Competition and Regulation in the Banking Sector:

A Review of the Empirical Evidence on the Sources of Bank Rents

Hans Degryse[*]
CentER - Tilburg University and CESifo

Department of Finance
PO Box 90153
NL 5000 LE Tilburg
The Netherlands
Telephone: +31 13 4662417
Fax: +31 13 4662875
E-mail: degryse@uvt.nl

Steven Ongena
CentER - Tilburg University and CEPR

Department of Finance
PO Box 90153
NL 5000 LE Tilburg
The Netherlands
Telephone: +31 13 4662417
Fax: +31 13 4662875
E-mail: ongena@uvt.nl

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Abstract

We combine recent findings from the empirical banking literature with established insights from studies of banking competition and regulation. Motivated by modern theory of financial intermediation we center our review on the various sources of bank rents. We start with a concise overview and assessment of the different *methodological approaches* taken to address banking competition. We then structure our discussion of the *empirical findings* based upon a framework that finds its roots in the different theories of financial intermediation. We categorize and assess the many empirical findings in the literature on competition in banking. We focus on *market structure*, *switching costs*, *location*, and *regulation*.

Our review highlights that more concentrated markets are associated with significant spreads in both deposit markets and loan markets. Fiercer competition lowers spreads, but may also spur banks to tie customers in relationships that possibly encompass more fee related products and cross-selling. Relationships shield rents, providing an explanation for the steep growth in fee income sought by the banks. Relationship duration seems not uniformly linked to higher loan spreads, though loan fees and the pricing of other products may be important and missing in those studies finding a negative correspondence. The few studies that focus on location as a source for bank rents find that close borrowers pay a higher loan rate. The effects of distance on credit availability on the other hand seem small. Though distance effects on branch efficiency seem minimal, distance constrains lending to informationally difficult but sound firms. To cross national borders to engage new customers or to merge with another bank continues to be an adventurous endeavor. Finally, regulation continues to be a fine source of rents for banks in many countries.

Keywords: competition, banking sector, market structure, switching costs, location, regulation.

JEL: G21, L11, L14.

I. Introduction

This review combines recent findings from the empirical banking literature with established insights from studies of banking competition and regulation. Motivated by modern theory of financial intermediation we center our review on the different sources of bank rents. "Sailing this tack" ensures that we don't replicate the many excellent reviews on financial intermediation that also feature discussions of the various aspects of competition in the banking sector.[1]

We start with a concise overview of the different *methodological approaches* taken to address competition in general and banking in particular. Our review of the traditional and new empirical methods employed in Industrial Organization (IO) is brief, specifically applied to banking, and mostly illustrative.[2] We first discuss the traditional studies of Structure-Conduct-Performance, bank efficiency, and economies of scale and scope. Then we turn to the New Empirical IO approaches taken by Panzar and Rosse (1987), the conjectural variations, structural demand, and other structural models (sunk costs and entry). We highlight the strengths and weaknesses of these different approaches and are naturally drawn to focus on the differences in data requirements and treatment of endogeneity in each method.

Figure 1 shows how research on banking competition has evolved over time. The figure highlights that since the early 1990s a sea change took place in modeling competition, measuring concentration and conduct, and arriving at fruitful applications. The literature basically abandoned the traditional Structure-Conduct-Performance paradigm stating that banks in less concentrated markets behave less competitively and capture more profits.

The literature has pushed in two directions since. One strand of the literature embarked on modeling market structure as endogenous. We will review this part of the literature in Section II. A second push in the literature intended to capture the "special nature of banking competition" by also looking at non-price dimensions of banking products. Theoretical work tackled for example the availability of credit and the role bank-firm relationships play in overcoming asymmetric information problems. Consequently in Sections III to VI we structure our discussion of the *empirical findings* in the literature based upon a framework that finds its roots within the different theories of financial intermediation (see the companion paper by Carletti (2005) reviewing the theoretical banking competition literature). We categorize and assess the many empirical findings in the literature on competition in banking by distinguishing between four possible sources of bank rents: *market structure*, *switching costs* (includes *informational rents*), *location*, and *regulation*.

Market structure consists for example of the number of players in the market but may also refer to the existence of alternative providers of finance. Switching costs can be the fixed technical costs of switching banks existing in retail deposit markets but can also be the costs of engaging a new bank rooted in pervasive informational asymmetries in business loan markets. Location stands for both *distance* and *borders* (see also Degryse and Ongena (2004)). We think of distance as pertaining to physical proximity that can be bridged by spending distance-related costs. For a given location of bank and borrower, distance *per se* is exogenous and bridging it (i.e., the lender visiting the borrower and/or the borrower visiting the lender) may be adequate to reduce informational problems for the lender concerning its decision about granting and pricing the loan. *Borders* introduce a

"discontinuity": borders endogenously arise through the actions of the competing lenders or result as an artifact of differences in legal practice and exogenous regulation (Buch (2002)).

In addition to differentiating between the sources of rents, we further frame our discussion by distinguishing between *conduct* and *strategy*. Conduct comprises the offering, pricing and availability of loans and/or deposits, while strategy concerns market presence and structure, and deals with the entry, location, composition and heterogeneity in bank (branches) present in the market.

Four sources of rents and two levels of decision-making yield the eight-celled matrix depicted in Figure 2. We assign the relevant empirical findings in the banking literature to one of these eight cells. Within each cell, we group current empirical work by market, i.e., *loan*, *deposit*, and *interbank* market, and also discuss findings on the *interplay* between any of these three markets.

Are these rents large and persistent, hence central to individual bank decision-making? Our review demonstrates they may well be. In addition, the special nature of banking and the recurring and ubiquitous fretting by regulators and market participants about banking sector stability and competitiveness indicate why the sources of rents, their magnitude, persistence and interdependence may well be key in understanding the dynamics in banking sectors around the world.

