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ABSTRACT

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This paper analyzes the consequences of bank diversification into fee-based businesses. Universal banks raise welfare by expanding the range of services available to entrepreneurs. However, because they may choose to rescue failed entrepreneurs in order to sell them fee-based financial services, universal banks provide weaker incentives. Adopting a holding company structure and devolving liquidation decisions to the lending division partially resolves this problem. We demonstrate a relationship between the welfare effects of diversification and competition for fee-based business, and we analyze the tying of lending and fee-based business. Our analysis yields several testable implications.

JEL Classification: G20, G21 and G34
Keywords: bank diversification, soft budget constraint, tying and universal banks

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Abstract

This paper analyzes the consequences of bank diversification into fee-based businesses. Universal banks raise welfare by expanding the range of services available to entrepreneurs. However, because they may choose to rescue failed entrepreneurs in order to sell them fee-based financial services, universal banks provide weaker incentives. Adopting a holding company structure and devolving liquidation decisions to the lending division partially resolves this problem. We demonstrate a relationship between the welfare effects of diversification and competition for fee-based business, and we analyze the tying of lending and fee-based business. Our analysis yields several testable implications.

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1. Introduction

An increasing fraction of bank income is derived from fee-based activities. In the United States this is partly a response to the 1999 passage of the Gramm-Leach-Bliley Act, which dismantled legal barriers to commercial bank participation in security market business. But the same trend had been evident in Europe for at least a decade:[1] scope expansion by banks appears to be a response to commercial and technological imperatives, and in particular to the economies of scale made possible by advances in information technology.[2]

Scope expansion in banking has generated some controversy. While there is little academic evidence in support of the concerns expressed in the 1930s that commercial banks underwrite low-quality securities issued by their borrowers,[3] modern commentators have raised other problems. In particular, an active policy debate in the United States concerns the phenomenon of "tying": that is, of making the price of one deal contingent upon participation in another. In 1992, U.S. congressman John Dingell wrote an open letter to Alan Greenspan, then chairman of the Federal Reserve system, suggesting that financial institutions were using loans as "loss-leaders" to attract more profitable investment banking business. Cross-selling of this type is illegal in the United States;[4] Congressman Dingell suggests that it may also undermine the safety and soundness of the banking system.

This paper provides a formal framework for thinking about these questions. We examine the effect of bank scope expansion upon financial contracts, upon the profitability of the bank's lending business, and upon social welfare. Our analysis generates some insights into the private and socially optimal organiza-

[1] This trend is documented by Lown, Osler, Strahan, and Sufi (2000) and the E.C.B. (2004).

[2] See Berger, De Young, Genay, and Udell (2000) and Barth, Brumbaugh, and Wilcox (2000).

[3] For a discussion of the Pecora committee's 1932 conclusions on the operations of commercial bank security affiliates, see Morrison and Wilhelm (2007, pp. 196-215). Modern evidence that 1920s commercial banks did not underwrite poor quality loans to repay distressed loans is presented below.

[4] Under sections 23A and 23B of the Federal Reserve Act, national banks may not charge below market rates on credit or other products to benefit affiliates. In fact, the Office of the Comptroller of the Currency (2003) find no evidence that banks have contravened the law.

tional form of financial conglomerates; it also yields testable empirical predictions and generates policy conclusions.

We model a bank that lends to cash-constrained entrepreneurs with risky projects. When entrepreneurs are unsuccessful their project can be liquidated immediately, or they can be supplied with continuation finance. Liquidation is socially costly, because it imposes private costs upon entrepreneurs that exceed the cost to the bank of providing continuation finance. Nevertheless, the threat of closure provides the entrepreneur with strong incentives to work hard, and hence may form part of the constrained optimal contract.

Banks do not internalise the entrepreneur's costs of liquidation. Hence, in our model, *non-diversified commercial banks*, which have no fee-based business, never provide unsuccessful entrepreneurs with continuation finance. We show that liquidation incentives can be changed by expansion into fee-based financial services. If the fee-based business is consolidated into the same profit and loss account as the lending business, we call the combined institution a *universal bank*. Universal banks may choose to provide unsuccessful entrepreneurs with continuation finance, in order to earn a profit by selling them fee-based financial services. If the fee-based business is sufficiently profitable, universal banks are therefore unable to use the threat of liquidation to incentivise entrepreneurs. Instead, they reduce the interest rate that they charge to entrepreneurs; doing so increases the entrepreneurs' success state income, and hence partially restores their incentives. In other words, while several commentators have suggested that the move into fee-based business is a *response to* reductions in the profitability of lending businesses, in our paper this move is the *cause of* these reductions.

An alternative to running a universal bank with lower interest rates is to adopt a *diversified holding company* structure, under which lending and fee-based businesses are run by divisions with independent profit and loss accounts. The lending division in a diversified bank holding company has the same liquidation incentives as a non-diversified commercial bank, and hence is able to commit to liquidate unsuccessful entrepreneurs. The associated positive incentive effect comes at a cost: diversified bank holding companies do not profit from the sale of fee-based financial services to unsuccessful entrepreneurs.

In line with the concerns expressed by Congressman Dingell, our model predicts that universal banks will advance unprofitable loans to unsuccessful entrepreneurs in order to sell them fee-based financial services.[5] However, these banks are more profitable than they would be as non-diversified commercial banks, so it is unclear that their fee-based businesses have a negative marginal impact upon financial stability. In any case, our model indicates that a legal argument about "market rates" for credit should allow for differences in organizational form: interest rates are lower in universal banks because this is the most effective way to incentivise their entrepreneurs, not because low interest rates are used as "loss-leaders" to attract fee-based business.

Universal banks extend continuation finance to unsuccessful entrepreneurs in our model in order to transact profitable fee-based business with them. This is a tying strategy of the type identified at the start of the Introduction. We analyse its consequences using two different sets of assumptions.

First, we assume that, by virtue of its priviledged access to customer data, only the lending bank is

[5] Stiroh (2004) provides indirect evidence of increasing cross-selling by U.S. banks: he argues that increasing correlation between net interest income growth and noninterest income growth could arise because banks are transacting loans and fee-based business with the same customers.

able to provide fee-based financial services to entrepreneurs. In this case, as a monopolist in the fee-based business, the bank is able to extract all of the surplus that it generates from that business, irrespective of the success or failure of its entrepreneur. Liquidation of unsuccessful entrepreneurs results in the loss of this surplus. Nevertheless, we demonstrate that, relative to the social optimum, bankers in this case are biased against universal banking and in favour of diversified bank holding companies. Since tying happens only in universal banking, our analysis indicates that there is *too little* tying of fee-based business when the market for that business is not competitive.

Second, we assume that the market for fee-based financial services is competitive, so that successful entrepreneurs can purchase these services anywhere. In contrast, because unsuccessful entrepreneurs can use fee-based services only if they attract continuation finance, their lenders are able to demand all of the surplus that these services generate as the price of securing additional finance.[6] Hence, competition in the market for fee-based financial services renders unsuccessful entrepreneurs more profitable customers in that market than successful entrepreneurs. This serves to increase the relative attractiveness of universal banking, as only universal banks sell fee-based services to unsuccessful entrepreneurs. When competition in the fee-based financial services market is sufficiently intense, we show that this effect is sufficiently powerful to render bankers excessively willing to run universal banks: as a result, there is *too much* tying of fee-based business.

Our work extends a growing literature on financial conglomeration and the efficiency implications of universal banking. Much of this literature is concerned with the systemic implications of universal banking. Allen and Jagtiani (2000) and Mälkönen (2004) use portfolio simulations to argue that universal banks may generate diversification benefits that increase their ability to withstand an economic shock. On the other hand, Boot and Schmeits (2000) argue that diversification may reduce the accuracy of price signals, and so weaken market discipline. A number of authors assert that universal banking may undermine financial stability by extending the deposit insurance safety net: Boyd, Chang, and Smith (1998) argue that banks are more likely to take advantage of the safety net when they have equity stakes in their borrowers, and Freixas, Lóránth, and Morrison (2007) argue that capital regulations for universal banks should be designed in light of the likelihood of this type of regulatory arbitrage. In practice, Benston (1994), White (1986), and Cornett, Ors, and Tehranian (2002) find no evidence that scope expansion reduces bank stability.

Several authors have investigated the profitability of universal banking although, as discussed in section 6.2 below, only one paper (Lepetit, Nys, Rous, and Tarazi (2008)) directly examines the effect of a bank's diversification upon its lending business. Stiroh and Rumble (2006) examine profitability in U.S. Financial Holding Companies betweem 1997 and 2002; they find that marginal increases in non-interest income are associated with lower risk-adjusted profits. Similarly, in a study of 755 European banks between 1997 and 2003, Mercieca, Schaeck, and Wolfe (2007) find an inverse relationship between non-interest income and bank performance. Allen and Rai (1996) and Vander Vennet (1999) find limited evidence of scope economies in European universal banks, although Cyberto-Ottone and Murgia (2000) find evidence that scope-expanding mergers in European banking markets increase shareholder wealth.

We note at the start of the Introduction that there is very little evidence to support the notion that universal banks rip off their customers by bringing poor quality securities to market. Indeed, as Kroszner and

[6]To employ an analogy from the foreclosure literature (see Rey and Tirole (2007)), the bank controls an "essential facility:" in this case, the supply of loans to the unsuccessful entrepreneur.

Rajan (1994) note, rational investors should anticipate this type of security issue, so that it could not succeed. Kroszner and Rajan (1994), Ang and Richardson (1994), and Puri (1994, 1996) present evidence that supports this hypothesis. Kanatas and Qi (1998) present a model in which universal banks determine their size by trading this price impact off against the potential for scope efficiencies.

The remainder of the paper is laid out as follows. We present our basic model in Section 2. Bank contracts and optimal bank organizational form is analyzed in Section 3 in the case without competition for fee-based business; Section 4 extends this analysis to the case with competition. Section 5 discusses the robustness of our theoretical results. Section 6 discusses the empirical implications of our work, and Section 7 concludes. Some of the proofs are contained in the Appendix.

2. Model

2.1. Technologies

The action in our model unfolds over three dates, $t = 0, 1, 2$. There is a unit mass of risk-neutral entrepreneurs, each of whom is endowed with a project that requires a time 0 investment of I_1. After investment occurs, each entrepreneur selects an effort level $e \in [0,1]$ at a personal cost $\Psi(e) = \alpha\frac{e^2}{2}$, where $\alpha > 0$; at time 1, each project succeeds with probability e, and is unsuccessful with probability $1-e$. At time 1, successful projects yield a verifiable return of $\Pi_1 > I_1$, and unsuccessful projects return 0. Unsuccessful projects can be continued or liquidated. Continuation requires a further capital injection of I_2 and yields a guaranteed verifiable return of Π_2 at time 2; liquidated projects yield no time 2 returns, and entrepreneurs experience a non-pecuniary cost of $b > 0$ if their projects are liquidated.

ASSUMPTION 1. *Time* 1 *continuation of unsucessful projects is socially optimal, but it yields negative pecuniary returns:*

$$b > I_2 - \Pi_2 > 0. \tag{1}$$

We define

$$L \equiv I_2 - \Pi_2$$

to be the pecuniary cost of continuing an unsuccessful project.

We assume that entrepreneurs have no cash at time 0, so that they require outside financing. Outside finance in our model is provided by a *bank*, which invests on behalf of risk-neutral shareholders. The bank makes time 0 investments, and also makes time 1 continuation decisions for unsuccessful entrepreneurs. When a bank provides continuation finance to an unsuccessful entrepreneur, we will say that it *rescues* the entrepreneur.

