution has led to value losses on average (Berger and Ofek, 1995).

We are thus left with a bit of a conundrum. There are possibly some benefits to some banks from expanding size, but this hardly constitutes persuasive evidence of pervasive scale economies. Moreover, it is hard to predict the mergers in which the benefits of size, if any, can actually be realized. And the economic benefits of expanding scope seem to be absent in the data. So, how do we answer the questions raised at the outset: why are banks getting bigger, and why are they expanding scope?

In what follows, we offer two competing, but possibly complementary, answers. In Section 2, we develop a simple reputation-based model in which CEOs of larger or more diverse banks enjoy higher reputation and possibly higher monetary compensation in equilibrium. When combined with over-confidence on the part of some CEOs, this leads to the result that the over-confident CEOs will merge to get bigger and/or increase scope for *perceived* personal benefit. Thus, growth is pursued despite the absence of shareholder-value benefits. If this growth is purely dissipative, then this is a corporate control problem arising from imperfect corporate governance. However, if the

---

[5] Berger (1997) discusses the methodological weaknesses in these studies. One noteworthy exception is Akhavein et al. (1997). This study finds substantial increases in profit efficiency on average from the bank megamergers of the 1980s.

[6] See Keeton (1997), Peek and Rosengren (1997), Strahan and Weston (1996), Craig and dos Santos (1997), and Berger et al. (1998).

[7] A recent paper by Berger (1997) comprehensively addresses this issue for a more recent sample of mergers, that from the 1990s. It finds that bank mergers generate statistically significant increases in profit efficiency but little changes in cost efficiency. However, efficiency gains *cannot* be predicted from ex ante information in most cases.

growth adds value under the management of *some* CEOs, herd behavior among *all* CEOs may be induced.

In Section 3, we offer an alternative explanation, based on a companion paper (Boot et al., 1998). Using a Cournot oligopoly model, we show in our companion paper that an expansion of scope could benefit the bank's shareholders when the environment is sufficiently uncertain. That is, when a bank faces sufficient *strategic skills uncertainty* – arising from a dearth of knowledge about its own future skills and the skills that will be needed to compete effectively in a particular market in the future – it may benefit the bank's shareholders if there is an expansion of scope. The principal advantage of expanded scope is that the bank gains a first-mover advantage in a new market and learns about the match of its skills to those needed to compete effectively in that market.

The second explanation is fundamentally different from the agency/corporate control explanation in that scope expansion could benefit the shareholders rather than just bank CEOs when there is sufficient strategic uncertainty. Our analysis also exposes a second factor that affects the bank's choice of whether to increase scope or remain focused, namely the competitiveness of banking. Expansion of scope is costly and not without risk since the scope-expanding investment will be wasted if demand does not materialize. Only if current activities are sufficiently profitable due to limited market competitiveness are the costs and risks of scope expansion sustainable. The combination of conditions that it takes to make scope expansion optimal is high strategic uncertainty and sufficient profitability in current operations. This may help us to understand cross-sectional differences in banking scope across countries.

We conclude the paper in Section 4 with observations about the relative merits of the two explanations and their empirical testability.

2. Why some CEOs like to manage bigger banks

2.1. The model

The agents: Consider a CEO managing a bank of average size. He is one of a very large number of CEOs who vary in ability $\eta \in \{U, T\}$, where U represents "untalented" and T represents "talented". Ability is unknown, both to the CEO himself and to others. The prior probability that a CEO is talented is given by

$$\Pr(T) = \gamma \in (0, 1). \tag{1}$$

There is universal risk neutrality. Later in the analysis, we will allow for a portion of these CEOs to be overconfident in their perceived probability of success.

Investment opportunities for banks: We assume that the bank currently operates in one line of business and has an investment commitment of I_1. This commitment is made at date $t = 0$. The payoff on this investment will occur at $t = 1$. There are two possible values of this payoff, S_1 (denoting success corresponding to investment I_1 and F_1 (denoting failure corresponding to investment I_1), with $S_1 > F_1 > 0$.

The probabilities of S_1 and F_1 are type-dependent and given by:

$$\Pr(S_1|\eta) = p_\eta,$$
$$\Pr(F_1|\eta) = 1 - p_\eta, \tag{2}$$

with $\eta \in \{U, T\}$ and $p_T > p_U$.

At an intermediate point in time, date $t = 1/2$, the CEO can increase the bank's size by elevating the investment base of the bank from I_1 to $I_2 > I_1$. The larger asset base leads to a lower probability of success. The idea here is that it is generally more difficult to manage a larger bank. This is a natural assumption. Managing a larger firm requires confronting more serious agency problems that call for greater coordination skills. Greater size also forces the CEO to make difficult decisions regarding resource allocation that are linked to a single corporate vision and a strategy that is integrated across the various units of the larger firm. Thus, we assume that for $\eta \in \{U, T\}$

$$\Pr(S_2|\eta) = q_\eta,$$
$$\Pr(F_2|\eta) = 1 - q_\eta, \tag{3}$$

where S_2 represents success and F_2 represents failure, both corresponding to an investment level (bank size) of I_2. Moreover, we assume that $S_2 > S_1 > F_1 > F_2$.