Economic theory offers conflicting predictions about the relationship between bank rents and fragility (Carletti (2005)). One side of the literature, the concentration-stability view, argues that there is a positive link between concentration and stability. A more concentrated market structure enhances profits and hence increases the franchise values of the banks. Higher franchise values reduce the banks' incentives to take excessive risk

resulting in lower fragility (Hellman, Murdock and Stiglitz (2000)). On the other hand, the proponents of the concentration-fragility view argue that if more concentration leads to greater market power, then the higher interest rates charged by banks may induce the firms to assume greater risks resulting in more risky bank portfolios and fragility (Boyd and De Nicolo (2005)).

Many papers ultimately bear on the issue of whether bank rents are important and persistent (we tabulate and evaluate the plethora of findings in Tables 1 to 6 and Figure 3). By way of preview, we hold the empirical literature dealing with competition in banking to suggest that (see also Figure 4):

- *Market concentration* results in significant spreads in deposit and loan markets. Fiercer competition lowers spreads, but may also spur banks to tie customers in rent shielding relationships that possibly encompass more fee related products and cross-selling.
- Bank-borrower *relationship duration* seems not uniformly linked to increasing loan spreads, though loan fees and pricing of other products may be important and missing in those studies finding a negative correspondence.
- The few studies that focus on *location* as a source for bank rents find that close borrowers pay a higher loan rate. The effects of distance on credit availability on the other hand seem small. Though distance effects on branch efficiency seem minimal, to cross borders to enter or merge with another bank continues to be a risky endeavor for many banks.

- *Regulation* continues to be a fine source of rents for banks in many countries.

We organize the rest of the paper as follows. Section II reviews the different methodological approaches taken to address banking competition, including where possible an assessment of the methods. Section III summarizes the many empirical studies documenting the impact of competition on loan conditions and market presence. Section IV discusses switching costs, Section V assesses location as a source of bank rents, and Section VI deals with the current state of banking regulation and its relation to competition. Section VII concludes.

II. Measuring Banking Competition

We start with a review of the different methodological approaches that have been employed to investigate banking competition. This empirical research can be subdivided into the more *traditional IO* and the *New Empirical IO* (NEIO) approaches. Within the traditional methods, we distinguish between the *Structure-Conduct-Performance* (SCP) analyses, studies of *efficiency*, and studies of *scale and scope economies*. The New Empirical IO methods aim to measure the degree of competition directly. We differentiate between the approaches taken by *Panzar and Rosse (1987)*, the *conjectural variations* models, *structural demand* models, and *other structural* models (sunk costs and entry) (see Bresnahan (1989) for a review). The usefulness of the different approaches hinges on data availability and the questions being addressed. The special nature of banking markets prompted the introduction of alternative and complementary approaches. For brevity's sake we do not introduce these approaches in this methodology section (but we will come back to some of these developments in later sections).

A. Traditional Industrial Organization

1. Structure-Conduct-Performance

The Structure-Conduct-Performance (SCP) model is originally due to Bain (1956). SCP research was quite popular until the beginning of the 1990s. Figure 1 summarizes the characteristics of SCP research. The SCP hypothesis argues that higher concentration in the banking market causes less competitive bank conduct and leads to higher bank profitability (but lower performance from a social point of view). To test the SCP hypothesis researchers typically regress a measure of bank performance, e.g., bank profitability, on a

proxy for market concentration, i.e., an *n*-bank concentration ratio or a Herfindahl – Hirschman Index (HHI). A representative regression specification equals:

$$\Pi_{ijt} = \alpha_0 + \alpha_1 CR_{jt} + \sum_k \gamma_k X_{k,ijt} + \varepsilon_{ijt},$$

where Π_{ijt} is a measure of bank *i*'s profitability, in banking market *j* at time *t*, CR_{jt} is the measure of concentration in market *j* at time *t*, and $X_{k,ijt}$ stands for a *k*-vector control variables that may affect bank profits (for example, variables that control for the profitability implications of risk taking). Banks operating in more concentrated markets are able (within the SCP paradigm) to set higher loan rates or lower deposit rates as a result of non-competitive behavior or collusion. Hence, the SCP hypothesis implies that $\alpha_1 > 0$, i.e. that higher market concentration implies more market power and higher bank profits. The market structure itself however is assumed to be exogenous.

Numerous studies document for example a positive statistical relationship between measures of market concentration and bank profitability. As Gilbert (1984) and recently Berger et al. (2004) wrote excellent critical reviews of this early approach, there is no need to make another attempt in this setting (but will discuss some of the results later in this paper). However, to illustrate SCP research in general, we briefly discuss Berger and Hannan (1989). While many studies focus on *profitability*-concentration, Berger and Hannan (1989) actually study the *deposit rate*-concentration link. Nevertheless their study is representative for the SCP approach given their measurement of concentration, reduced-form estimation, and interpretation.

Berger and Hannan (1989) study US retail deposit markets. Their analysis covers 470 banks operating in 195 local banking markets offering six different deposit products. Using

quarterly data from 1983:III to 1985:IV, they estimate the following specification:

$$r_{ijt} = \alpha_0 + \alpha_1 CR_{jt} + \sum_k \gamma_k X_{k,ijt} + \varepsilon_{ijt},$$

where r_{ijt} is the interest rate paid on the retail deposit by bank *i* in banking market *j* at time *t*. The SCP hypothesis implies that $\alpha_1 < 0$, i.e. that higher market concentration implies more market power and lower deposit rates.[3]

Researchers have employed many different concentration measures to capture non-competitive behavior. Berger and Hannan use both a three-bank concentration ratio (CR3) and the HHI.[4] Their results overall show a negative impact of market concentration on deposit rates, independent of the concentration measure being used. For example, moving from the least concentrated market towards the most concentrated market in their sample yields a reduction of about 47 to 52 basis points on Money Market Deposit Accounts.