As a consequence of its first period lending, the bank acquires relationship-specific information about its borrowers. Banks can elect at time 0 to make an infrastructure investment $F > 0$ that will enable then to use their relationship-specific information to provide fee-based financial services to entrepreneurs who at time 1 are either successful, or are rescued after being unsuccessful. Entrepreneurs use the fee-based financial services that they purchase at time 1 generate an additional time 2 surplus of S. We assume that

$$S > F. \tag{2}$$

We refer to a bank that spends F at time 0 as a *diversified bank*. A diversified bank comprises a *commercial bank division*, which manages the lending business, and a *non-lending division*, which provides fee-based financial services at tme 1. A bank that does not spend F at time 0, and hence that cannot sell fee-based financial services at time 1, is a *non-diversified commercial bank.*

2.2. First-Best Outcome

Consider the benchmark case in which entrepreneurial effort and the time 1 continuation decision are selected to maximise total surplus. In this case, Assumption 1 implies that all unsuccessful projects will be continued, and equation (2) then implies that the social surplus is maximized by running a universal bank. With these decisions, the social surplus derived from entrepreneurial effort e is given by equation (3):

$$\mathscr{W}(e) \equiv e(\Pi_1 + S) + (1-e)(S-L) - I_1 - F - \psi(e). \tag{3}$$

It follows immediately that the first best effort level is given by equation (4):

$$e^{FB} = \frac{\Pi_1 + L}{\alpha}. \tag{4}$$

ASSUMPTION 2. *The first best effort level is strictly between* 0 *and* 1*:*

$$\alpha > \Pi_1 + L. \tag{5}$$

The marginal social benefit of time 1 success is $\Pi_1 + L$ and the first-best effort level e^{FB} obtains when this benefit is equal to the marginal cost αe of effort. Hence, as illustrated in figure 3 on page 12, e^{FB} is monotonically increasing in pecuniary cost L of continuation and in the benefit Π_1 derived from time 1 success, and is decreasing in the effort cost parameter α.

2.3. Contractual Limitations

We make two assumptions that guarantee that the first best will not be achieved. First, we assume that there is moral hazard between the entrepreneur and the bank: the entrepreneur's effort is private non-verifiable information, and hence cannot be the subject of a contract. Second, we assume that the bank cannot commit at time 0 to a time 1 continuation policy.

We allow the bank to make two types of commitment. First, it can write state-contingent contracts over the cash that the project yields. The time 0 contract (R_1, R_2) stipulates the payments R_1 and R_2 that the commercial bank receives at times 1 and 2 from successful and continued unsuccessful projects respectively. The time 1 contract between the non-lending division and the entrepreneur stipulates the time 2 payment P that the non-lending division receives for fee-based financial services.

Second, we allow the bank to commit to an authority structure that allocates decision-making power over time 0 cash flow contracting, and over the time 1 continuation decision. We consider two possible authority structures for diversified banks: in *diversified bank holding companies*, decisions over both cash flow contracts (R_1, R_2) and time 1 continuation are made by the commercial bank division in order to maximise its divisional profit; in *universal banks*, all decisions are made centrally in order to maximise the total return to shareholders. We show in Section 5 that hybrid structures in which some decisions are taken centrally and others are decentralised are always dominated by either diversified bank holding companies or universal banks.

3. Monopoly Banks

In this section we first derive optimal bank contracts for different organizational structures (section 3.1). We then determine the banker's choice of organizational form (section 3.2). Finally, we discuss the welfare implications of our analysis (3.3)

Throughout the section, we assume that the bank is a monopoly lender, so that it makes time 0 take-it-or-leave-it offers to the entrepreneur: we argue in Section 5.3 that our qualitative results are robust to a relaxation of this assumption.

3.1. Optimal Bank Contracts

(i) Non-Diversified Commercial Banks

We first analyze the optimal lending contract for a non-diversified commercial bank. Assumption 1 implies that the bank will never rescue an unsuccessful entrepreneur. The lending contract offered by a non-diversified commercial bank therefore comprises only a time 1 repayment R_1. R_1 is the critical choice variable: since it is impossible to contract upon entrepreneurial effort e, the entrepreneur selects e to maximize his expected utility given R_1.

Given a rate R_1, the entrepreneur selects his effort level $e_{Com}(R_1)$ by equating the marginal benefit $\Pi_1 - R_1 + b$ of effort with its marginal cost αe:

$$e = e_{Com}(R_1) \equiv \frac{b + \Pi_1 - R_1}{\alpha}. \tag{6}$$

The bank's expected income from an interest rate R_1 is therefore given by $e_{Com}(R_1) R_1$. The marginal cost

$$MC_{Com}(R_1) \equiv -e'_{Com}(R_1) R_1 \tag{7}$$

of an increase in R_1 represents the effects of a reduced entrepreneurial income in the success state upon entrepreneurial effort; the optimal interest rate R_1^{Com} is obtained by equating this cost with the marginal benefit

$$MB_{Com}(R_1) \equiv e_{Com}(R_1), \tag{8}$$

which reflects the increased bank income in the success state.

Lemma 1 summarizes the equilibrium interest rate R_1^{Com}, entrepreneurial effort e^{Com}, and expected bank profit V^{Com} yielded by this calculation.

LEMMA 1. *A non-diversified commercial bank never rescues a failed entrepreneur, and it sets*

$$R_1 = R_1^{Com} \equiv \frac{1}{2}(b + \Pi_1). \tag{9}$$

This induces entrepreneurial effort

$$e^{Com} \equiv \frac{1}{2\alpha}(\Pi_1 + b) \tag{10}$$

and expected bank profit

$$V^{Com} \equiv \frac{(\Pi_1 + b)^2}{4\alpha} - I_1. \tag{11}$$

Proof: For a direct proof of these results, note that with entrepreneurial effort e, an interest rate R_1 generates expected profit $V_{Com}(e,R) \equiv eR_1 - I_1$ for the bank, and an expected utility $U_{Com}(e,R) \equiv e(\Pi_1 - R_1) - (1-e)b - \Psi(e)$ for the entrepreneur. $U_{Com}(e,R_1)$ is maximized when $e = e_{Com}(R_1)$ (see equation (6)). Substituting this value into $V_{Com}(e,R_1)$ and maximizing with respect to R_1 gives us $R_1 = R_1^{Com} \equiv \frac{1}{2}(b+\Pi_1)$; substituting R_1^{Com} into $e_{Com}(R_1)$ yields e^{Com}. V^{Com} is equal to $V_{Com}\left(e^{Com}, R_1^{Com}\right)$. □

Recall from section 2.2 that the marginal impact of success upon social surplus is $\Pi_1 + L$; the difference between this and the marginal impact $\frac{1}{2}(\Pi_1 + b)$ of success upon the entrepreneur's income is $L - b + R_1^{Com} = L + \frac{1}{2}(\Pi_1 - b)$. It is immediately apparent that e^{Com} and e^{FB} differ for three reasons. First, entrepreneurs pay an interest rate when they borrow from a commercial bank, and therefore fail to internalise the full benefits of success. Second, entrepreneurs never experience the cost L of continuation and so do not internalise the full costs of failure. These effects both serve to decrease the entrepreneur's effort relative to the first best. A third, countervailing, effect arises because the non-diversified commercial bank, which ignores the costs to the entrepreneur of project liquidation, does not rescue unsuccessful projects. Hence, unsuccessful entrepreneurs experience a cost b when they borrow from a commercial bank, which does not arise in the first best; this effect serves to increase their effort incentives. We assume that the first two effects outweigh the third:

ASSUMPTION 3. *Effort in non-diversified commercial banks is always lower than the first best:*

$$\Pi_1 > b. \tag{12}$$

Assumption 3 ensures that the agency problem between the entrepreneur and the non-diversified commercial bank's shareholders is large enough to cause a problem. In the following sections we examine the effect of scope expansion upon this agency problem in both diversified bank holding companies, and universal banks.

(ii) Diversified Bank Holding Companies

Diversified bank holding companies comprise a commercial bank division and a non-lending division, each of which acts to maximize its own profitability without reference to the profitability of the other division. In particular, the commercial bank division makes time 1 continuation decisions. Hence, as in section 3.1.i, an unsuccessful entrepreneur never receives continuation finance: he will therefore make the same effort decisions when financed by a diversified bank holding company as he would in a non-diversified commercial bank. Hence the marginal cost $MC_D(R_1)$ and the marginal benefit $MB_D(R_1)$ of an increased R_1 are the same in diversified holding companies and non-diversified commercial banks.

The non-lending division provides fee-based financial services to successful entrepreneurs. Since, by assumption, it is a monopolist in the market for these services, the non-lending division will extract all of the surplus generated by these services. Hence, it sets the price P of fee-based services equal to S. Lemma 2 therefore follows immediately:

LEMMA 2. *A diversified bank holding company never rescues a failed entrepreneur, and it sets*

$$R_1 = R_1^D \equiv \frac{1}{2}(b+\Pi_1). \tag{13}$$

This induces entrepreneurial effort

$$e^D \equiv \frac{1}{2\alpha}(\Pi_1 + b) \tag{14}$$

and expected bank profit

$$V^D \equiv \frac{(\Pi_1 + b)^2}{4\alpha} - I_1 + \frac{S}{2\alpha}(\Pi_1 + b) - F. \tag{15}$$

Proof: Only the profit figure differs from that of lemma 1; the difference is equal to the expected profit $e^D S - F$ of selling fee-based financial services to successful entrepreneurs. □

(iii) Universal Banks

Both lending contracts and continuation decisions are imposed centrally in universal banks, so as to maximize the combined shareholder surplus generated by both divisions. Precisely as in section 3.1.ii, the bank sets the price P of fee-based financial services equal to S, so that the time 0 lending contract again reduces to an interest rate R_1.

Unlike a diversified bank holding company, a universal bank may elect to rescue unsuccessful projects at time 1, because it internalises the profits that its non-lending division will make from rescued entrepreneurs. If rescue occurs, the bank extracts all of the surplus from continuation finance, and hence sets $R_2 = \Pi_2$. However, the universal bank is unable to commit at time 0 to a rescue policy; it therefore rescues unsuccessful entrepreneurs precisely when it is profitable to do so at time 1. The following Lemma follows immediately.

LEMMA 3. *Universal banks rescue unsuccessful entrepreneurs at time* 1 *when $L \leq S$, and they liquidate them when $L > S$.*

Lemma 3 indicates that entrepreneurs who are financed by a universal bank face a *soft budget constraint* when $L \leq S$: a threat to liquidate them if they are unsuccessful can never be credible. Such a threat is credible when $L > S$, in which case entrepreneurs face a *hard budget constraint*.