We will assume that talented CEOs can manage larger banks just as efficiently as smaller banks, but that an untalented CEO has a lower success probability with a larger bank. This is consistent with the notion that the *average* success probability is lower with a larger bank. Thus,

$$q_T = p_T \quad \text{and} \quad p_U > q_U = 0,$$

where we have normalized $q_U = 0$ without loss of generality.

We can now write down the average success probabilities for the CEO for the two possible sizes of the bank (with $\overline{\eta}$ representing the expected quality of the CEO with the expectation taken with respect to the commonly-held prior beliefs about the CEO's type):

$$\Pr(S_1|\overline{\eta}) = \gamma p_T + [1 - \gamma]p_U \equiv \overline{p}, \tag{4}$$

$$\Pr(S_2|\overline{\eta}) = \gamma q_T + [1 - \gamma]q_U = \gamma q_T \equiv \overline{q}. \tag{5}$$

Clearly, since $p_T = q_T$ and $p_U > 0$, we have $\overline{q} < \overline{p}$. Thus, the larger the asset base, the lower the average success probability.

For simplicity, we assume that the expected values of the bank under investment levels I_1 and I_2 are identical. Technically, this means that $\overline{p}S_1 + (1 - \overline{p})F_1 = \overline{q}S_2 + (1 - \overline{q})F_2$. Shareholders are therefore indifferent between the two.

Overconfidence: We wish to model overconfidence in the simplest possible way. Let us assume that there is a fraction $1 - h \in (0, 1)$ of CEOs in the overall sample of CEOs who are overconfident in the sense that they overestimate the probability of success while managing a larger bank. That is,

$$\text{Pr}^O(S_2|T) = q_T^O > q_T \tag{6}$$

where $\text{Pr}^O(S_2|T)$ represents the success probability that an overconfident CEO estimates while managing a bank with size I_2. That is, the probability of success enjoyed by a talented CEO managing a size-I_2 bank is assessed to be higher by an overconfident CEO than by a rational CEO. We also assume that overconfident CEOs know that the rest of the market assesses a lower success probability in managing a size-I_2 bank.

Thus, the *expected* success probability assessed by an overconfident CEO managing a size-I_2 bank is

$$\text{Pr}^O(S_2|\overline{\eta}) = \gamma q_T^O + [1 - \gamma]q_U = q_T^O \equiv \overline{q}^O \tag{7}$$

since we assume that even an overconfident CEO is rational about the success probability of an untalented CEO ($q_U = 0$). Observe that overconfident and rational CEOs are equally valuable to the firm in terms of their ability to produce successful outcomes. That is, they have the same probability of being talented/untalented. We will consider a more general version of this in Section 2.3.

Wages: We assume that CEO wages are reputation-dependent and paid at two points in time: after the intermediate investment decision (I_1 or I_2) and after terminal payoffs are realized. A CEO's wage at date t is given by

$$W^t = \text{Pr}(\text{CEO is T at date t}|\text{investment decision-and/or payoff}) \times \Delta \tag{8}$$

where $\Delta \equiv \overline{W}_T - \overline{W}_U > 0$, $\overline{W}_T$ is the reservation wage of a talented CEO and $\overline{W}_U$ is the reservation wage of an untalented CEO. The interpretation of Eq. (8) is that the CEO's wage is the wage that would be paid to an untalented CEO (which can be nomalized to be zero without loss of generality) plus the difference between the reservation wages of talented and untalented CEOs weighted by the probability that the CEO is talented.

Sequence of events: The sequence of events is depicted in Fig. 1. At date $t = 0$, the CEO is in place and has investment $I = I_1$ committed to the business. At date $t = 1/2$, the CEO has the choice of increasing the size of the bank from I_1 to I_2, and the first wage is paid. At date $t = 1$, the payoff on the investment

t=0	t=1/2	t=1
CEO is in place with uncertainty about his ability.	CEO can either increase the bank's size to I_2 or keep it at I_1.	Payoff is realized and becomes common knowledge.
Investment $I = I_1$ is committed to the bank.	The size decision is publicly observed and becomes common knowledge.	CEO is paid his second wage.
	CEO is paid his first wage.	Game ends.

Fig. 1. Sequence of events.

$(I_1$ or $I_2)$ is realized (S or F) and becomes common knowledge. Then the second wage is paid.