While the early SCP approach was successful in documenting the importance of market structure for various bank interest rates, Berger et al. (2004) surely presents the consensus view when they write, "the [empirical banking] literature has now advanced well past this simple approach". We summarize the notable differences between the SCP and more recent studies both within an SCP framework and beyond in Figure 1.

2. Studies of Bank Efficiency

The efficiency hypothesis provides an alternative explanation for the positive link between bank profitability and concentration or market share. The efficiency hypothesis (see Demsetz (1973) or Peltzmann (1977)) entails that more efficient banks will gain market share. Hence market concentration is driven (endogenously) by bank efficiency.

Two types of efficiency can be distinguished (Berger (1995)). In an *X-efficiency* narrative, banks with superior management and/or production technologies enjoy higher profits and as a result grow larger market shares. Alternatively, some banks may produce at more *efficient scales* than others, again leading to higher per unit profits, larger market shares, and higher market concentration.

The positive relationship between structure and performance reported in the SCP literature is spurious in the two versions of the efficiency hypothesis, as both structure and performance are determined by efficiency. Initially, the empirical literature aimed to disentangle the SCP and efficiency hypotheses through the following regression specification:

$$\Pi_{ijt} = \alpha_0 + \alpha_1 CR_{jt} + \alpha_2 MS_{ijt} + \sum_k \gamma_k X_{k,ijt} + \varepsilon_{ijt},$$

with MS_{ijt} the market share of bank *i* in market *j* for period *t* (the notation for the other variables remains the same).

SCP implies that $\alpha_1 > 0$, whereas both efficiency hypotheses imply that $\alpha_2 > 0$. Most studies find a positive and statistically significant α_2, but an α_1 close to zero and insignificant. These findings support both efficiency hypotheses, i.e. larger market shares go together with higher profitability.

Berger (1995) goes one step further than the standard bank efficiency study and aims to further differentiate between the SCP and efficiency hypotheses by including direct measures of both X-efficiency and scale efficiency into the regression specification (as additional variables in the $X_{k,ijt}$-vector). He argues that after controlling for efficiency,

MS_{ijt} captures the relative market power of banks. Berger derives both efficiency measures from the estimation of a translog cost function. X-efficiency is separated from random noise by assuming that X-efficiency differences will persist over time while random noise does not. The X-efficiency measure for bank *i* then equals the ratio of the predicted costs for the most efficient bank in the sample to the predicted costs for bank *i* for any given vector of outputs and inputs. Berger also computes scale efficiencies on the basis of the translog cost function by taking the ratio of the minimum predicted average costs for bank *i* to the actual predicted average costs for bank *i* given output mix and input prices. By construction both measures range between 0 and 1.

Berger (1995) estimates a cost function using data from 4,800 US banks during the 1980s. Mean scale inefficiencies amount to over 15 percent. Including both computed efficiency measures in the performance equation that also contains market share and concentration, Berger finds that in 40 out of 60 regressions market share actually retains its positive sign. However, the economic significance of market share seems very small: a one percent increase in market share boosts Return On Assets with less than one-tenth of a percent. Nevertheless, Berger interprets these findings as evidence in favor of the relative market power hypothesis: market share does represent market power of larger banks and their market power may be grounded in advertising, local networks, or business relationships. Results further show that X-efficiency also contributes positively in explaining profits whereas the results on scale efficiency on the other hand are mixed and never economically important.

Studies of operational efficiency of financial institutions are also related to the efficiency hypotheses. Operational efficiency requires (1) optimization of the input mix to avoid

excessive input usage (technical X-inefficiency) or suboptimal input allocation (allocative X-inefficiency), and (2) production at an optimal scale and in an optimal mix to achieve economies of scale and scope. For more on X-efficiency studies analyzing financial institutions we refer the reader to surveys by Allen and Rai (1996), Molyneux, Altunbas and Gardener (1996), Berger and Humphrey (1997), or recent work by Turati (2001). We turn to economies of scale and scope in the next sub-section.

3. Studies of Economies of Scale and Scope

Studies of economies of scale and scope in banking address the question whether financial institutions produce the optimal output mix both in terms of size and composition. Allen and Rai (1996), for example, estimate economies of scale and scope while controlling for X-efficiency. In particular, they estimate the following equation:

$$\ln(TC_{it}) = f(y_{it}, p_{it}) + \varepsilon_{it},$$

where TC_{it}, y_{it}, and p_{it} are total costs, outputs, and input prices of bank *i* in at time *t*, respectively. They consider only one market (hence *j* is dropped as a subscript). ε_{it} is a composite error term that can be decomposed into statistical noise and X-inefficiency. Allen and Rai pursue two identification strategies. First, they follow the so-called *stochastic cost frontier* approach (see also for example Mester (1993)), whereby the error term is assumed to consist of random noise and a one-sided inefficiency measure. Second, they estimate a *distribution-free model*, whereby X-efficiency differences are assumed to persist over time while random noise is not.

Allen and Rai estimate a translog cost function with total costs due to labor, capital, and borrowed funds, employing data from 24 countries for the period 1988-1992. They obtain

the price of labor by dividing staff expenses by the total number of employees; the price of fixed capital by dividing capital equipment and occupancy expenses by fixed assets; and interest costs by taking total interest expenses over total interest bearing liabilities.

They distinguish between countries with and without universal banking (i.e., so-called *separated* banking occurs in countries that prohibit the functional integration of commercial and investment banking) and between small and large banks (smaller or larger in asset size than the median bank in each country).

Allen and Rai find evidence of significant scale economies for *small banks* in all countries. Large banks in separated markets on the other hand show significant diseconomies of scale amounting to 5 percent of optimal output levels. They do not find any evidence of significant economies of scope.[5] Many other papers present comparable results on economies of scale and scope. Detailed reviews are provided by Berger and Humphrey (1997), and Cavallo and Rossi (2001).