At time 0, the bank takes as given the rescue policy identified in Lemma 3. If $L \leq S$ its income is $R_1 + S$ if the entrepreneur succeeds, and is $S - L$ if the entrepreneur is unsuccessful; the corresponding figures when $L > S$ are $R_1 + S$ and 0. Hence, for a given interest rate R_1, the marginal impact of entrepreneurial success upon bank income is given by $\mu(R_1, L)$:

$$\mu(R_1, L) \equiv \begin{cases} R_1 + L, & L \leq S; \\ R_1 + S, & L > S. \end{cases} \tag{16}$$

The bank's expected income from an effort level e is therefore given by equation (17):

$$V_U(e, R_1) = \begin{cases} S - L + e\mu(R_1, L) - I_1, & L \leq S; \\ e\mu(R_1, L) - I_1, & L > S. \end{cases} \tag{17}$$

The entrepreneur's effort level is determined by the rescue policy described in Lemma 3, and by the time 1 interest rate R_1. Given an R_1, the entrepreneur's effort level $e_C(R_1)$ is obtained by setting the marginal cost αe of effort equal to its marginal benefit; by Lemma 3, the marginal benefit is $\Pi_1 - R_1$ when $L \leq S$, and it

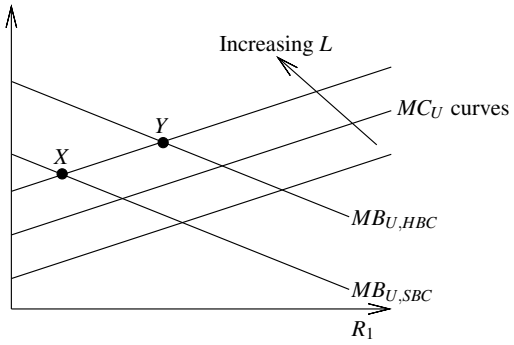

Figure 1: **Equilibrium effort level and interest rate in universal banks.** Equilibrium occurs where the marginal benefit MB_U to the bank of an increase in the interest rate R equals the marginal cost MC_U. The marginal cost curve increases continuously in L for $L \leq S$, and then remains at the highest level indicated on the figure as L increases further. The marginal benefit of increases in R_1 is $MB_{U,SBC}$ when $L \leq S$, so that entrepreneurs face a soft budget constraint, and is $MB_{U,HBC}$ when $L > S$, so that entrepreneurs face a hard budget constraint. The equilibrium (R_1, e) values shift discontinuously from X to Y at $L = S$.

is $\Pi_1 - R_1 + b$ when $L > S$. Hence we obtain the following relationship between entrepreneurial effort, the interest rate R_1, and the cost L of rescuing an unsuccessful entrepreneur:

$$e_U(R_1, L) \equiv \begin{cases} \frac{\Pi_1 - R_1}{\alpha}, & L \leq S; \\ \frac{\Pi_1 - R_1 + b}{\alpha}, & L > S. \end{cases} \tag{18}$$

Substituting $e = e_U(R_1, L)$ into $V_U(e, R_1)$ and differentiating with respect to R_1 gives us the marginal effect that R_1 has upon bank income:

$$\frac{dV_U}{dR} = \frac{\partial e_U}{\partial R_1}\mu + e_U$$

Increasing R_1 generates a marginal benefit

$$MB_U(R_1, L) = e_U(R_1, L) \tag{19}$$

for the bank from increased success state income, and a marginal cost

$$MC_U(R_1, L) \equiv -\frac{\partial e_U}{\partial R_1}(R_1, L)\,\mu(R_1, L) = \begin{cases} \frac{1}{\alpha}(R_1 + L), & L \leq S \\ \frac{1}{\alpha}(R_1 + S), & L > S \end{cases} \tag{20}$$

from a reduction in entrepreneurial effort. The optimal interest rate R_1^U is obtained by equating these expressions.

This calculation is illustrated in Figure 1. When $L \leq S$, unsuccessful projects are rescued at a cost L to the bank. Increasing R_1 lowers entrepreneurial effort and hence increases the likelihood that the cost L will be incurred. Hence, as indicated in the Figure, the marginal cost $MC_U(R_1, L)$ of raising R_1 is increasing in L when $L \leq S$. The optimal interest rate R_1^U for these L-values obtains at the point where the marginal benefit curve $MB_{U,SBC}$ in Figure 1 intersects the relevant marginal cost curve. It is clear from Figure 1 that the optimal interest rate R_1^U is decreasing in L, and that the corresponding entrepreneurial effort e^U is increasing in L.

When $L > S$, the bank liquidates unsuccessful projects. This introduces a cost b for unsuccessful entrepreneurs. As a result, the entrepreneur's effort level given any interest rate R_1 is higher when $L > S$ than when $L \leq S$. Hence, as indicated in Figure 1, the marginal benefit $MB_{U,HBC}(R_1)$ that the bank derives from an increase in R when $L > S$ is strictly greater than the corresponding marginal benefit $MB_{U,SBC}$ when $L \leq S$. In contrast, there is no discontinuity in the marginal cost $MC_U(R_1, L)$ when $L = S$, since for every $L > S$ the marginal cost of increasing R_1 is equal to the marginal cost when $L = S$. As illustrated in Figure 1, the discontinuous upward jump at $L = S$ in the marginal benefit that the bank derives from higher R_1 translates into a discontinuous increase in both R_1^U and e^U. This jump corresponds to the shift from point X to point Y of the intersection between the marginal cost and benefit curves.

Lemma 4 supplements our intuitive discussion by providing expressions for the equilibrium interest rate R_1^U, entrepreneurial effort e^U, and bank profit V^U.

LEMMA 4. *A universal bank rescues unsuccessful entrepreneurs at time* 1 *precisely when* $L \leq S$. *It sets* $R_2 = \Pi_2$ *and sets* R_1 *equal to the following value*

$$R_1^U \equiv \begin{cases} R_{1,SBC}^U \equiv \frac{1}{2}(\Pi_1 - L), & \text{if } L \leq S; \\ R_{1,HBC}^U \equiv \frac{1}{2}(\Pi_1 + b - S), & \text{if } L > S. \end{cases} \tag{21}$$

This induces entrepreneurial effort

$$e^U \equiv \begin{cases} e_{SBC}^U \equiv \frac{1}{2\alpha}(\Pi_1 + L), & \text{if } L \leq S; \\ e_{HBC}^U \equiv \frac{1}{2\alpha}(\Pi_1 + b + S), & \text{if } L > S. \end{cases} \tag{22}$$

and expected bank profit

$$V^U \equiv \begin{cases} V_{SBC}^U \equiv \frac{(\Pi_1 + L)^2}{4\alpha} - F + S - I_1 - L, & \text{if } L \leq S; \\ V_{HBC}^U \equiv \frac{(b + S + \Pi_1)^2}{4\alpha} - F - I_1, & \text{if } L > S. \end{cases} \tag{23}$$

Proof: It is convenient to denote by x the probability that the bank will rescue an unsuccessful entrepreneur at time 1. By Lemma 3, $x = 1$ when $L \leq S$, and $x = 0$ when $L > S$. With this notation, the total surplus derived by the universal bank from an interest rate R_1 is therefore given by $V_U(e, R_1, x) \equiv e(R_1 + S) + (1 - e)x(R_2 + S - I_2) - I_1 - F$. For a given interest rate R_1, closure policy x, and effort level e, the entrepreneur's exected utility is given by $U_U(e, R_1, x) \equiv e(\Pi_1 - R_1) - (1 - e)(1 - x)b - \Psi(e)$.

$U_U(e, R_1, x)$ is maximized when $e = e_U(R_1, x) \equiv \frac{\Pi_1 - R_1 + (1-x)b}{\alpha}$. Substituting $e = e_U(R_1, x)$ into $V_U(e, R_1, x)$ and maximizing with respect to R_1 gives us $R_1 = R_1^U$; setting $R_1 = R_1^U$ in $e_U(R_1, x)$ yields e^U. Finally, $V^U = V_U\left(e_C\left(R_1^U, x\right), R_1^U, x\right)$. □

(iv) Comparison of Optimal Contracts

We now compare the effort level e^U that obtains in universal banks with the level e^D in diversified bank holding companies. Once again, the critical decision variable is the interest rate R_1 that the bank selects. Figure 2 illustrates marginal benefit and marginal cost curves for diversified holding companies, and for universal banks. As we have already analyzed the curves MB_U and MC_U for a universal bank, we focus

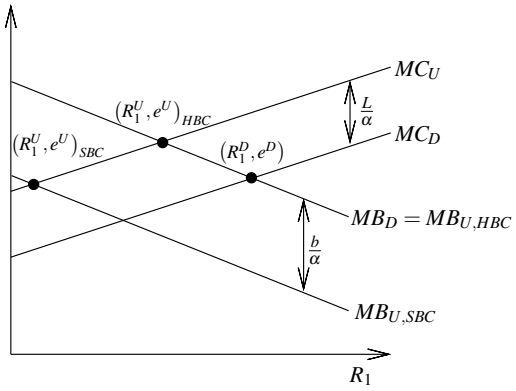

Figure 2: **Diversified bank equilibria.** Equilibrium interest rate and effort levels $\left(R_1^D, e^D\right)$ for diversified bank holding companies are found where the marginal cost and benefit curves MC_D and MB_D of increases in R_1 intersect. For $L > S$, MB_U coincides with MB_D, while the marginal cost curve MC_U is L/α above MC_D; hence $R_1^U < R^D$ and $e^U > e^D$. When $L \leq S$ the marginal benefit curve MB_U lies b/α below MB_D. Hence $R_1^U < R^D$ and, because $b > L$, $e^U < e^D$.

in this discussion upon the differences between them and the corresponding curves, MB_D and MC_D, for a diversified bank holding company.

In the case where $L > S$, universal banks and diversified bank holding companies have the same liquidation policy, so that their entrepreneurs face the same incentives. Hence, MB_D and MB_U coincide, as in Figure 2. However, in contrast to a universal bank, interest rates in diversified bank holding companies are set without accounting for the loss of non-lending division surplus caused by the liquidation of unsuccessful entrepreneurs. Hence, MC_U exceeds MC_D by S/α. It follows immediately by inspection of Figure 2 that universal banks charge a lower interest rate, and that universal banks achieve a higher effort level, than diversified bank holding companies.

The MC_D and MB_D curves are the same in the case where $L \leq S$ as they are when $L > S$. Moreover, as in figure 1, the MC_U curve experiences no discontinuity at $L = S$; it exceeds MC_D by L/α when $L \leq S$. However, there is a discontinuous drop of b/α in MB_U at $L = S$, which is indicated in Figure 2. The positive gap b/α between MB_D and MB_U serves to increase equilibrium effort in bank holding companies relative to universal banks, while the negative gap L/α between MC_D and MC_U serves to decrease it. The former effect outweighs the latter, and universal banks generate lower effort than bank holding companies, precisely when $b > L$; Assumption 1 guarantees that this is the case. It is clear from Figure 2 that the gaps between the *MC* and the *MB* curves both serve to reduce the equilibrium interest rate.

We summarize the above discussion in Lemma 5.