2.2. Analysis

The key to the analysis is the decision that the CEO makes at date $t = 1/2$. To understand this decision, let us compare the CEO's expected wages across his two choices, I_1 and I_2. Observe that we can ignore the first wage for now because none of the CEOs know their type, and hence choosing I_1 or I_2 provides no information about the talent of the CEO. [8] Let us first consider the choice problem of a rational CEO. He assesses his expected second wage for $I = I_1$ as

---

[8] Given the shareholders' indifference between I_1 and I_2, they do not care whether the CEO is overconfident or not.

$$\begin{aligned}
\mathrm{E(wage}|I_1) &= \mathrm{E}[\mathrm{Pr}(T|I_1)] \times \Delta \\
&= \mathrm{Pr}(S_1) \times \mathrm{Pr}(T|S_1) \times \Delta \\
&\quad + \mathrm{Pr}(F_1) \times \mathrm{Pr}(T|F_1) \times \Delta \\
&= \overline{p}\left[\frac{\mathrm{Pr}(S_1|T)\mathrm{Pr}(T)\Delta}{\mathrm{Pr}(S_1|T)\mathrm{Pr}(T) + \mathrm{Pr}(S_1|U)\mathrm{Pr}(U)}\right] \\
&\quad + [1-\overline{p}]\left[\frac{\mathrm{Pr}(F_1|T)\mathrm{Pr}(T)\Delta}{\mathrm{Pr}(F_1|T)\mathrm{Pr}(T) + \mathrm{Pr}(F_1|U)\mathrm{Pr}(U)}\right].
\end{aligned}$$

That is,

$$\mathrm{E}(W|I_1) = \frac{\overline{p}p_T\gamma\Delta}{p_T\gamma + p_U[1-\gamma]} + \frac{[1-\overline{p}][1-p_T]\gamma\Delta}{[1-p_T]\gamma + [1-p_U][1-\gamma]}. \tag{9}$$

Similarly, we can derive the rational CEO's expected wage for $I = I_2$ as

$$\mathrm{E}(W|I_2) = \overline{q}\Delta + \frac{[1-\overline{q}][1-q_T]\gamma\Delta}{[1-q_T\gamma]}. \tag{10}$$

We now have the following result.

Proposition 1. *A rational CEO is indifferent between I_1 and I_2.*

Proof. Using Eqs. (9) and (10), it is straightforward to show that $\mathrm{E}(W|I_1) = \mathrm{E}(W|I_2)$. $\square$

The intuition is as follows. Even though the expected wage at $t = 1$ associated with successfully managing a larger bank is higher, the probability of success is lower. For a CEO who knows no more about whether he is talented or not than the market does, the tradeoff between the lower success probability and the higher wage conditional upon success is exactly a wash. We can thus assume that some fraction $f \in (0, 1)$ of them will choose I_1 and the rest $(1 - f)$ will choose I_2.

Consider now the decision problem of the overconfident CEO. These CEOs differ only in their assessment of the probability of success for $I = I_2$. However, they recognize that the bank's shareholders – who determine CEO wages – have a lower prior belief about the probability of success, and use this recognition in determining their expected wages. For $I = I_1$, there is no difference in the assessments of rational and overconfident CEOs. That is, an overconfident CEO assesses his expected wage at $t = 1$ as

$$\mathrm{E}^{\mathrm{O}}(W|I_1) = \frac{\overline{p}p_T\gamma\Delta}{p_T\gamma + p_U[1-\gamma]} + \frac{[1-\overline{p}][1-p_T]\gamma\Delta}{[1-p_T]\gamma + [1-p_U][1-\gamma]}, \tag{11}$$

which is the same as $E(W|I_1)$ given in Eq. (9). But for $I = I_2$, we have

$$E^O(W|I_2) = Pr^O(S_2) \times [1 \times \Delta] + Pr^O(F_2) \times \left[\frac{[1 - q_T]\gamma\Delta}{1 - q_T\gamma} \right]$$

$$= \overline{q}^O \Delta + [1 - \overline{q}^O] \left[\frac{[1 - q_T]\gamma\Delta}{1 - q_T\gamma} \right]. \tag{12}$$

We now have the following result.

Proposition 2. *An overconfident CEO strictly prefers I_2 to I_1.*

Proof. We know that $E^O(W|I_1) = E(W|I_1)$, and we also know by Proposition 1 that $E(W|I_1) = E(W|I_2)$. Thus, all that we need to show is that $E^O(W|I_2) > E(W|I_2)$. Now, since $\overline{q}^O = q_T^O\gamma$, we have

$$E^O(W|I_2) = \Delta\gamma \left[q_T^O + \frac{[1 - q_T^O\gamma][1 - q_T]}{[1 - q_T\gamma]} \right] \tag{13}$$

whereas from Eq. (10) we have

$$E(W|I_2) = \Delta\gamma \left[q_T + \frac{[1 - q_T\gamma][1 - q_T]}{[1 - q_T\gamma]} \right] = \Delta\gamma. \tag{14}$$

Comparing Eqs. (13) and (14), we see that $E^O(W|I_2) > E(W|I_2)$ if

$$q_T^O + \frac{[1 - q_T^O\gamma][1 - q_T]}{[1 - q_T\gamma]} > 1,$$

which is true since $1 - q_T^O\gamma < 1 - q_T\gamma$. $\square$

2.3. CEO herding behavior

While the analysis thus far shows that only overconfident CEOs will strictly prefer to expand scale and possibly scope, the model could easily be extended to show that herding behavior may *force* all managers to expand scale and scope.