B. New Empirical Industrial Organization

A fundamental criticism leveled against the SCP and the efficiency hypotheses relates to the embedded one-way causality from market structure to performance. In other words, most SCP studies do not take into account the conduct of the banks in the market and the impact of performance of the banks on market structure.

New Empirical Industrial Organization (NEIO) circumvents this problem and does not try to infer the degree of competition from "indirect proxies" such as market structure or market shares. Indeed, NEIO aims to infer firms' conduct directly – without even taking into account market structure – employing a variety of alternative methodologies with

sometimes substantially different data requirements. We highlight a number of approaches.

1. *Panzar and Rosse (1987)*

Panzar and Rosse (1987) present a reduced form approach using industry or bank-level data to discriminate between perfect competition, monopolistic competition, and monopoly. The Panzar and Rosse methodology investigates the extent to which changes in factor input prices are reflected in equilibrium industry or bank-specific revenues. In particular, bringing the empirical Panzar and Rosse methodology to banking can be obtained by the following revenue equation:

$$\ln(INTR_{it}) = \alpha + \sum_f \beta_f \ln(P_{f,it}) + \sum_k \gamma_k X_{k,it} + \varepsilon_{it},$$

where $INTR_{it}$ is the ratio of total interest revenue to total assets of bank *i* at time *t*. $P_{f,it}$ and $X_{k,it}$ denote the (price of) factor input *f* and control variable *k*, respectively, of bank *i* at time *t*. The application may consider one market only, or many markets (in which case *j* should be added as subscript). Moreover, some authors use variables that are not scaled and/or total revenues (including non-interest rate revenues) as left hand side variables. The Panzar and Rosse (1987) *H*-statistic can be computed as:

$$H = \sum_f \beta_f .$$

Hence *H* is the sum of the elasticities of the (scaled) total interest revenue of the banks with respect to their factor input prices. In most studies three different input prices are considered: (1) the *deposit rate*, measured by the ratio of annual interest expenses to total assets; (2) *wages*, measured by the ratio of personnel expenses to total assets; and (3) *price of equipment or fixed capital*, measured by the ratio of capital expenditures and other

expenses to total assets.

A monopoly situation yields an *H*-statistic that can be negative or zero. What will happen to a monopolist's revenues when all factor prices increase with 1 percent? For a monopolist such increase in factor prices leads to lower revenues (since the price elasticity of demand exceeds one). In other words, the sum of the elasticities should be negative. Perfect competition implies an *H*-statistic equal to one. Indeed, an increase in input prices augments both marginal costs and total revenues to the same extent as the original increase in input prices. Monopolistic competition yields values of *H* in between zero and one. Banks will produce more but less than would be optimal in each individual case, leading to an H-statistic in between 0 and 1. It is worth stressing though that the interpretation of competition based on the *H*-statistic requires that the banking sector is in a long-run equilibrium (Nathan and Neave (1989)).

Many studies bring the Panzar and Rosse (1987) methodology to banking. Bikker and Haaf (2002) offer a broad review of the results of many other studies (their Table 4). By far the most comprehensive application to date of the Panzar and Rosse (1987) methodology is a recent paper by Claessens and Laeven (2004). They compute the Panzar and Rosse *H*-statistic for 50 countries for the period 1994-2001. They exclude countries with less than 20 banks or 50 bank-year observations but still end up with 35,834 bank-year observations in total.

The empirical results by Claessens and Laeven (2004) show that most banking markets are actually characterized by monopolistic competition with *H*-statistics ranging between 0.6 and 0.8. In addition, Claessens and Laeven aim to identify factors that determine banking competition across countries by regressing the estimated country *H*-statistics on a

number of country characteristics. They find no evidence of a negative relationship between bank system concentration and *H*, but find that fewer entry and activity restrictions result in higher *H*-statistics and hence more competition.

The Panzar and Rosse methodology seems well designed to compare competition across banking markets. Data requirements are quite low, and the necessary data is readily available in many countries. And as already discussed Claessens and Laeven (2004) nicely exploit this attractive feature of the methodology and document that entry barriers, not market structure, determine competition in most banking markets.

2. Conjectural-Variations Method

Another methodology to infer the degree of competition was introduced by Iwata (1974), Bresnahan (1982), and Lau (1982). This methodology is often referred to as the conjectural-variations approach. It is based on the idea that a bank when choosing its output takes into account the "reaction" of rival banks. The equilibrium oligopoly price is then characterized by the following first order condition:

$$P(Q,Y;\alpha)+\lambda QP'(Q,Y;\alpha)=C'(Q,Z;\beta),$$

where P is the market's equilibrium price, $P(Q,Y,\alpha)$ is the market inverse demand function, Q the market level quantity, and $C'(Q,Z,\beta)$ is the market marginal cost. α and β are vectors of unknown parameters associated with demand and costs respectively. Y and Z are a vector of variables that affect demand and costs respectively. λ is the conjectural elasticity of total bank industry output to variation of bank *i* output; that is $\lambda=\frac{\partial Q}{\partial Q_i}\frac{Q_i}{Q}$. In other words, λ is the perceived response of industry output to a change in

quantity by bank *i* (see Vives (1999) for more on this methodology).