LEMMA 5. *The interest rate in a universal bank is lower than the interest rate in a diversified bank holding company. When $L > S$, the equilibrium effort level e^U in a universal bank exceeds the equilibrium level e^D in a diversified bank holding company by $S/2\alpha$; when $L < S$, e^D exceeds e^U by $(b-L)/2\alpha$.*

Proof: The result follows from inspection of equations (14) and (22). □

Figure 3 plots the equilibrium entrepreneurial effort level e achieved under each possible organizational

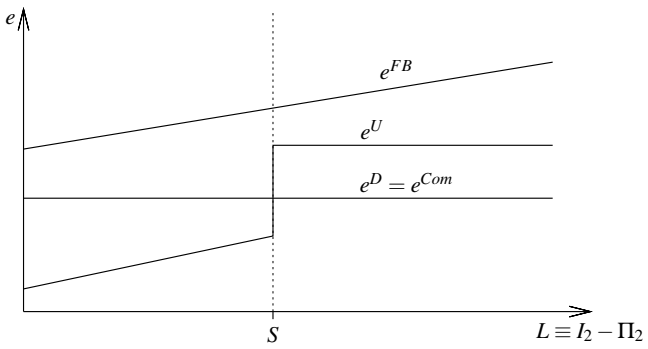

Figure 3: **Equilibrium effort levels.** The first best effort level e^{FB} and the equilibrium levels e^D, e^U, and e^{Com} that obtain respectively in diversified bank holding companies, in universal banks, and in non-diversified commercial banks, are plotted as functions of the cost L of rescuing an unsuccessful entrepreneur.

form as a function of the cost L of rescuing an unsuccessful entrepreneur. The line labelled e^{FB} indicates the first best effort level; as noted in section 2.2, it is increasing in L, because all unsuccessful entrepreneurs are rescued in the first best world. Assumption 3 guarantees that the first best effort level is never attained with any feasible bank organizational form. Both non-diversified commercial banks and diversified bank holding companies generate the same level of entrepreneurial effort which, because neither type of bank ever rescues an unsuccessful entrepreneur, is L-invariant. Finally, the effort level generated by universal banks is increasing in L when $L \leq S$ so that they rescue unsuccessful entrepreneurs; their effort level is L-invariant when $L > S$ so that they liquidate unsuccessful entrepreneurs. As discussed in Lemma 5, universal banks generate lower effort than diversified bank holding companies for $L \leq S$, and higher effort for $L > S$.

3.2. Choice of Organizational Form

In this section, we analyze the bank's time 0 choice between operating as a non-diversified commercial bank, and spending F to become a diversified bank. The critical parameters informing this choice are the surplus S that a diversified bank derives from the sale of fee-based financial products, and the cost L to a universal bank of rescuing unsuccessful entrepreneurs.

When $L > S$ we know from Lemma 3 that an entrepreneur who borrows from a universal bank faces a hard budget constraint: the universal bank always liquidates unsuccessful projects. Since the entrepreneur faces the same incentive structure whether he borrows from a universal or a diversified bank holding company, a universal bank can always generate the same surplus as a diversified bank holding company, simply by charging the same interest rate. However, as stated in Lemma 5, a universal bank sets a lower interest rate than a diversified bank holding company, thus sacrificing some of the profits it makes from lending in order to increase its surplus from non-lending products. Consequently, because it correctly accounts for all of the effects of a change in interest rates, a universal bank generates a higher surplus when $L > S$ than a diversified bank holding company.

Hence, for $L > S$, the bank chooses between operating as a universal bank, and as a non-diversified commercial bank. The former strategy dominates the latter precisely when $V^U_{HBC} \geq V^{Com}$; this requirement

reduces to condition (24):

$$S \geq S_{U,Com} \equiv -(b+\Pi_1) + \sqrt{(b+\Pi_1)^2 + 4\alpha F}. \tag{24}$$

When $L \leq S$, an entrepreneur who borrows from a universal bank faces a soft budget constraint: he will never be liquidated when unsuccessful. The bank can avoid this problem in two ways: it can operate as a diversified bank holding company, and it can operate as a non-diversified commercial bank. For ease of exposition, we start by comparing the value V^D of a diversified bank holding company with the value V^{Com} of a non-diversified commercial bank. The holding company has the higher value precisely when condition (25) is satisfied:

$$S \geq S_{D,Com} \equiv \frac{2F\alpha}{b+\Pi_1}. \tag{25}$$

Diversified bank holding companies differ from non-diversified commercial banks only because they generate a surplus by selling fee-based financial services to successful entrepreneurs. Condition (25) states that it is worth opening a non-lending division to sell these products precisely when the fixed cost F of doing so is sufficiently low.

We now consider the benefits of operating as a diversified bank holding company in order to commit to liquidate unsuccessful entrepreneurs. For a given rescue cost $L \leq S$, the difference between the expected value of a diversified bank holding company, and of a universal bank is

$$\begin{aligned}\Phi(L) &\equiv e^D\left(R_1^D + S\right) - \left(e_{SBC}^U\left(R_{1,SBC}^U + S\right) + \left(1 - e_{SBC}^U\right)(S-L)\right) \\ &= \underbrace{\left(e^D - e_{SBC}^U\right)\left(S + R_1^D\right) + \left(R_1^D - R_{1,SBC}^U\right)e_{SBC}^U}_{\text{Benefit of commitment to liquidate}} - \underbrace{\left(1 - e_{SBC}^U\right)(S-L)}_{\text{Cost of commitment to liquidate}}.\end{aligned} \tag{26}$$

The first two terms in Equation (26) represent the increased income that the diversified bank holding company achieves from a commitment to liquidate unsuccessful entrepreneurs; this derives from a higher equilibrium effort level, and a higher equilibrium interest rate. Liquidation generates a cost, in the form of foregone second period income from the sale of fee-based financial services to rescued entrepreneurs; this cost is given by the third term in equation (26).

The value $\Phi(L)$ of commiting to liquidate by running a diversified bank holding company is positive precisely when condition (27) is satisfied:

$$S \geq S_{D,U}(L) \equiv L - b - \frac{(L-b)^2 - 4b\alpha}{2(2\alpha - \Pi_1 - b)}. \tag{27}$$

$S_{D,U}(L)$ has an inverted-U shape, because, by assumptions 2 and 3, $2\alpha - \Pi_1 - b > 0$. $S_{D,U}(L)$ attains its maximum when $L = 2\alpha - \Pi_1$; since, by assumption 2 $L < \alpha - \Pi_1$, it follows that $S_{DU}(L)$ is increasing in L within the feasible parameter range.

The locus of $S_{D,U}(L)$ is illustrated for feasible L-values in figure 4. As illustrated in the Figure, we assume that F is sufficiently low to guarantee that $S_{D,U}(0)$ lies above $\frac{2F\alpha}{b+\Pi_1}$. Proposition 1 then follows immediately.

PROPOSITION 1. *The time* 0 *privately optimal form for the bank is as follows.*

1. *When $L > S$, so that the entrepreneur faces a hard budget constraint irrespective of the type of bank, the bank operates as a universal bank precisely when $S \geq S_{U,Com}$, and it otherwise operates as a non-diversified commercial bank.*

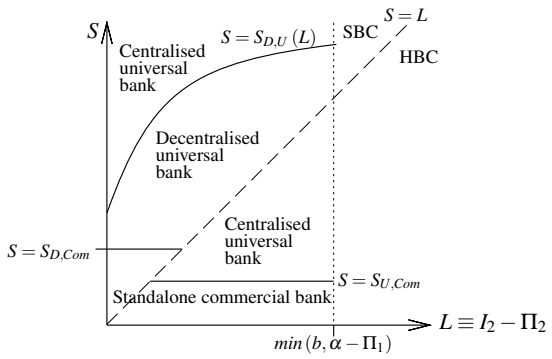

Figure 4: **Privately optimal organisational form.** If the cost F of setting up a non-lending division is too high, the bank will operate as a non-diversified commercial bank. Otherwize, when $L > S$ the entrepreneur faces a hard budget constraint and the bank operates as a universal bank. When $L \leq S$, the entrepreneur faces a soft budget constraint. When the surplus it could make from rescuing unsuccessful entrepreneurs and selling them fee-based financial services is not too high, the bank will elect to operate as a diversified bank holding company.

2. *When $L \leq S$, so that the entrepreneur faces a soft budget constraint if he borrows from a universal bank, the bank operates as a universal bank when $S > S_{D,U}(L)$, it operates as a diversified bank holding company when $S_{D,Com} \leq S < S_{D,U}(L)$, and it operates as a non-diversified commercial bank when $S < S_{D,Com}$. $S_{D,U}(L)$ is monotone increasing for feasible L-values.*

For a given liquidation policy, diversified bank holding companies generate less shareholder surplus than universal banks. This is because only universal banks internalize the effects of their lending policy upon the second period income that they derive from their non-lending divisions. Hence diversified bank holding companies are employed only when it is impossible for universal banks to implement a given liquidation policy. This is the case when $L \leq S$, so that the entrepreneur faces a soft budget constraint.

The value of diversified bank holding companies as a mechanism for hardening the budget constraint depends upon the cost b to the entrepreneur of liquidation; higher values of b tilt the scales further in favour of a hard budget constraint, and hence render diversified bank holding companies relatively more attractive. This can be checked directly, by differentiating the right hand side of condition (27) with respect to b.[7] Hence Proposition 1 has the following corollary.

COROLLARY 1. *The range of parameter values for which diversified bank holding companies are the dominant organizational form is increasing in the entrepreneur's private cost b of liquidation.*

3.3. Welfare

In this section, we examine the welfare implications of the organizational forms derived in section 3.2. We define welfare to be the sum of the expected surplus that accrues to all of the agents in the economy.

[7] The derivative is $\frac{b^2+L^2-4\alpha(b+L)+2\Pi_1(b+L-2\alpha+\Pi_1)}{2(2\alpha-\Pi_1-b)}$, which is negative because, by assumptions 2 and 3, $\alpha > L+\Pi_1 > L+b$.

(i) Hard Budget Constraint: $L > S$

First, we consider the case where $L > S$, so that the entrepreneur always faces a hard budget constraint. In this case, as in section 3.2, the bank operates either as a non-diversified commercial bank, or as a universal bank. The interest rate R_1^{Com} charged by a non-diversified commercial bank is given by equation (9); as detailed in Lemma 1, this results in entrepreneurial effort e^{Com} and expected bank profit V^{Com}, given by equations (10) and (11), respectively. Hence the welfare generated when a non-diversified commercial bank lends to an entrepreneur is given by equation (28):

$$\mathscr{W}^{Com} \equiv -I_1 + e^{Com}\Pi_1 - \left(1 - e^{Com}\right) b - \psi\left(e^{Com}\right). \tag{28}$$

This comprises the cost I_1 of investment, the expected return $e^{Com}\Pi_1$ generated by the project, the entrepreneur's expected personal cost $\left(1 - e^{Com}\right) b$ of project termination, and his cost $\psi\left(e^{Com}\right)$ of effort. Using expressions (9), (10), and (11), we can re-write equation 28 as follows:

$$\mathscr{W}^{Com} = V^{Com} - \left(1 - e^{Com}\right) b + e^{Com}\left(\Pi_1 - R_1^{Com}\right) - \psi\left(e^{Com}\right). \tag{29}$$

The last three terms in expression (29) constitute social effects for which the bank fails to account. The first of these terms is the expected cost to the entrepreneur of time 1 project termination, the second is the part of the project return that accrues to the entrepreneur, and the last is the entrepreneur's cost of effort. Straightforward manipulation of equation (29) gives us the following:

$$\mathscr{W}^{Com} = V^{Com} - b + \psi\left(e^{Com}\right). \tag{30}$$

The welfare generated when a universal bank lends to an entrepreneur and $L > S$ is given by equation

$$\mathscr{W}_{HBC}^{U} \equiv -I_1 - F + e_{HBC}^{U}\left(\Pi_1 + S\right) - \left(1 - e_{HBC}^{U}\right) b - \psi\left(e_{HBC}^{U}\right), \tag{31}$$

where the entrepreneurial effort e_{HBC}^{U} is given by equation (22). Equation (31) comprises the expected social surplus from the bank's lending business, which is obtained by analogy with equation (28), and the expected social surplus $-F + e_{HBC}^{U} S$ from the bank's non-lending division.