Assume that the proportion of the overconfident CEOs who are *truly* talented is $\gamma^O > \gamma$. We will assume that the CEO population is sufficiently large so that γ^O can be viewed as the commonly-shared prior probability that an overconfident CEO is talented. Thus, the population of CEOs who are overconfident has a higher-than-average fraction of CEOs who are talented, and everybody agrees on this. And we continue to assume that every overconfident CEO overestimates the probability of success associated with I_2, relative to the

assessments of all others. Moreover, as before, no CEO – rational or over-confident – knows his type.

Let us now contrast this result to our earlier analysis. There we showed that rational CEOs were indifferent between I_1 and I_2, and we simply assumed that a random fraction f chose I_2 over I_1. Moreover, all overconfident CEOs chose I_2. In the current setting, all overconfident CEOs again choose I_2. However, can it be an equilibrium that some rational CEOs remain at I_1? The answer is no. The reason is that in this case, shareholders are now willing to pay overconfident CEOs higher wages. Since all CEOs are indistinguishable to shareholders, the *average* wage earned by a CEO would be higher for I_2 than I_1. Therefore, rational CEOs originally choosing I_1 would deviate from their choice. This intuition is captured in the following two results.

Before we state and discuss these results, it would be useful to note that, unlike the analysis in the previous subsection, the CEO does *not* ignore his first wage and focus solely on his expected wage at $t = 1$. Since different CEOs *may* choose different bank sizes I_1 or I_2 depending on whether they are rational or overconfident and because there is a higher fraction of talented CEOs among the latter set, the bank size decision at $t = 1/2$ can potentially communicate information that is relevant for CEO wage determination. Let $\widehat{W}(I)$ be the CEO wage set at $t = 1/2$ based on the observed I. Each CEO now seeks to maximize

$$\widehat{W}(I) + \mathrm{E}(W|I), \tag{15}$$

where we assume, without loss of generality, that the CEO assigns equal weights to his wages at $t = 1/2$ and $t = 1$.

The CEOs now find themselves in a signaling game in which the CEO – privately informed about whether he assesses the expected success probability of an I_2 bank as $\overline{q}^O$ or $\overline{q}$ – moves first and the uniformed "market" responds with a wage. Thus, this is a standard signaling game in which the informed agent moves first, and we can use available concepts of equilibrium. We will use Nash Equilibrium and the Kreps and Wilson (1982) Sequential Equilibrium concepts.

Proposition 3. *There is never a separating Nash equilibrium in this game with at least some rational CEOs choosing I_1 and all the overconfident CEOs choosing I_2.*

Proof. Suppose counterfactually that there is a nonzero fraction of rational CEOs who choose I_1. Because it does not matter what this fraction is, as far as this proof is concerned, we will assume it is 1. Then,

$$\widehat{W}(I_1) = \Pr(T|I_1) \times \Delta$$
$$= \Pr(T|I_1, \text{CEO rational})$$
$$\times \Pr(I_1|\text{CEO rational}) \times \Delta$$
$$= \gamma \times 1 \times \Delta. \tag{16}$$

and

$$\widehat{W}(I_2) = \Pr(T|I_2) \times \Delta$$
$$= \Pr(T|I_2, \text{CEO overconfident})$$
$$\times \Pr(I_2|\text{CEO overconfident}) \times \Delta$$
$$= \gamma^O \times 1 \times \Delta. \tag{17}$$

Since $\gamma^O > \gamma$, we see from Eqs. (16) and (17) that $\widehat{W}(I_2) > \widehat{W}(I_1)$.

Next, since only rational CEOs choose I_1 in this conjectured equilibrium, we have

$$E(W|I_1) = [\Pr(S_1) \times \Pr(T|S_1) \times \Delta] + [\Pr(F_1) \times \Pr(T|F_1) \times \Delta]$$
$$= \frac{\overline{p} p_T \gamma \Delta}{p_T \gamma + p_U[1 - \gamma]} + \frac{[1 - \overline{p}][1 - p_T]\gamma \Delta}{[1 - p_T]\gamma + [1 - p_U][1 - \gamma]}. \tag{18}$$

And since only overconfident CEOs choose I_2, a rational CEO will assess his expected wage at $t = 1$ from choosing I_2 at $t = 1/2$ to be:

$$E(W|I_2) = [\Pr(S_2) \times \Pr(T|S_2) \times \Delta] + [\Pr(F_2)\Pr(T|F_2) \times \Delta]$$
$$= \overline{q}\Delta + \frac{[1 - \overline{q}]\Delta[1 - q_T]\gamma^O}{1 - \gamma^O q_T}. \tag{19}$$

It is easy to show that $E(W|I_2) > E(W|I_1)$. Thus, $\widehat{W}(I_2) + E(W|I_2) > \widehat{W}(I_1) + E(W|I_1)$, so that a rational CEO will *not* want to choose I_1. It is straightforward to show that $\widehat{W}^O(I_2) + E^O(W|I_2) > \widehat{W}^O(I_1) + E^O(W|I_1)$, so that the overconfident CEOs avoid I_1 as well. □

The only outcome that could possibly be a separating equilibrium is the one described in this proposition. Since it is not a Nash equilibrium, we can conclude that there are no separating equilibria in this game.