One can also compute the conjectural elasticity or conduct parameter as:

$$\lambda = \eta(P)\left[\frac{P - MC}{P}\right],$$

where $\eta(P)$ is the price elasticity of demand, and MC ($=C'(Q,Z;\beta)$) the marginal cost. This implies that λ is the elasticity-adjusted Lerner index. A nice feature of the conjectural variations model is the possibility to write different types of competition compactly. It nests the joint profit maximization (λ=1), perfect competition (λ=0), and the Cournot equilibrium or zero-conjectural variations model (λ=1/*I* with *I* the number of firms in the market; that is the perceived variation of other participants in the industry to changes in bank *i*'s output is zero).[6]

Shaffer (1993) applies this methodology to banking (see also Spiller and Favaro (1984) for an earlier application). He approximates the demand function as:

$$Q = a_0 + a_1 P + a_2 Y + a_3 PZ + a_4 Z + a_5 PY + a_6 YZ + e\,,$$

with Z is an additional exogenous variable such as the price of a substitute for banking services, and e an error term.[7] He derives the unobserved marginal cost from estimating a translog cost function:

$$\begin{aligned}\ln TC = {} & \beta_0 + \beta_1 \ln Q + \beta_2 (\ln Q)^2 + \beta_3 \ln W_1 + \beta_4 \ln W_2 + \beta_5 (\ln W_1)^2 / 2 \\ & + \beta_6 (\ln W_2)^2 / 2 + \beta_7 \ln W_1 \ln W_2 + \beta_8 \ln Q \ln W_1 + \beta_9 \ln Q \ln W_2\end{aligned},$$

where TC is total cost, Q is output, and W_1, W_2 are input prices. Assuming that banks are input price-takers, the supply relation becomes:

$$P = \left[\frac{-\lambda Q}{a_1 + a_3 Z + a_5 Y} \right] + MC .$$

An important issue is whether banks can be viewed as price takers in the input market. The "price taking" assumption is especially problematic in deposit markets, where banks may enjoy market power. If this is indeed the case then the estimated degree of market power λ will be overestimated, as some of the "input market power" will wrongly be attributed to market power on the asset side.

Shaffer (1993) applied this specific conjectural variations method to the Canadian banking sector, using annual data from 1965 to 1989. The application is attractive as "Canada […] had but twelve chartered banks in 1980 [and] six of these banks have dominated the Canadian financial sector since the 1930s" (p. 50). The low number of players for a long time raised concerns about competition in the Canadian financial sector. And that was (is) also increasingly the case in other parts of the world where bank consolidation gathered momentum.

In his study Shaffer (1993) follows the so-called intermediation approach of banking. According to this view, banks use labor and deposits to originate loans. The quantity of output Q is the dollar value of assets and the price P is the interest rate earned on assets. Input prices are the annual wage rate and the deposit rate.[8] The exogenous variables are output and the 3-month Treasury bill rate. The regression results show that λ is not significantly different from zero implying that the estimates are consistent with perfect competition. Shaffer (1989) actually shows that US banking markets are even more competitive than Cournot competition (λ is again close to zero and not statistically significant).

Shaffer's paper focuses on one "aggregate" market and to implement his approach it suffices to have aggregate data. In this aggregate setting λ captures the "average industry" market power. Shaffer's methodology has been extended to allow for heterogeneity within and between different sectors, countries, and to include bank heterogeneity. The potential to include bank heterogeneity and estimate specific λ_{ij} is an attractive feature of the conjectural variations methodology.

3. Structural Demand Models

Another strand of the New Empirical Industrial Organization uses characteristics-based demand systems. Dick (2002), for example, estimates a demand model for deposit services following a methodology prevalent in the discrete choice literature. Consumers choose for a particular bank based on prices and bank characteristics. In particular, she starts from a consumer's utility function to derive a demand model and introduces product differentiation through bank heterogeneity. Dick adds a model of firm conduct in order to define the price-cost margin. She defines the relevant banking market as geographically local, be it either a Metropolitan Statistical Area (MSA) or a non-MSA rural county. Her study considers only commercial banks, but incorporates other financial institutions as providing the outside good in the demand model. Market shares are computed on the basis of dollar deposits at each bank branch in the US.

Consumers *c* and banks *i* populate markets *j*. The utility a consumer *c* derives from depositing at bank i stems both from individual and product characteristics. Formally, consumer *c* derives indirect utility from choosing bank *i*'s services in market *j*. The consumer utility includes both the mean utility from buying at bank *i* in market *j*, δ_{ij}, and a

mean zero random disturbance, ε_{cij}:

$$u_{cij} \equiv \delta_{ij} + \varepsilon_{cij} \equiv p_{ij}^{d}\alpha^{d} - p_{ij}^{s}\alpha^{s} + X_{k,ij}\beta + \xi_{i} + \varepsilon_{cij}\,.$$

p_{ij}^{d} represents the deposit rate paid by bank *i* in market *j*; p_{ij}^{s} are the service charges on deposits by bank *i* in market *j*; $X_{k,ij}$ is a vector capturing *k* observed product characteristics for the (singular) product offered by bank *i* in market *j*; ξ_{i} are the unobserved bank product characteristics. The taste parameters to be estimated are α^{d}, α^{s}, and β.

A consumer *c* chooses a bank *i* in market *j* if and only if $u_{cij} \geq u_{crj}$, for $r = 0$ to I_j, with 0 the outside good and I_j the number of banks in market *j*. Making assumptions on the distribution of ε_{ci} then allows obtaining a closed form solution for the market share of bank *i*. A multinomial logit specification is obtained when assuming that ε_{ci} is i.i.d. extreme value, yielding the bank *i*'s market share s_i in market *j*:

$$s_{i} = \frac{\exp(\delta_{i})}{\sum_{r=0}^{I_j}\exp(\delta_{r})}\,.$$

Other assumptions may yield a nested logit model.[9]

Dick (2002) estimates this discrete choice model on US-data for the period 1993-1999. Her results indicate that consumers respond significantly to changes in deposit rates but to a lesser extent to changes in account fees. Bank characteristics such as geographic diversification, density of the local branch network, bank age and size increase the attractiveness of a bank to consumers. The computed price elasticities in the logit model are around six for the deposit rate but below one for the account fees. The implied price

cost-margin is 10 percent for the deposit rate and 25 percent for the service fees.