Using equations (21), (22), and (23) we can re-write equation (31) as follows:

$$\mathscr{W}_{HBC}^{U} = V_{HBC}^{U} - \left(1 - e_{HBC}^{U}\right) b + e_{HBC}^{U}\left(\Pi_1 - R_{1HBC}^{U}\right) - \psi\left(e_{HBC}^{U}\right) \tag{32}$$

$$= V_{HBC}^{U} - b + \psi\left(e_{HBC}^{U}\right). \tag{33}$$

As in the case of a non-diversified commercial bank, the difference between the social value of a universal bank with a hard budget constraint, and the private value that the bank's owners derive from it, comprises the entrepreneurial costs of project termination, project returns that accrue to the entrepreneur, and the cost of entrepreneurial effort.

Lemma 6 details discrepancies between the banker's private choice of organisational form, and the socially optimal choice.

LEMMA 6. *Suppose that $L > S$. Relative to the social optimum, the banker is biased in favour of non-diversified commercial banks over universal banks.*

Proof: Equation (34) follows immediately from equations (30) and (33):

$$\mathscr{W}^{Com} - \mathscr{W}^{U}_{HBC} = V^{Com} - V^{U}_{HBC} + \frac{\alpha}{2}\left(e^{Com} - e^{U}_{HBC}\right)\left(e^{Com} + e^{U}_{HBC}\right). \tag{34}$$

Using equations (10) and (22) to substitute for $\left(e^{Com} - e^{U}_{HBC}\right)$ in equation (34) gives us the following:

$$\begin{aligned} \mathscr{W}^{Com} - \mathscr{W}^{U}_{HBC} &= V^{Com} - V^{U}_{HBC} - \frac{S}{4}\left(e^{Com} + e^{U}_{HBC}\right) \\ &< V^{Com} - V^{U}_{HBC}. \end{aligned}$$

Hence the banker is socially excessively willing to select a non-diversified commercial bank over a universal bank when $L > S$. □

The intutition for Lemma 6 is straightforward. Universal bankers extract all of the social surplus from non-lending products. Moreover, because $L > S$, liquidation policies are the same in every type of bank. Hence, discrepancies between the private and socially optimal organisational form reflect only differences in the value placed upon additional entrepreneurial effort. Precisely because closure policies are invariant, greater effort can be induced only by lowering the time 1 interest rate. As a consequence, the banker extracts a diminishing fraction of the increased social surplus deriving from higher effort levels; at the margin, he therefore values higher effort less than is socially optimal. Hence, as in Equation (34), the banker overvalues the organizational form that generates the lower effort level.

(ii) Soft Budget Constraint: $L \leq S$

We now consider the case where $L \leq S$, so that entrepreneurs face a soft budget constraint. First, we examine the choice between diversified bank holding companies and non-diversified commercial banks. As in section 3.3.i, the welfare $\mathscr{W}^{Com}$ generated by a non-doversified commercial bank is given by equation (30). Like the universal banks of section 3.3.i, diversified bank holding companies have a hard budget constraint. Hence, by analogy with equations (31), (32), and (33), the welfare $\mathscr{W}^{D}$ generated by a diversified bank holding company is given by the following expressions:

$$\begin{aligned} \mathscr{W}^{D} &\equiv -I_1 - F + e^{D}\left(\Pi_1 + S\right) - \left(1 - e^{D}\right)b - \psi\left(e^{D}\right) \\ &= V^{D} - \left(1 - e^{D}\right)b + e^{D}\left(\Pi_1 - R^{D}_1\right) - \psi\left(e^{D}\right) \\ &= V^{D} - b + \psi\left(e^{D}\right). \end{aligned} \tag{35}$$

In these expressions, R^{D}_1, e^{D} and V^{D} are given by equations (13), (14) and (15), respectively.

Recall that, because lending contracts in non-diversified commercial banks and in diversified bank holding companies are made by the lending division, the effort levels e^{Com} and e^{D} are the same. The following result is therefore immediate:

LEMMA 7. *When $L \leq S$, the banker's choice between a diversified bank holding company and a non-diversified commercial bank coincides with the social optimum.*

Proof: Equations (30) and (35) give us

$$\mathscr{W}^{D} - \mathscr{W}^{Com} = V^{D} - V^{Com} - \psi\left(e^{D}\right) + \psi\left(e^{Com}\right) = V^{D} - V^{Com}. \tag{36}$$

□

Precisely as for Lemma 6, the diversified bank holding company internalises all of the social benefits of the non-lending division so that, as in equation (36), the difference between the extra social surplus derived from a diversified bank holding company over a universal bank exceeds the extra private surplus by $\psi\left(e^{Com}\right) - \psi\left(e^{D}\right)$. It follows that, relative to the social optimum, the bank is once again biased towards organizational form that generate lower effort levels; in this case, however, equilibrium effort levels in both organisational forms are identical, so that the banker exhibits no bias.

We now examine the welfare consequences of the banker's choice between running a universal bank and a diversified bank holding company when $L \leq S$. In this case, the welfare $\mathscr{W}_{SBC}^{U}$ generated by the universal bank is given by equation (37):

$$\mathscr{W}_{SBC}^{U} \equiv -I_1 - F + S + e_{SBC}^{U}\Pi_1 - \left(1 - e_{SBC}^{U}\right)L - \psi\left(e_{SBC}^{U}\right). \tag{37}$$

When $L \leq S$, the soft budget constraint introduces three welfare effects that are not present when $L > S$. First, unsuccessful entrepreneurs do not experience the private cost b of liquidation; second, the bank experiences a cost L when an unsuccessful entrepreneur's project is continued; third, the non-lending surplus S is realised from unsuccessful entrepreneurs.

Equation (37) can be re-written as follows:

$$\mathscr{W}_{SBC}^{U} = V_{SBC}^{U} - \psi\left(e_{SBC}^{U}\right). \tag{38}$$

Expression (38) differs from the corresponding expression (33) in the hard budget constraint case because the entrepreneur never experiences the cost b when he faces a soft budget.

The following result is now immediate:

LEMMA 8. *Suppose that $L \leq S$. Relative to the social optimum, the banker is biased in favour of diversified bank holding companies over universal banks.*

Proof: Equations (33) and (38) yields equation (39):

$$\mathscr{W}^{D} - \mathscr{W}_{SBC}^{U} = V^{D} - V_{SBC}^{U} - b + \frac{\alpha}{2}\left(e^{D} - e_{SBC}^{U}\right)\left(e^{D} + e_{SBC}^{U}\right). \tag{39}$$

Substituting from equations (14) and (22) for e^{D} and e_{SBC}^{U} in expression (39) gives us:

$$\begin{aligned} \mathscr{W}^{D} - \mathscr{W}_{SBC}^{U} &= V^{D} - V_{SBC}^{U} - b + (b - L)\frac{\left(e^{D} + e_{SBC}^{U}\right)}{2} \\ &< V^{D} - V_{SBC}^{U} - L \\ &< V^{D} - V_{SBC}^{U}, \end{aligned} \tag{40}$$

from which the Lemma follows immediately. □

Expression (39) shows that two effects determine the difference between the socially and privately optimal choice of organisational form. First, as in the proof of Lemma (6), the $\frac{\alpha}{2}\left(e^{D} - e_{SBC}^{U}\right)\left(e^{D} + e_{SBC}^{U}\right)$ term biases the banker towards the organisational form with the lower effort level: in this case, the universal bank. But in this case, a second effect is at work: universal banks and diversified bank holding companies have different

time 1 termination policies when $L \leq S$. The entrepreneur experiences a termination cost only if he borrows from a diversified bank holding company: the term $-b$ in equation (39) reflects the fact that this cost is not internalised by the banker; it therefore biases him towards running a diversified bank holding company. Equation (40) demonstrates that the second of these effects outweighs the first.

Proposition 2 summarises the welfare results of this section.

PROPOSITION 2. *The relationship between the time* 0 *socially and privately optimal form for the bank is as follows:*

1. *When $L > S$, there exists $\Sigma_{U,Com} < S_{U,Com}$ such that:*
   (a) *When $S \leq \Sigma_{U,Com}$ non-diversified commercial banks are the socially and privately preferred organizational form;*
   (b) *When $\Sigma_{U,Com} < S \leq S_{U,Com}$ universal banks are the socially preferred organizational form, but the bank elects to operate as a non-diversified commercial bank;*
   (c) *When $S > S_{U,Com}$ universal banks are the socially and privately preferred organizational form.*
2. *When $L \leq S$, there exists $\Sigma_{D,U}(L) < S_{D,U}(L)$ such that:*
   (a) *When $S \leq S_{D,Com}$ non-diversified commercial banks are the socially and privately preferred organizational form;*
   (b) *When $S_{D,Com} < S \leq \Sigma_{D,U}$ diversified bank holding companies are the socially and privately preferred organizational form;*
   (c) *When $\Sigma_{D,U} < S \leq S_{D,U}$ universal banks are the socially perferred organizational form, but the bank elects to operate as a diversified bank holding company;*
   (d) *When $S > S_{D,U}$ universal banks are the socially and privately preferred organizational form.*

Proof: The result follows from Lemmas 6, 7, and 8. Simple manipulations yield the following explicit expressions for $\Sigma_{U,Com}$ and $\Sigma_{D,U}(L)$:

$$\begin{aligned} \Sigma_{U,Com} &= -b - \Pi_1 + \sqrt{(b+\Pi_1)^2 + \frac{8}{3}F\alpha}; \\ \Sigma_{D,U}(L) &= \frac{(b-L)(3(b+L) - 8\alpha + 6\Pi_1)}{4(2\alpha - b - \Pi_1)}. \end{aligned}$$

□

Proposition 2 is illustrated in Figure 5. The social and private indifference curves between diversified bank holding companies and non-diversified commercial banks coincide at $S_{D,Com}$. The respective social indifference curves $\Sigma_{U,Com}$ and $\Sigma_{D,U}(L)$ between universal banks and non-diversified commercial banks and diversified bank holding companies are indicated in the figure as bold lines. Note that $\Sigma_{U,Com}$ and $\Sigma_{D,U}(L)$ lie below the corresponding private indifference curves $S_{U,Com}$ and $S_{D,U}$. In the regions between social and private indifference curves, the banker opts not to run a universal bank, although it would be socially better to do so; outside these regions, the banker's private choice of organisational form coincides with the social optimum.

From a social point of view, the banker is insufficiently willing to run a universal bank throughout the parameter space illustrated in Figure 5. However, the reasons for this differ between the region $L > S$, where

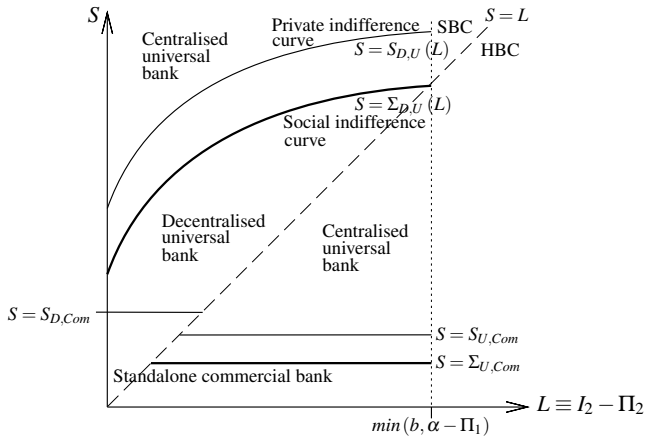

Figure 5: **Socially and privately optimal forms.** The social surplus derived from any two organizational forms indicated on the figure is identical along the bold dividing lines separating them; the private surplus derived by the bank is identical along the non-bold lines. Hence bankers are socially insufficiently willing to run universal banks. The social and private indifference curves between diversified bank holding companies and non-diversified commercial banks coincide at $S_{D,Com}$.

an entrepreneur borrowing from a universal bank faces a hard budget constraint, and the region $L \leq S$, where the same entrepreneur faces a soft budget constraint. In the former case, as discussed in Lemma 6, the bank is biased against the organizational form that illustrates a higher effort level; for $L > S$, this is the universal bank. In the latter case, when $L \leq S$, the bank retains a bias against higher effort levels, which for these parameters occur in diversified bank holding companies. However, in Lemma 8 we demonstrate a countervailing effect, which arises because, from the bank's point of view, higher effort is cheaper to incentivise in diversified bank holding companies than in universal banks. This is because entrepreneurial incentives are provided in the former through the threat of early closure, and the associated cost b is not internalised by the banker. This second effect outweighs the first and, once again the banker has a bias against universal banks.