Proposition 4. *There is a pooling Sequential Equilibrium in which all CEOs choose I_2 and the market (which determines the CEO's wage) believes with probability 1 that a CEO choosing I_1 is rational.*

Proof. Consider the conjectured equilibrium. Since all CEOs choose I_2, we have:

$$\widehat{W}(I_2) = \Pr(T|I_2) \times \Delta$$

$$= \left\{ \begin{array}{l} \Pr(T|I_2, \text{ overconfident CEO}) \times \Pr(\text{CEO overconfident}) \\ \quad + \Pr(T|I_2, \text{ CEO rational}) \times \Pr(\text{CEO rational}) \end{array} \right\} \times \Delta$$

$$= \left[[1-h]\gamma^O + h\gamma\right]\Delta$$

$$= \overline{\gamma}\Delta, \tag{20}$$

where we have defined $\overline{\gamma} \equiv [1-h]\gamma^O + h\gamma$. Moreover,

$$\mathrm{E}(W|I_2) = \Pr(S_2)\Pr(T|S_2)\Delta + \Pr(F_2)\Pr(T|F_2)\Delta,$$

where

$$\Pr(T|S_2) = \frac{\Pr(S_2|T)\Pr(T)}{\Pr(S_2|T)\Pr(T) + \Pr(S_2|U)\Pr(U)}$$

and

$$\Pr(S_2|T)\Pr(T) = [\Pr(S_2|T, \text{CEO rational})$$
$$\times \Pr(T|\text{CEO rational}) \times \Pr(\text{CEO rational})]$$
$$+ [\Pr(S_2|T, \text{CEO overconfident})$$
$$\times \Pr(T|\text{CEO overconfident}) \times \Pr(\text{CEO overconfident})].$$

Thus, we can write

$$\mathrm{E}(W|I_2) = \overline{q}\Delta + \frac{[1-\overline{q}]\Delta[1-q_T]\overline{\gamma}}{1 - \overline{\gamma}q_T}. \tag{21}$$

Since a choice of I_1 is an out-of-equilibrium move, we now need to use the belief that a CEO choosing I_1 is rational with probability 1 to write: $\widehat{W}(I_1)$ and $\mathrm{E}(W|I_2)$, which are exactly the same as those derived in the proof of Proposition 3. It is now easy to see that

$$\widehat{W}(I_2) + \mathrm{E}(W|I_2) > \widehat{W}(I_1) + \mathrm{E}(W|I_1)$$

and

$$\widehat{W}^O(I_2) + \mathrm{E}^O(W|I_2) > \widehat{W}^O(I_1) + \mathrm{E}^O(W|I_1). \qquad \square$$

2.4. Further interpretations

One factor we have not used in our analysis is private control rents that are *noncontractible*. The CEO's preference for size stems thus far solely from his perception that he can get a higher wage by managing a larger bank, either because he overestimates the probability that he will be successful in managing the larger bank (Section 2.2) or because following the herd is optimal (Section 2.3). If we also introduced noncontractible private control rents that increased

with bank size, then *all* CEOs would prefer to run larger banks. Although we have chosen a very stylized way to model how banks get bigger, what we have in mind is that the CEO acquires another bank of size $I_2 - I_1$, to add to his bank (with size I_1. [9]

Note that even though we have focused on a larger bank being more difficult to manage, we could just as easily imagine that a bank with more diverse activities is more difficult to manage. In this case, our model also explains the overconfident CEO's desire for greater scope.

The way we have modeled overconfidence is a little different from the approach used recently in asset pricing papers to explain the anomalous behavior of stock returns (e.g., Daniel et al., forthcoming; Kyle and Wang, 1997). In those papers, the approach is to assume that an overconfident agent overestimates the precision of a noisy signal about a future outcome. We could have used a similar assumption in a more elaborate model of CEO behavior. In our context, however, we believe our assumption of overestimation of the success probability allows us to generate the desired results more directly.

There are many ways to interpret the combination of overconfidence and the desire for a higher wage that motivates the CEO's wish to increase the bank's size. One can think of this combination as "ambition", as captured in the following quote from *The Economist* (7 February 1998).