4. Other Structural Models

a) Sunk-Cost Models

Sutton (1991) finds that some product markets remain concentrated even when growing in size. Vives (2000) introduces endogenous sunk costs models to banking. He argues that investments in information technology become more important when markets grow. When the level of these "quality investments" can be chosen by individual banks and a bank's market share is sufficiently responsive to these investments, then a new global marketplace with only a few global players may arise. The outcome of this "competition through endogenous sunk costs" is that the number of "dominant" banks in the market remains approximately the same and that only the number of "fringe" banks will increase in market size.

Dick (2004) investigates a cross-sectional sample of US MSAs. As endogenous sunk costs Dick takes bank branch and Automatic Teller Machine (ATM) networks, advertising, and branding expenses. She defines banks that hold jointly more than 50 percent of market deposits as the dominant banks. All other banks are her fringe banks. She finds that there is a lower bound to concentration and that markets remain concentrated across all market sizes. She also reports in line with Sutton (1991) that the number of dominant banks remains unchanged in market size and is independent of the total number of banks in the MSA. Finally, she finds that the level of bank quality investments increases in market size, and dominant banks offer higher quality than fringe banks.

A further illustration can be found in Dick (2006). In this paper she explores the impact

of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 on various aspects of banking markets. In particular, she examines the effects of the Act on bank market concentration, structure, and service quality, by comparing markets in 1993 and 1999. She finds that market concentration at the regional level increased dramatically, but that market structure at the MSA level, i.e. the presence of a few dominant banks, remained unchanged. However, nationwide branching did lead to increases in product quality as consumers can now enjoy expanded branch and ATM network coverage.

b) Structural Models of Entry

A number of recent papers aim to infer competitive behavior from observed industry structure that produces insights about unobserved firm profitability. The underlying idea in these so-called "structural models of entry" is that the entry decisions of potential competitors and the continuation decisions of the incumbent firms only occur in case these decisions are actually profitable. The entry decision hinges on the level of fixed costs, the nature of post-entry competition, and the (future) entry or continuation decisions of other firms. A crucial advantage of the structural entry models is that detailed data on prices and volumes are not necessary for the analysis. We refer the interested reader to Bresnahan and Reiss (1991) and Bresnahan and Reiss (1994) for more on this methodology. Important starting assumptions are that: (1) markets are non-overlapping, i.e. consumers do not buy from banks outside the geographically defined market; and (2) all banks are competing with each other.

Cohen and Mazzeo (2003) bring this structural methodology to banking data. More formally, they let $\Pi_i(I; X_k)$ be the expected long-run profits for bank *i* (or branch *i*) that

chooses to be active in a certain market *j*. I is the number of banks active in market *j* (where for brevity subscript *j* is dropped) and X_k captures a *k*-vector of demand and cost shifters. Not operating in a market yields zero profits. The equilibrium condition then requires that:

$$\Pi_i(I) \geq 0 > \Pi_i(I+1).$$

Entry of one additional bank in the market where I banks are already active implies that competition would become too intense given the market characteristics to generate positive profits. Cohen and Mazzeo (2003), following Bresnahan and Reiss (1991), take the following profit function to capture bank behavior in a symmetric equilibrium in market *j*:

$$\Pi_j = (\text{Variable Profits}_j * \text{Market Size}_j) - \text{Entry Cost}_j .$$

In this set-up, variable profits hinge on the number of banks in the market:

$$\Pi_{I,j} = X_k\beta - \mu_I + \varepsilon_j ,$$

with X_k exogenous market factors, μ_I the effect of I competitors on per-bank profits, and ε_j a market-level error term assumed to follow a normal distribution. Given that banks will not enter when having negative profits, the probability of observing I banks becomes:

$$P(\Pi_I \geq 0 \text{ and } \Pi_{I+1} < 0) = \Phi(\overline{\Pi}_I) - \Phi(\overline{\Pi}_{I+1}),$$

with Φ the cumulative normal density function and $\overline{\Pi}_I = X_k\beta - \mu_I$. The parameters β and μ_I are estimated with an ordered probit model.

Cohen and Mazzeo (2004) extend this basic framework to accommodate for differentiation among different types of competitors – multi-market bank, single-market bank and thrifts. They do this by allowing for a separate profit function for competitors of

each type in each market. Suppose there are two types of banks, *A* and *B*. An additional market participant of type *A* will always decrease profits in the market, but this decrease is assumed to be larger for type *A* than for type *B* banks. They exploit data from 1,884 non-MSA areas as of June 2000. Population, per capita income, the number of farms and non-farms capture market size. Cohen and Mazzeo focus on the cross-type effects measuring how banks of one type affect the profits of other-type banks. They find that the effects of same-type banks on these banks' profits are greater than the impact of the other-type institutions. This result suggests that differentiation between bank types is an important feature of banking markets. Moreover, multi-market banks and single-market banks affect each other more than thrifts do.

III. Competition: Conduct and Strategy

Section II showed that the competition literature has made substantial progress by modeling market structure as endogenous. Furthermore methodologies have been developed to exploit the rich heterogeneity and different dimensions of the available data sets. However, "it can be argued that the standard competitive paradigm is not appropriate for the banking industry" (Vives (1991), Vives (2001a), Allen, Gersbach, Krahnen and Santomero (2001) and Carletti (2005)). Hence to capture the "special nature of banking competition", we will review the available empirical evidence and structure our discussion within a framework that finds its roots within the different theories explaining the existence of financial intermediation.

To categorize and assess the many empirical findings in the literature on competition in banking, we focus (as already indicated) on four possible sources of rents for banks: *market structure*, *switching costs*, *location*, and *regulation*. And for each of these sources we frame our discussion by distinguishing between *conduct* and *strategy*, yielding the eight-celled matrix already introduced in Figure 2. We strive to assign the relevant empirical findings in the banking literature to one of these eight cells. Within each cell, we will discuss (where applicable) empirical work on *loan*, *deposit*, and *interbank* markets and also discuss findings on the *interplay* between any of these three markets.