4. Competition

So far, we have assumed that, by virtue of the special information it derives from its lending relationships, a diversified bank is able to monopolize its customers in the market for fee-based financial services. In practice, however, the bank may face competition in a number of fee-based activities that are characterised by lower information costs and switching costs than lending (DeYoung and Roland (2001)). Hence, in this section, we assume that fee-based financial services do not rely upon special information derived from a banking relationship. Instead, we assume that a successful entrepreneur is able to buy fee-based financial services in an imperfectly competitive market. Because it competes for his business, his bank extracts a surplus $S(N) \leq S$, where $N \geq 0$ is an index of market competition, and $S(\cdot)$ is a continuous differentiable function with $S(1) = S$, $S'(N) < 0$, and $\lim_{N\to\infty} S(N) = 0$.

Even in this set-up, unsuccessful entrepreneurs rely upon their banks for continuation finance, and they cannot buy fee-based financial services without it. As a result, the bank is able, by threatening to withdraw

funding from unsuccessful entrepreneurs, to extend his loan market monopoly into fee-based businesses, and hence to extract all of the surplus S from these products.

4.1. Optimal Contracts with Competition

In this section, we determine optimal contracts and effort levels when there is competition in the market for fee-based financial services. We analyze bank types in the order that they appear in Section 3. Much of our analysis is similar to that presented in Section 3, and is therefore presented in a more abbreviated fashion.

(i) Non-Diversified Commercial Banks

The analysis of Section 3.1.i is predicated upon the assumption that entrepreneurs who are financed by non-diversified commercial banks cannot attract time 1 continuation finance if they are unsuccessful. The reason for this is that continuation finance is loss-making, and the commercial bank is unable to generate any surplus from second period fee-based services.

This argument is more subtle when the entrepreneur can extract some of the surplus generated by these services; in this case, he may be able to attract continuation funding by pledging his share $(S-S(N))$ of the surplus. As N increases, the entrepreneur's share of the surplus increases, and hence so does the sum that the bank can extract in exchange for continuation finance. For high enough N, the bank extracts so much surplus in the wake of time 1 failure that the entrepreneur faces a soft budget constraint. Hence, for large N, the analysis of decentralized commercial banks when entrepreneurs can pledge their income from fee-based financial services is very close to that of universal banks below. We therefore adopt the following assumption:

ASSUMPTION 4. *Entrepreneurs cannot pledge the surplus from their fee-based business to third parties.*

It follows immediately from Assumption 4 that non-diversified commercial banks liquidate unsuccessful entrepreneurs at time 1.

Competition in the market for fee-based financial services increases the entrepreneur's success state income by his share $S-S(N)$ of the surplus from fee-based businesses; the increased reward for success raises the entrepreneur's effort level to $\hat{e}_{Com}$, and increases the interest rate charged to $\hat{R}_1^{Com}$:

$$\begin{aligned}\hat{e}^{Com}(R_1,N) &\equiv (b_1+\Pi_1-R_1+(S-S(N)))/\alpha \\ &= e^{Com}+(S-S(N))/\alpha; \\ \hat{R}_1^{Com} &\equiv R_1^{Com}+(S-S(N))/2.\end{aligned}$$

As in Section 3.1.i, $\hat{e}^{Com}$ is the marginal benefit that the non-diversified commercial bank derives from increasing the interest rate R_1. The marginal cost of raising R_1 again reflects the reduction in entrepreneurial effort caused by the increase, and this is unchanged by the introduction of period 2 competition. Lemma 9 follows immediately.

LEMMA 9. *Entrepreneurial effort and the interest rate R_1 in non-diversified commercial banks are increasing in the level N of competition in the market for fee-based financial services.*

Lemma 9 implies that introducing competition to the market for fee-based financial services increases the profitability of, and the social surplus generated by, non-diversified commercial banks.

(ii) Diversified Bank Holding Companies

Interest rate and continuation decisions in diversified bank holding companies are delegated to the commercial bank division, which faces the same incentives as a non-diversified commercial bank. The only difference between this case and the analysis of Section 3.1.ii is therefore that the introduction of competition changes the profit that the bank derives from fee-based financial services from $e^{Com}S$ to $\hat{e}^{Com}S(N)$. We therefore have the following result:

LEMMA 10. *Entrepreneurial effort and the interest rate R_1 in diversified bank holding companies are identical to the corresponding figures in non-diversified commercial banks.*

Once again, heightened competition in the market for fee-based financial services raises the profitability, and the social surplus generated by, diversified bank holding companies.

(iii) Universal Banks

Entrepreneurial effort in universal banks when there is competition in the market for fee-based financial services is given by the following expression:

$$\begin{aligned} \hat{e}^U(R_1,L,N) &\equiv \begin{cases} \frac{\Pi_1+(S-S(N))-R_1}{\alpha}, & L \leq S; \\ \frac{\Pi_1+(S-S(N))-R_1+b}{\alpha}, & L > S. \end{cases} \\ &= e^U(R_1,L) + \frac{(S-S(N))}{\alpha} \end{aligned} \tag{41}$$

As in Section 3.1.iii, the marginal benefit to the bank of a higher R_1 is given by the entrepreneur's effort level: with competition, entrepreneurs receive a share of the surplus from fee-based services, and hence their effort rises by $(S-S(N))/\alpha$. On the other hand, introducing competition reduces the marginal impact μ of entrepreneurial success upon bank income by $(S-S(N))$; hence, the marginal cost $-\frac{\partial e}{\partial R_1}\mu$ of raising R_1 is lowered by $(S-S(N))/\alpha$. Note that the magnitude of the shifts in the marginal cost and marginal benefit curves is the same, irrespective of whether L is above or below S. The shifts are illustrated in Figure 6: they have an offsetting effect upon entrepreneurial effort, and they serve to increase R_1 by $S-S(N)$. It is easy to demonstrate that the expected profit of the universal bank is N-invariant.

We summarise this analysis in Lemma 11.

LEMMA 11. *Competition in the market for fee-based financial services increases the interest rate R_1 charged by universal banks by $S-S(N)$, but it affects neither entrepreneurial effort nor profitability in these banks.*

Lemma 11 has the following simple intuitive explanation. Given his demand for the period 1 loan and for period 2 fee-based financial services, the entrepeneur selects an effort level contingent upon the sum of the interest rate R_1 and the price P of fee-based financial services, and not upon their individual values. Hence, because it is a monopolist in the loan market, the bank can always compensate for a lower price P of fee-based financial services by raising the interest rate R_1. The bank is therefore able to induce the effort level that it would have selected absent competition.

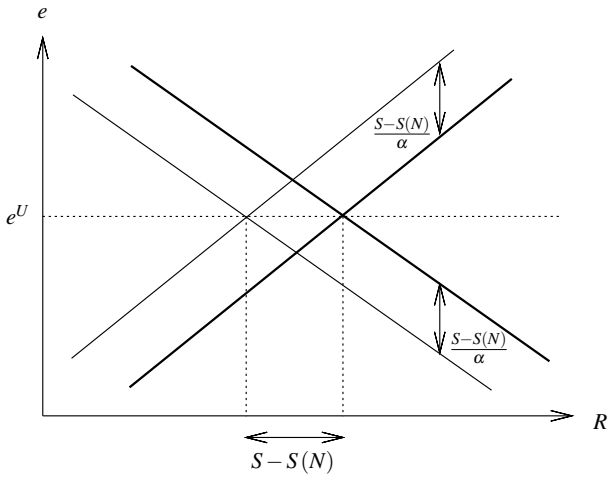

Figure 6: **Introduction of competition in universal banks.** The marginal benefit and cost of increasing R_1 are illustrated in the absence of competition by non-bold lines, and with a competition level N by bold lines. The changes to the curves have equal and offsetting effects upon entrepreneurial effort; interest rates are higher with competition.

4.2. Choice of Organizational Form

In this section, we examine the relationship between the bank's choice of organizational form and the competition parameter N. We combine our discussion of bank choices with an analysis of their welfare consequences and, because this analysis follows the reasoning in Sections 3.2 and 3.3, we present it in slightly less detail.

As in Section 3.2, the only reason for a bank to operate as a diversified bank holding company is to commit to liquidate unsuccessful entrepreneurs. Hence diversified bank holding companies are formed only when $L \leq S$. In this case, following Section 3.2, the banker prefers universal banks, which present entrepreneurs with a soft budget constraint, only when they generate a sufficiently high post-failure surplus S; for lower S, the banker chooses between diversified bank holding companies, which generate a success state surplus from fee-based business, and non-diversified commercial banks, which have no set-up costs.

The observations in the previous paragraph inform the structure of our discussion in this section. We first examine the choice between running a universal bank and a diversified bank holding company when $L \leq S$; we then analyse the choice between running a diversified bank holding company and a non-diversified commercial bank when $L \leq S$; finally, we characterise the choice between universal banks and non-diversified commercial banks when $L > S$.

(i) Diversified bank holding company versus universal bank when $L \leq S$

When $L \leq S$, we know from Lemma 11 that universal bank profitability is invariant to the competition parameter N. In contrast, Lemma 10 indicates that competition in the fee-based business raises the profitability of diversified bank holding companies. Hence, the surplus $\hat{S}_{D,U}(L,N)$ at which the bank is indifferent between operating as a universal bank and as a diversified bank holding company is increasing in N, with $\hat{S}_{D,U}(L,1)$ equal to the function $S_{D,U}(L)$ introduced in Proposition 1. We therefore have the following Lemma.

LEMMA 12. *Heightened competition in fee-based financial services expands the set of parameters for which diversified banks operate as diversified bank holding companies.*

The welfare implications of an increased competition parameter N follow from two observations. First, Lemma 8 points to a *decentralisation bias*: in the absence of competition, bankers are socially excessively biased towards diversified bank holding companies. Second, there is an *effort effect*: the social surplus generated by a diversified bank holding company is increasing in the entrepreneurial effort that it induces. Competition in the non-lending market serves both to tilt the bank's choice towards a diversified holding company, as opposed to a universal bank, structure, and it also increases entrepreneurial effort. When the increase in entrepreneur effort is sufficiently low, the heightened decentralised bias outweighs the benefits of increased competition, and welfare is reduced; when the increase in effort is large enough, the effort effect outweighs the increased decentralisation bias, and the shift to decentralised banking is welfare-enhancing.