> It is tempting to conclude that this new round of mergers, built on true romance, will be more successful at boosting profits than those built on 1980s KKR-style tactics; tempting but premature. After all, hostile takeovers have at least one important virtue. By pitting managers against each other, they force them to explain at length how they propose to create value in a business... In the 1990s, this healthy choice between rival stewards has often been missing.

> There is another reason to be wary of friendliness. Merger mania often breaks out when firms are flush with cash and their bosses are flush with ambition. In their haste to create bigger, better companies, it is all too easy for executives to fall into one another's arms with indecent haste. Sir Richard Sykes, Glaxo's boss and the prime mover behind the merger [with SmithKline] has made no secret of his desire to run the world's largest drug company. That the biggest merger ever was hatched in just ten days

---

[9] Another way in which we could have generated a size preference on the part of the CEO is to assume CEO risk aversion as in Holmstrom and Ricart i Costa (1986) and derive an optimal wage contract that is intertemporally downward rigid. With such a wage contract, the (rational) CEO essentially holds an option on his human capital. This invites him to overinvest relative to the shareholders' optimum because there is no risk that his wage will decline if the bigger bank fails.

should encourage shareholders in Glaxo and SmithKline to look closely at the small print.

3. Scope as a strategic advantage

3.1. General framework

The explanation developed in this section is that strategic uncertainty about future exploitable core competencies may dictate broadening of scope. In a related paper (see Boot et al., 1998), we develop a formal model of banking that formalizes these ideas and incorporates scope as a potential competitive advantage. Here we present the general arguments only informally. As in that paper, we start with a banking sector with narrowly defined existing activities and ask whether banks should expand into a 'new' activity F. A key feature of the analysis is that there is strategic future uncertainty about this activity in that the bank is unsure of whether it has the skills to compete effectively in activity F. It also faces uncertainty about the demand for this new activity, i.e., demand may not materialize.

The activity F has prospects only in the long run. The bank must decide whether to expand into activity F, and if so, whether to enter early or late. Early entry is costly because the activity F becomes important only later. Demand may not materialize, and entering early requires investments to be made prior to the resolution of demand uncertainty. Moreover, the scope expansion associated with investing in strategic options could reduce the competitiveness of existing operations (say due to dilution of focus). However, early entry offers potential strategic advantages. In particular, early entry could lead to the discovery of skills that would allow for a more efficient delivery of activity F and hence make the commercial bank a more credible competitor once the prospects of this activity become clear.

The question is: When will the benefits of early entry outweigh the costs? The uncertainty about skills plays a key role. If this uncertainty is substantial, early entry may be beneficial. The other key factor is the competitive environment of the banking sector, and the anticipated competition for the new activity, F.

Suppose that F can also be offered by a specialized provider (a "boutique" specializing in this activity). If the commercial bank enters (early or late), we could consider the market for this activity as a Cournot duopoly game. Early entry is beneficial because the bank would then learn its skills in the new activity F. This allows the bank to compete more aggressively when it has favorable information about its skills and more cautiously when it has poor information about its skills. The benefits of early entry thus depend on how likely it is that a specialized provider will come along.

The competitive environment of the "traditional" banking sector enters the analysis because of the investment and risk associated with early entry in F. If banking is sufficiently competitive, banks would be unable to absorb the investment and risk that come with early entry. We will say more about the interaction between the competitive environment and the benefits of early entry in what follows.

3.2. Further observations

An immediate implication of the analysis is that investments in strategic options – and thus the adoption of broader, less-focused strategies – will be observed in less competitive industries, whereas firms in competitive industries will embrace more focused strategies. This could also explain why Continental European banks generally follow broad strategies. Their local market power allows them to afford the 'widening of scope' strategy and benefit from its potential future strategic advantages.

Moreover, as stated earlier, the anticipated future competitive environment for activity F matters as well. If the bank anticipates facing little or no competition in this activity in the future, early entry – with its accompanying cost of focus dilution – is unnecessary because a competitively unchallenged bank can operate successfully in this market without the benefit of early skills discovery. At the other extreme, when the anticipated competition for F is very intense (perhaps due to many potential future competitors), early entry may once again be suboptiomal. The analysis in Boot et al. (1998) thus leads to the predicition that *moderate* anticipated competition in F leads to early entry. In Table 1, we have summarized the main insights.

We therefore show that the competition in the bank's current activity, the competition it anticipates in the future in a new activity, and the degree of uncertainty about future skills needed in F combine to lead to predictions about early entry and hence optimal scope. Scope expansion is seen to be optimal when there is high strategic uncertainty, moderate competition expected in activity F, and low-to-moderate competition in the existing activity.

Table 1
Optimal scope as function of competitive environment

Anticipated competitive environment in strategic option	Current competitive environment in "traditional" banking activity	
	Little competition	High competition
Little competition	Narrow	Narrow
Medium competition	Broad	Narrow
High competition	Narrow	Narrow

Narrow = no early investment in F, Broad = early investment in F.