In this Section we start discussing the impact of market structure on loan and deposit conditions and then turn to the question of whether market structure determines market presence.

A. Market Structure and Conduct

1. Loan Markets

a) Local Markets

There is ample empirical work starting from the SCP-paradigm investigating the impact of bank market concentration on bank loan rates (see for example Gilbert and Zaretsky (2003) for a recent review). Table 1 displays the results of selected studies that regress bank loan rates on a Herfindahl – Hirschman Index (HHI) of market concentration (we do not report any studies that employ *number of competitors* as a measure; these studies typically find no impact on the loan rate). Studies employ both US and international data.

Though mostly positive, the magnitude of the impact of the concentration index on loan rates varies widely. To benchmark the results we calculate the impact of a change in the HHI of 0.10, which according to widely accepted cut-offs could mark the transition from a competitive market (HHI < 0.10) to a concentrated market (HHI > 0.18). Illustrating the wide range of results we note that recent studies for example indicate that a ΔHHI = 0.1 increases the loan rate by between 21*** to 55 *** basis points (bp) in the US (Cyrnak and Hannan (1999)) and 59*** bp in Italy (Sapienza (2002)),[10] but only 3 bp in Norway (Kim, Kristiansen and Vale (2004)) and –4 to 5*** bp in Belgium (Degryse and Ongena (2005a)). However, it remains difficult to compare results across specifications, banking markets, periods, and HHI measures that are alternatively based on loans, deposits, or branches, and vary widely (across studies) in geographical span (Morgan (2002)). Indeed a serious related problem of interpretation is that local market concentration is often negatively correlated with market size.

In their seminal paper Petersen and Rajan (1995) investigate the effects of competition between banks not only on the loan rate but also on the availability of bank credit to firms. Petersen and Rajan model how especially firms with uncertain future cash flows are negatively affected by competition between banks. Banks may be unwilling to invest in relationships by incurring initial loan losses that may never be recouped in the future (as firms can later on obtain a low loan rate in a competitive banking or financial market).

Petersen and Rajan provide evidence on the impact of concentration both on loan rates and availability of credit. They document that young firms – having uncertain future cash flows – in more concentrated banking markets obtain substantially lower loan rates than firms in more competitive banking markets. The loan rates decreases by more than 150** basis points for *de novo* firms, if the HHI increases by 0.10. They also document somewhat easier access to bank credit in more concentrated markets (see the second panel in our Table 1), but even for young firms the effects seem modest economically speaking and statistically not always significant. An increase of 0.1 in the HHI roughly augments the percentage trade credit paid before the due date by between 1.5*** and 3*** percent across all firms and by around 2* to 8 percent for young firms.

The effects of banking competition on the firms' capital structure decisions seem even more subdued. For example, Petersen and Rajan (1994) document that a ΔHHI = 0.1 increases firm % Total Debt / Assets by only 0.36 percent, while a recent paper by Zarutskie (2004) shows an increase in % Outside Debt / Assets by only between 0.19 and 0.77*** percent. Similarly, Cavalluzzo, Cavalluzzo and Wolken (2002) find no significant aggregate effect of an increase in HHI on a variety of credit availability measures (though they do find significant positive effects for small firms owned by African Americans or

females), while Angelini, Di Salvo and Ferri (1998) record no economically significant effect on perceived access to credit for a sample of small Italian firms.

b) Multi-Market

The presence of banks operating in several geographical areas or several industries – multi-market banks – may impact local loan rate conditions. The influence on the local loan rates depends on whether the multi-market banks apply uniform or discriminatory pricing across local markets and on the structure of each local banking market (including the importance of the multi-market banks present in that market).

Radecki (1998) for example reports that most banks set uniform rates on auto loans and home equity loans *within* a US-state. Loan rates however can differ *across* states. Berger, Rosen and Udell (2002) address the issue of whether in the US large regional or nationwide banks compete in different ways than small, local institutions. Their study is motivated by the observation that US banking consolidation over the period 1984-1998 had only a minor impact on "local" HHI but a major effect on bank size because many "market-extension" M&As, i.e. mergers between banks operating in different local markets, took place. Berger, Rosen and Udell (2002) document that loan rates to SMEs are lower in markets with a large bank presence. They find that interest rate spreads charged in markets with a large bank presence are 35* bp lower than in other markets.

A key paper by Sapienza (2002) investigates the impact of Italian bank M&As on interest rates to continuing borrowers. She can actually compare the impact of "in-market" versus "out-of-market" bank mergers on loan rates. Interestingly enough she finds that "in-market" mergers decrease loan rates but only if the acquired bank has a sufficiently low

local market share. The decrease in loan rates is much less important for "out-of-market" mergers.

Panetta, Schivardi and Shum (2004)) study the link between firm risk, measured by bank credit ratings, and interest rates. They find that the risk-rate schedule becomes steeper after bank mergers (i.e., the merged bank prices risk sharper) and attribute this result to the informational benefits arising from bank mergers. Important in this context is their finding that the risk-rate schedules are even steeper for "out-of-market" than for "in-market" mergers, suggesting that "out-of-market" mergers even yield more informational benefits to the banks than "in-market" mergers. Finally, a recent paper by Berger, Hasan and Klapper (2004) reports cross-country evidence on the importance of small, domestic, community banks for local economic activity in general. They find that higher shares of community banks in local bank markets are associated with more overall bank lending, faster GDP growth, and higher SME employment.