Which of the two welfare effects identified in the preceding paragraph dominates depends upon the specification of S_N: even monotonicity of the welfare effect of heightened competition is not guaranteed. However, we are able to draw some general conclusions about the effect upon welfare in the limiting case where there is perfect competition in the non-loan market:

PROPOSITION 3. *There exist feasible parameterisations for which, with perfect competition in the market for fee-based financial services, universal banks are privately preferred to diversified bank holding companies, while diversified bank holding companies are perferred from a social perspective.*

Proof: In the Appendix. □

The proof of Proposition 3 identified two types of parameterizations: First, those for which b is low, so that the social damage caused by liquidating unsuccessful projects is not too great; second, those for which α is high, so that it is costly to generate high enough entrepreneurial effort levels, so that the effort effect identified above is particularly important.

Lemma 3 shows that, with an appropriate parameterization, introducing competition for fee-based business can reverse the private bias towards diversified bank holding companies identified in Proposition 2. This is because with competition, the universal bank extracts a surplus S from the sale of fee-based products to unsuccessful entrepreneurs, and extracts only $S(N) < S$ from successful entrepreneurs. Hence, the bank undervalues entrepreneurial effort relative to the social optimum. But the only rationale for operating as a diversified bank holding company is to incentivise entrepreneurial effort by commiting to liquidate unsuccessful entrepreneurs. As N increases, the banker undervalues this commitment more and more relative to the social optimum.

(ii) Diversified bank holding company versus non-diversified commercial banks when $L \leq S$

We now consider the bank's choice between operating as a diversified bank holding company and as a non-diversified commercial bank when $L \leq S$. This choice determines whether or not the bank incurs the cost F of establishing a non-banking division.

Our analysis in this section requires a more careful discussion of the cost F of establishing a diversified bank. In Section 3, F was the cost to the bank of creating a unique, consumer-specific, service; if the bank did not spend F then the service was unavailable to its customers. In this section, the fee-based service is

more commoditized. As a result, the technology required to create it is cheaper, and more readily available. Moreover, while F may represent a genuinely dissipative development cost, it may also be a wealth transfer to an agent that has already sunk the costs necessary to provide the fee-based service. The difference between these interpretations is relevant only in this section and the next, when we compare the welfare generated by diversified banks to that generated by non-diversified commercial banks. We write

$$\delta \leq 1$$

for the fraction of F that represents a genuinely dissipative social cost.

Lemma 2 states that effort levels and interest rates are the same in both diversified bank holding companies and non-diversified commercial banks. Note that, in contrast to Section 3.1.ii, successful entrepreneurs who are financed by non-diversified commercial banks will be able to purchase fee-based financial services in a competitive market. It follows that non-diversified commercial banks and diversified bank holding companies both generate the same economic welfare. Hence, because there is a social cost δF of establishing a bank holding company, they are socially inferior to non-diversified commercial banks, for which there is no such cost.

Notwithstanding this observation, bankers still have an incentive to run diversified bank holding companies, in order to capture some of the surplus S generated by fee-based financial services. The share $S - S(N)$ that accrues to the banker, and hence the corresponding incentive to run a non-diversified bank holding company, is diminishing in the level N of competition in the fee-based business.

We summarise the above observations in Lemma 13:

LEMMA 13. *When there is competition in fee-based markets, banks are always excessively biased relative to the social optimum in favor of diversfied bank holding companies over non-diversified commercial banks. This bias is decreasing in the intensity of competition.*

(iii) Universal banks versus non-diversified commercial banks when $L > S$

When $L > S$, the banker chooses between operating as a universal bank, and as a non-diversified commercial bank. Lemma 9 states that increasing levels of competition increase the profitability of non-diversified commercial banks, while Lemma 11 states that the profitability of universal banks is unaffected by competition. Hence, increased competition in fee-based businesses expands the range of parameter values for which the bank prefers operating as a non-diversified commercial bank to operating as a universal bank. The social ramifications of this effect depend upon the relative magnitude of the social costs of establishing a universal bank, and the benefits that accrue from the higher effort level implemented by the universal bank. Lemma 14 summarizes the relationship between the socially and privately optimal choice of organizational form when $L > S$:

LEMMA 14.

1. *For any competition index N, there is a $\delta_N \geq 0$ such that, relative to the social optimum, the bank is biased towards operating as a non-diversified commercial bank when $\delta < \delta_N$, and is biased towards operating as a universal bank when $\delta > \delta_N$;*
2. *For any $\delta < 1$, there is a competition index N_δ such that, relative to the social optimum, the bank is excessively biased towards operating as a non-diversified commercial bank for $N > N_\delta$.*

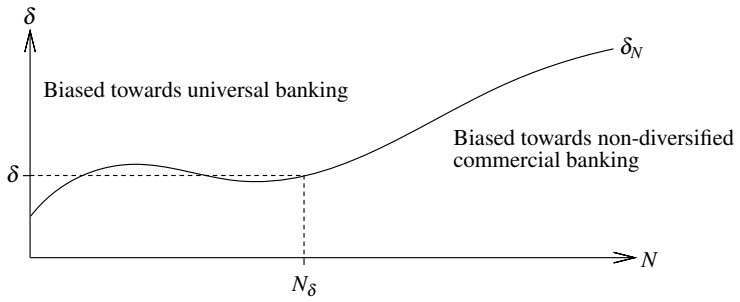

Figure 7: **Bias between universal banking and non-diversified commercial banking relative to the social optimum when $L > S$.** Above the line δ_N, the bank is biased towards universal banking; below this line, the bank has the reverse bias.

Proof: In the Appendix.

□

Lemma 7 is illustrated in Figure 7. The first part of the Lemma guarantees the existence of a function δ_N as illustrated in the Figure, such that the bank is biased towards universal banking precisely when $\delta > \delta_N$. While we cannot guarantee that the function is monotonic without a more specific representation for $S(N)$, part 2 of the Lemma is similar to a monotonicity property: it guarantees that, for any δ value, δ_N can dip below that value only for low enough N.

The results in Lemma 7 are generated by two effects. First, while the bank places a positive private value on the surplus that it generates from the non-lending activity, this surplus is not incorporated in the marginal social value of the universal bank, because it would be generated by another market participant, anyway. This serves to bias the banker in favour of universal banking relative to the social optimum. Second, the banker internalises the whole of the cost F of establishing a non-lending division, but only a fraction δ of this private cost is a social cost. This difference between private and social costs serves to bias the banker in favour of non-diversified commercial banks. The first of these effects is highest for low N, in which case the fee-based surplus that flows to the banker is greatest; the second effect is highest for low δ. These observations translate into the statements about δ_N that appear in the Lemma.

5. Robustness

In this section we discuss the robustness of our results to three model changes: a relaxation of the parameter restrictions; the introduction of hybrid bank structures in which some decisions are devolved to business units, and others are made centrally; and an increase in *ex ante* bank competition levels. Our qualitative conclusions are robust to each of these changes.

5.1. Parameter Restrictions

We now examine the consequences of reversing Assumption 1, which states states that the entrepreneur's private cost b of liquidation exceeds the cost L to the bank of continuing the project, and hence guarantees that contination is socially optimal. If instead L is greater than b, it is inefficient from a social point of view

to extend continuation finance to unsuccessful entrepreneurs. As a result, the first best effort level becomes

$$e^{FB} = \frac{\Pi_1 + b}{\alpha}.$$

In contrast to the case where continuation is socially efficient, when $L > b$, the effort level attained by universal banks exceeds that in diversified bank holding companies even when $L \leq S$: that is, $e^U_{SBC} > e^D$. The reason for this is as follows. When $L \leq S$ the universal bank imposes a soft budget constraint upon its entrepreneur. When $L > b$, the cost L that the universal bank experiences upon failure exceeds the cost b experienced by an unsuccessful entrepreneur in diversified bank holding companies, and in non-diversified commercial banks. The universal bank therefore values entrepreneurial effort more than the entrepreneur. As a consequence, the universal bank induces a higher entrepreneurial effort than the diversified bank holding company, or the non-diversified commercial bank.

The qualitative welfare results of Section 3.3 remain true when $L > b$. In particular, the banker continues to exhibit a bias against universal banking. This is because the higher effort level that the universal bank implements when $L > b$ reduces the fraction of the social surplus that the bank receives. Hence, the banker continues to undervalue the universal bank.

5.2. Hybrid Structures

We have analysed banks in which all decisions are devolved to decentralised business units, and those in which all decisions are taken centrally to maximise total profitability. Although they are not observed in practice, structures in which some decisions are decentralised and others are centralised are possible: in this section we demonstrate that they will never be selected.

Three hybrid structures are possible: one in which continuation decisions are made centrally, but contracts are selected by business units; one in which contracts are written centrally and the continuation decision is devolved to the commercial bank division; and one in which contracts are written centrally and the continuation decision is made by the non-lending division. We consider the three cases in turn.

First, note that, when continuation decisions are made centrally, continuation will occur precisely when $L \leq S$, as in the centralised case of section 3.1.iii. When $L \leq S$, the universal bank earns the surplus S from fee-based financial services irrespective of the time 1 success or failure of the entrepreneur. Hence the value of the universal bank is maximised precisely when the value of the commercial bank division is maximised so that the commercial bank division selects the contract that the universal bank prefers, and the hybrid bank and the universal bank have the same value. When $L > S$ the continuation decision is the same as that which obtains in a diversified bank holding company, so that the commercial bank division selects the same contract in both diversified bank holding companies and hybrid banks.

Second, consider the case where contracts are written centrally, but the continuation decision is made by the commercial bank division. In this case, unsuccessful entrepreneurs are never rescued, so the combined value of the two divisions of the bank is maximised when the value of the commercial bank division is maximised. This is accomplished by writing the contracts that would obtain in a diversified bank holding company.

Finally, when the non-lending division makes the continuation decision, it always rescues unsuccessful entrepreneurs. Hence the bank's value is maximised by the lending contract associated with universal banks

for which $L < S$. It is clear from figure 3 that for $L > S$ this contract delivers a lower effort level than a universal bank achieves,[8] and, moreover, the continuation entailed by the hybrid contract generates a pecuniary loss. Hence the value of the hybrid is strictly lower than that of the universal bank.

We summarise the above discussion in proposition 4.

PROPOSITION 4. *Hybrid authority structures in financial conglomerates are always weakly dominated by either a universal bank or a diversfied bank holding company structure.*

5.3. Ex Ante Competition

We have assumed throughout the paper that the bank is the monopoly time 0 provider of loans. In practice, the loan market is often characterised by some form of imperfect competition among banks. Loan market competition market affects the way in which the ex ante expected surplus is shared between the entrepreneur and the bank, but it does not affect the bank's time 1 continuation decision: even with time 0 competition in the loan market, the bank continues to exercise the same degree of time 1 monopoly power, and the mechanisms identified in this paper continue to operate.

6. Empirical Implications

In this section, we discuss the empirical predictions that follow from our research, and, where applicable, we relate them to the existing literature.

6.1. Access to Funds

In our model, universal bankers are more willing to lend, because this increases the size of the market for their fee-based services. Hence we obtain the following:

HYPOTHESIS 1. *Universal bank relationships increase corporate access to funds.*

Evidence in support of Hypothesis 1 comes from several quarters. First, Petersen and Rajan (1994) find in a study of small business lending that firms face less stringent financial constraints when they buy more than one product from a bank. Second, Ramirez (1995) presents evidence that J. P. Morgan's banking customers at the turn of the twentieth century enjoyed a lower cash flow sensitivity of investment than their peers. The lower sensitivity suggests, in line with our work, that unsuccessful entrepreneurs were more likely to receive fresh financing, because J.P. Morgan anticipated benefits from cross-selling. However, Fohlin (1998) is unable to find evidence that a relationship with one of Germany's nine universal "great banks" had a similar effect for nineteenth century German corporations.[9]

[8] The upward sloping segment of e^C intersects the horizontal segment to the right of the maximum feasible L.