Our approach also permits us to explore the benefits of consolidation. We do this by introducing multiple competing banks at the outset. Consider two of these banks contemplating a merger. The question before them is whether consolidation (merging) today gives them a competitive advantage in undertaking activity F tomorrow. We show in our companion paper (Boot et al., 1998) that the benefit of such a merger is twofold. First, merging may help create ''deep pockets'' and make investments in strategic options more affordable. Second, merging leads to *diversification* in skills. The two banks jointly have a higher probability of having the right skills to compete in F than each has separately. While both effects may work in concert in many mergers, either effect by itself could rationalize a merger.

It should be clear that these effects have little significance in an environment without strategic options. Our analysis thus predicts greater consolidation in industries with more strategic uncertainty.

4. Conclusion

We began this paper with the argument that, in light of the existing empirical evidence, it was puzzling why banks seemed so keen on getting bigger and expanding the scope of their operations. We have offered two explanations for this practice.

First, on the issue of size, as well as possibly scope, we presented a simple model in which reputation building incentives could give rise to excessive mergers. The idea is simple. If it takes greater ability to successfully run a bigger bank, then expansion of scale and/or scope should benefit reputation-conscious managers. Moreover, if a CEO is overconfident in that he assesses a higher probability of success in running a bigger bank than he rationally should, then he will display a strict preference for size. Shareholders of the acquiring bank will not be better or worse off due to the acquisition, but the bank will do it anyway. This agency explanation suggests that bank CEOs may pursue size even if shareholders are worse off. We also show that this may give rise to herd behavior, and hence induce the whole industry to follow suit.

Second, on the issue of expanding scope, we suggested that it may be optimal for the bank's shareholders to do this in an environment with sufficiently high strategic skills uncertainty. If a bank anticipates that regulators will permit it to engage in a greater variety of activities in the future, but it is uncertain about whether it has the skills to compete effectively in these markets, then it may wish to make investments in these new activities early to resolve the skills uncertainty. Doing this carries with it risks (making investments early before demand is known) and costs (e.g., dilution of focus), so it pays to do so only when competition in current activities is *low* to *moderate*.

Finally, on the question of the *interaction*between the bank's desires for size and focus, we suggested that consolidation could benefit banks both by deepening their pockets and by diversifying strategic skills uncertainty, facilitating strategic investments in new activities.

Our overall conclusion, therefore, is that banks may be expanding their size and their scope for two reasons. One is that CEOs see great reputational benefits in doing so, even though they may not be entirely rational in assessing the expected value of these benefits. [10] This reason has little to do with what is good for the shareholders. The other reason is that CEOs see potential benefits to their banks' shareholders from getting bigger and expanding scope.

Our explanations have the virtue of pointing to ways in which we can look at the data and empirically distinguish between these two motivations. In particular, the specific predictions that could be confronted with the data are:

- If there is substantial strategic uncertainty about future opportunities, there is low to moderate competition in the existing activities of banks, and there is expected to be moderate competition in the uncertain future opportunity, scope-expanding early entry to exploit the future opportunity should benefit shareholders. Both the stock price announcement effect as well as the post-expansion performance of the bank should be positive.
- Scale-expanding mergers between banks under the conditions identified above should also benefit shareholders, and these benefits should show up both in the announcement effect and in the post-merger performance of the bank.
- Scale and/or scope expansion that does not satisfy the above conditions is not good for shareholders and is attributable to either CEO overconfidence, herd behavior, or other reasons related to the CEO's personal preference for size. Even though the stock price announcement effect to such initiatives may be positive, the post-initiative performance of the bank will be disappointing to the shareholders.

Relative to what is available on this issue in the existing literature, we believe that the predictions we have delineated provide sharply-defined control variables that empiricists could use in future tests of whether scale and scope expansion benefit shareholders.

It should be obvious by now that our explanations for scope and scale expansion transcend banking. We have chosen to focus on banking because it is one industry that faces significant strategic uncertainties, making the assumptions of our analysis particularly applicable. That is, the key assumptions of our analysis are well calibrated for banking. Moreover, both expansion of

---

[10] It is plausible to believe that there is a relatively high proportion of overconfident individuals among CEOs, many of whom were promoted because they placed big bets that paid off.

size and scope are highly visible in banking and have potentially important policy ramifications.

Acknowledgements

References

Akhavein, J.D., Berger, A.N., Humphery, D.B., 1997. The effects of megamergers on efficiency and prices: Evidence from a bank profit function. Review of Industrial Organization 12, 95–139.

Altunbas, Y., Maude, D., Molyneux, P., 1995. Efficiency and mergers in the UK (Retail) banking market. Working paper, Bank of England.

Benston, G.J., Hunter, W.C., Wall, L.D., 1995, Motivations for bank mergers and acquisitions: Enhancing the deposit insurance put option versus earnings diversification, Journal of Money, Credit, and Banking, 27, 777–788.

Berger, A.N., 1997. In: Amihud, Y., Miller, G. (Eds.), The Efficiency Effects of Bank Mergers and Acquisition: A Preliminary Look at the 1990s Data. Bank Mergers and Acquisitions, Kluwer Academic Publishers, Boston, MA (forthcoming).

Berger, A.N., Humphrey, D.B., 1992. Megamergers in banking and the use of cost efficiency as an antitrust defense. Antitrust Bulletin 37, 541–600.

Berger, A.N., Humphrey, D.B., 1997. Efficiency of financial institutions: international survey and directions for future research. European Journal of Operational Research 98, 175–212.

Berger, A.N., Hunter, W.C., Timme, S.G., 1993. The efficiency of financial institutions: A review and preview of research past, present and future. Journal of Banking and Finance (special issue on The Efficiency of Financial Institutions) 17, 221–249.

Berger, A.N., Saunders, A., Scalise, J.M., Udell, G.F., 1998. The effects of bank mergers and acquisitions on small business lending. Journal of Financial Economics 50, 187–229.

Berger, P.G., Ofek, E., 1995. Diversification's effect on firm value. Journal of Financial Economics 37, 39–65.

Boot, A.W.A., Milbourn, T.T., Thakor, A.V., 1998. Expansion of banking scale and scope: Don't banks know the value of focus? Working paper, London Business School.

Chamberlain, S.L., 1997. The effect of bank ownership changes on subsidiary-level earnings. In: Amihud, Y., Miller, G. (Eds.), Bank Mergers and Acquisitions, Kluwer Academic Publishers, Boston, MA (forthcoming).

Cornett, M.M., Tehranian, H., 1992. Changes in corporate performance associated with bank acquisitions. Journal of Financial Economics 31, 211–234.

Craig, B.R., dos Santos, J.C., 1997. Banking consolidation: Impact on small business lending. Working paper. Federal Reserve Bank of Cleveland.

Daniel, K., Hirshleifer, D., Subrahmanyam, A., forthcoming. A theory of overconfidence, self-attribution, and security market under- and over-reactions. Journal of Finance.

Demsetz, R.S., Strahan, P.E., 1997. Diversification, size, and risk at bank holding companies. Journal of Money, Credit, and Banking 29, 300–313.

DeYoung, R., 1997, Bank mergers, X-efficiency, and the market for corporate control. Managerial Finance 23.

Hamel, G., Prahalad, C.K., 1990. The core competence of the corporation, Harvard Business Review, May-June, 79–91.

Hannan, T.H., Prager, R.A., 1996. Do substantial horizontal mergers generate significant price effects? Evidence from the banking industry. Working paper. Board of Governors of the Federal Reserve System, Washington DC.

Houston, J.F., Ryngaert, M.D., 1994. The overall gains from large bank mergers. Journal of Banking and Finance 18, 1155–1176.

Hughes, J.P., Lang, W., Mester, L.J., Moon, C.-G., 1996. Efficient banking under interstate branching. Journal of Money, Credit, and Banking 28, 1045–1071.

Keeton, W.R., 1997. The effects of mergers on farm and business lending at small banks: New evidence from tenth district states. Working paper. Federal Reserve Bank of Kansas City.

Kreps, D.M., Wilson, R., 1982. Sequential equilibrium. Econometrica 50 (4), 863–894.

Kyle, A.S., Wang, F.A., 1997. Speculation duopoly with agreement to disagree: Can overconfidence survive the market test?. Journal of Finance 52 (5), 2073–2090.

Peek, J., Rosengren, E.S., 1997, Bank consolidation and small business lending: It's not just bank size that matters. Working paper, Federal Reserve Bank of Boston.

Peristiani, S., 1997. Do mergers improve the X-efficiency and scale efficiency of U.S. Banks? Evidence from the 1980s Journal of Money Credit and Banking 29, 326–337.

Piloff, S.J., 1996. Performance changes and shareholder wealth creation associated with mergers of publicly traded banking institutions. Journal of Money, Credit and Banking 28, 294–310.

Rhoades, S.A., 1986. The operating performance of acquired firms in banking before and after acquisition. Staff Economic Studies 149, Board of Governors of the Federal Reserve System, Washington, DC.

Rhoades, S.A., 1990. Billion dollar bank acquisitions: A note on the performance effects. Working paper, Board of Governors of the Federal Reserve System, Washington, DC.

Savage, D.T., 1991. Mergers, branch closings, and cost savings. Working paper, Board of Governors of the Federal Reserve System, Washington DC.

Spindt, P.A., Tarhan, V., 1992. Are there synergies in bank mergers? Working paper, Tulane University, New Orleans, LA.

Strahan, P.E., Weston, J., 1996. Small business lending and bank consolidation: Is there cause for concern? Current Issues in Economics and Finance 2, Working paper. Federal Reserve Bank of New York.

Zhang, H., 1995. Wealth effects of U.S. bank takeovers, Applied Financial Economics 55, 329–336.