[9] This literature is related to Gerschenkron's (1962) classic study of economic development, in which he argues that universal banks allow the expert human capital of the banker to be most effectively brought to bear upon the organization of large-scale industry.Similarly, Gorton and Schmid (2000) argue that concentrating voting rights in universal banks improved firm performance in Germany between 1975 and 1985.

6.2. Loan Margins and Profitability

When $L < S$, universal banks cannot use the threat of liquidation to motivate entrepreneurs. They therefore incentivise their entrepreneurs by charging lower interest rates than other banks (see Lemmas 1, 2, and 4). This yields Hypothesis 2:

HYPOTHESIS 2. *Interest margins are lower in universal banks than in non-diversified commercial banks.*

Recent work by Lepetit et al. (2008) confirms this hypothesis in the European context. Lapetit et. al. examine the effect of expansion into fee-based business upon 602 European banks between 1996 and 2002. They find that an increased income share from commissions and fees is associated with lower margins and loan spreads. We are aware of no empirical study that directly examines the relationship between organizational form and interest margins in U.S. banks, although Barth, Caprio, and Levine (2004) find in a study of bank regulation in 107 countries that diversification into non-lending activities does not translate into higher quality loans.

Our model yields another prediction, which is closely related to the above point. We identify two factors that affect the profitability of the lending business within universal banks. First, as noted in the previous paragraph, universal banks charge lower interest rates than other banks. Second, universal banks provide continuation finance at a loss to entrepreneurs in order to profit from their fee-based business. While both these effects reflect rational decisions that increase the aggregate profitability universal banks, both serve to reduce the profitability of the interest-based business. Hence, we have the following hypothesis:

HYPOTHESIS 3. *Lending businesses are less profitable in universal banks than in non-diversified commercial banks.*

Recent work that examines the relationship between total bank profitability and organizational form is cited in the Introduction. However, we are unaware of a direct test of Hypothesis 3, although Edwards and Fischer (1994) argue that German universal banks appear to make lower quality loans than do specialized banks.

Finally, our analysis indicates that, when $L < S$, entrepreneurial effort is lower in universal banks than in non-diversified commerical banks and diversified bank holding companies. Lower entrepreneurial effort translates in our model to greater credit risk, which generates the following hypothesis:

HYPOTHESIS 4. *Universal banks have riskier credit portfolios than non-diversified commercial banks.*

Although DeYoung and Roland (2001) find a positive relationship between aggregate earnings volatility and fee-related business in U.S. consolidated bank holding company data that pre-dates the Gramm-Leach-Bliley Act, Hypothesis 4 has not been directly tested.

6.3. Diversification Discounts

An empirical literature appears to indicate that diversified conglomerates trade at a discount to their breakup value: see for example Lang and Stulz (1994) and Berger and Ofek (1995). Theoretical work by Scharfstein and Stein (2000) attributes this discount to inter-divisional agency problems that are absent in our set-up. However, recent contributions to the conglomerate literature suggest that conglomeration may be an endogenous response to factors that reduce the value of the constituent firms (Maksimovic and Phillips

(2002), Graham, Lemmon, and Wolf (2002), Campa and Kedia (2002)), so that the value discount is a cause of conglomeration, rather than a consequence of it.

Our work provides a fresh insight into this literature. A standard approach in the diversification discount literature is to use non-diversified businesses to determine standard valuation multiples, which are then used to value the constituent parts of the conglomerate. Standard metrics used in this type of study are value to sales, and value to asset, ratios. In our model, because the lending division of a universal bank has lower interest rate margins than a non-diversified commercial bank, it is assigned a lower value by these measures than the non-diversified bank. Moreover, since the decision to charge lower interest rates is made at the moment of conglomeration, this discount does not arise only when undervalued non-diversified businesses expand, or are purchased. We therefore arrive at the following hypothesis.

HYPOTHESIS 5. *Universal banks exhibit a diversification discount that is robust to standard tests of endogeneity.*

Hypothesis 5 is confirmed by two recent studies: Laeven and Levine (2005) and Schmid and Walter (2008) both find evidence of a diversification discount in financial conglomerates. Laeven and Levine ascribe this discount to agency problems in diversified financial institutions. This type of problem is absent in our model. The discount arises in our work because universal banks optimally set lower interest rates than non-diversified commercial banks. Breaking up a universal would raise the value of its lending division, but, because they would lose the profits from the fee-based business, its shareholders would be worse off. Hence, in our model, the "diversification discount" in financial institutions is not evidence of value dissipation.

7. Conclusion

In this paper, we examine the effect that expansion into fee-based businesses has upon bank incentives and, hence, upon the real economy. We show that, when it increases the range of financial services available to entrepreneurs, this type of diversification has the potential to raise welfare. However, we point to a countervailing effect: when universal banks are able to extract most of the surplus from non-lending financial services, they may be willing to extend continuation finance to unsuccessful entrepreneurs. As a result, entrepreneurs borrowing from universal banks may face a soft budget constraint: the consequential reduction in entrepreneurial effort may wipe out the social benefits that cross-selling generates. Diversified banks can respond to this problem by adopting a holding company structure, which, in our model, is a device to harden the entrepreneur's budget constraint. Within a diversified bank holding company, lending decisions are devolved to the commercial banking division, and hence are made without reference to the profitability of the accompanying fee-based business.

Our analysis sheds light on recent debates about the tying of lending and fee-based bank business. In our model, the welfare effects of tying depend upon the competitiveness of the fee-based business. When it is not competitive, we show that, from a social perspective, too little tying occurs; introducing competition into the market for fee-based financial products can reverse this conclusion. In addition, our analysis suggests that it is very hard to identify sub-market pricing by universal banks: we show that, even in a competitive market, universal banks will charge lower interest rates, as this is the only way that they can counter the effects of the soft budget constraint and incentivise effort. Moreover, even though they are maximizing overall profitability, ceteris paribus universal banks have less profitable commercial banking businesses than

non-diversified commercial banks, and they appear under standard metrics to trade at a discount to their breakup value. Our work therefore opens new avenues for policy analysis and for empirical testing.

Appendix

Proof of Lemma 3

First, recall from Lemma 11 that, irrespective of the level N of competition in the market for fee-based financial services, the private value V^U of a universal bank is given by equation (23), and that it generates an N-invariant social welfare $\mathscr{W}^U_{SBC}$, given by equation (37).

It is straightforward to show that the equilibrium effort level $\hat{e}^D(N)$ and the interest rate $\hat{R}^D_1$ for diversified bank holding companies with a competition index N for the fee-based business are given by the following expressions:

$$\hat{e}^D \equiv \frac{1}{2\alpha}\left(\Pi_1 + S - S(N) + b\right); \tag{42}$$

$$\hat{R}^D_1 \equiv \frac{1}{2}\left(\Pi_1 + S - S(N) + b\right). \tag{43}$$

Hence, the corresponding private value $\hat{V}^D(N)$ generated by the diversified bank holding company is as follows:

$$\begin{aligned}\hat{V}^D(N) &\equiv \hat{e}^D\left(\hat{R}^D_1 + S(N)\right) - I_1 - F \\ &= \frac{1}{4\alpha}\left(\left(\Pi_1 + S + b\right)^2 - -S(N)^2\right) - I_1 - F.\end{aligned}$$

The social value $\hat{\mathscr{W}}^D(N)$ generated by the diversified bank holding company is as follows:

$$\hat{\mathscr{W}}^D(N) \equiv \hat{e}^D\left(\Pi_1 + S\right) - \left(1 - \hat{e}^D\right)b - I_1 - F.$$

Straightforward manipulations now give us

$$\begin{aligned}\mathscr{W}_\Delta(S) &\equiv \lim_{N\to\infty}\left(\mathscr{W}^U - \hat{\mathscr{W}}^D(N)\right) \\ &= -\frac{(b - L + S)\left(3\left(b + L + S\right) - 8\alpha + 6\Pi_1\right)}{8\alpha},\end{aligned}$$

and

$$\begin{aligned}V_\Delta\ (S) &\equiv \lim_{N\to\infty}\left(V^U - \hat{V}^D(N)\right) \\ &= \frac{-(b+S)^2 + L(L-4\alpha) + 4S\alpha - 2(b - L + S)\Pi_1}{4\alpha}.\end{aligned}$$

Now observe that

$$\begin{aligned}\mathscr{W}_\Delta\left(S'\right) &= 0; \\ V_\Delta\left(S'\right) &= \frac{1}{9}\left(8\alpha - 6\left(L + \Pi_1\right)\right) - b,\end{aligned}$$

where $S' = -b - L + \frac{8\alpha}{3} - 2\Pi_1$. By Assumption 2 , $\alpha > \Pi_1 + L$. Hence $V_\Delta(S') > 0$ whenever $\alpha > 9b/2$. Then for S marginally above S', $\mathscr{W}_\Delta < 0$ and $V_\Delta > 0$, so that diversified bank holding companies are socially preferred to universal banks, while private preferences run in the opposite direction.

Proof of Lemma 14

We write V^U and $\hat{V}^{Com}(N)$ for the respective private values of a universal bank and a non-diversified commercial bank when the competition index is N, and we write $\mathscr{W}^U_{HBC}$ and $\hat{\mathscr{W}}^{Com}$ for the corresponding social values. V^U and $\mathscr{W}^U$ are given by equations (23) and (31), respectively, but with the private cost F of establishing a non-lending division replaced in equation (31) by the social cost δF. By lemma 10, the effort level $\hat{e}^{Com}$ and the interest rate $\hat{R}_1^{Com}$ in a non-diversified commercial bank are the same as the corresponding figures $\hat{e}^D$ and $\hat{R}_1^D$ from equations (42) and (43), respectively. Hence we have

$$\begin{aligned} \hat{V}^{Com}(N) &\equiv \hat{e}^D \hat{R}_1^D - I_1; \\ \hat{\mathscr{W}}^{Com} &\equiv \hat{e}^D (\Pi_1 + S) - I_1. \end{aligned}$$

The following expression represents the difference between the additional private value that a universal bank generates relative to a non-diversified commercial bank, and the corresponding incremental social value:

$$\Delta_{U,Com} \equiv \left(V^U - \hat{V}^{Com}(N)\right) - \left(\mathscr{W}^U - \hat{\mathscr{W}}^{Com}\right). \tag{44}$$

Relative to the social optimum, the bank is excessively biased in favour of universal banks when $\Delta_{U,Com} > 0$; it is otherwise excessively biased in favour of non-diversified commercial banks.

Direct substitution for V^U, $\hat{V}^{Com}$, $\mathscr{W}^U$, and $\hat{\mathscr{W}}^{Com}$ in equation (44) and some manipulation yields equation (45):

$$\Delta_{U,Com} = S(N) \frac{3(S - S(N)) + S + 2(b - S + \Pi_1)}{8\alpha} - F(1 - \delta). \tag{45}$$

The first term on the right hand side of equation (45) is positive, and the second is negative. Set

$$\delta_N \equiv \max\left(0, 1 - S(N) \frac{3(S - S(N)) + S + 2(b - S + \Pi_1)}{8F\alpha}\right).$$

Then $\Delta_{U,Com}$ is negative precisely when $\delta < \delta_N$, which proves part 1 of the Lemma. For part 2 it is sufficient to observe that, for any $\delta < 1$, the first term on the right hand side of equation (45) tends to zero as N tends to infinity.

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