2. Deposit Markets

a) Local Market

There is also a long line of research, at least going back to Berger and Hannan (1989), investigating the impact of bank market concentration on bank deposit rates. Table 2 summarizes the findings of this literature. Studies employ both the three-bank concentration ratio (CR3) and the HHI as concentration measures. Overall most papers find a negative impact of an increase in concentration on time and savings deposit rates, but as with the loan rate studies, the effects vary across samples and specifications. We take a change in CR3 by 0.3 to be approximately comparable to a change in HHI by 0.1. The

effect of the changes in either the CR3 or HHI on US time and savings deposits rates ranges then from –26*** to –1 and from –27*** to +5 basis points, respectively. Rates on demand deposits seem less affected by market concentration with estimates varying from –18*** to +10* bp. But there is evidence of more downward price rigidity and upward price flexibility in demand deposit rates than in time deposit rates especially in more concentrated markets (Neumark and Sharpe (1992)).

More recent studies typically find smaller negative effects for all deposit products, possibly reflecting the widening geographical scope of banking competition (Radecki (1998)) and the ensuing difficulties delineating the relevant local market (Heitfield (1999), Biehl (2002)). Geographical markets in the US for demand deposits may be currently "smaller than statewide" but not necessarily "local" (Heitfield and Prager (2004)), suggesting both local and state-wide measures of concentration and multi-market contact variables should be included in the analysis. Heitfield and Prager (2004) finds that the coefficients on "state" concentration measures became larger in absolute value over time than the coefficients on the "local" measures in particular for demand deposits. In 1999, for example, a 0.1 change in the local HHI affected the NOW deposit rate by only -1* bp while a similar change in the state HHI decreased the rate by 23*** bp.

A recent paper by Corvoisier and Gropp (2002) studies European national banking markets, in geographical and economic span often comparable to US states. They find a substantial effect of –70*** bp on demand deposit rates (corresponding an increase in HHI of 0.1), but a surprising increase of +50*** and +140*** bp for time and savings deposits rates. Corvoisier and Gropp argue that local markets are more relevant for demand deposits whereas customers may shop around for time and savings deposits. Shopping around

would imply an increase in contestability, breaking the expected link between HHI and this deposit rate. Demand deposit rates are often posted within a national market after being determined at the banks' headquarters where competition (or lack thereof) may be perceived to be nation-wide. On the other hand, for the time and savings deposit markets the coefficient on HHI may actually pick up bank efficiency (even though various bank cost measures are included) or the effect of bank mergers caused by an unobservable increase in contestability. In any case, this study again underlines the methodological difficulties in interpreting the reduced form coefficients in interest rate – market concentration studies.

b) Multi-Market

A number of papers explore the impact of multi-market banks on deposit pricing. Radecki (1998) provides evidence of uniform pricing across branches of banks operating throughout an entire US-state or large regions of a state. He interprets this finding as evidence in favor of an increase of the geographic reach of deposit markets over time. Heitfield (1999) shows however that uniform pricing is only practiced by multi-market banks that operate statewide, but not by single-market banks that operate in one MSA only. Hence "charging the same deposit rate" may result from a deliberate decision of uniform pricing and not mechanically from a geographical expansion of market boundaries. Heitfield and Prager (2004) further fine-tunes the previous findings by exploring heterogeneity in the pricing of several deposit products. They report that the geographic scope of the markets for NOW accounts remains local, but that the scope of money market deposit accounts and savings accounts markets has broadened over time.

Hannan and Prager (2004) explore the competitive impact of multi-market banks on local deposit conditions, using US data for 1996 and 1999. They document that multi-market

banks offer lower deposit rates than single-market banks operating in the same market. Moreover, a greater presence of multi-market banks relaxes competition as single-market banks offer lower deposit rates. On the other hand, Calem and Nakamura (1998) argue that multi-market banks mitigate localized market power in rural areas,[11] but that multi-market branching reduces competition in already competitive (urban) markets. Recent work by Barros (1999) reasons that the presence of banks across markets may lead to local interest rate dispersion, without implying different conduct of banks. Collusive behavior among banks could impact the degree of price dispersion. His empirical findings for Portugal provide strong support for Nash behavior but, given the small sample size, collusion cannot be rejected. Using a similar setup collusive behavior among Spanish banks in the loan market in the early 90s can also not be rejected (Jaumandreu and Lorences (2002)).

What about the impact of M&As? Focarelli and Panetta (2003) document that "in-market" mergers hurt depositors in the short run due to lower deposit rates – a drop of 17*** bp. The short-run impact of "out-of-market" mergers, however, is negligible. In the long run, depositors gain from both "in-market" and "out-of-market" mergers as deposit rates increase with 14*** and 12*** bp respectively compared to the pre-merger level.

3. Interplay between Markets

The links between the different banking markets have been recently also empirically investigated.[12] Park and Pennacchi (2003) for example discuss the impact of the entry by large multi-market banks on competition in *both* loan and deposit markets. Park and Pennacchi (2003) posit that multi-market banks may enjoy a funding advantage in the wholesale market. As a result they establish that a higher presence of the multi-market banks promotes competition in loan markets, but harms competition in deposit markets if

these multi-market banks have funding advantages. Hence, their paper nicely shows that the impact of "size-structure" could be asymmetric across markets.

B. Market Structure and Strategy: Product Differentiation and Network Effects

Empirical work measuring product differentiation and network effects in banking is still rather limited, despite the fact that theoretical models are already highly developed and rich in testable hypotheses (see Carletti (2005)). Within the area of product differentiation, we can distinguish between studies dealing with *vertical* and *horizontal* differentiation.

Kim, Kristiansen and Vale (2004) for example study whether banks can pursue strategies in order to vertically differentiate their products and services. If customers are willing to pay for banks enjoying a higher reputation, then banks may invest in variables increasing their reputation. They consider a bank's capital ratio, its ability to avoid loan losses, bank size and branch networks as possible strategies. The empirical question addressed is whether borrowers are actually willing to pay for "quality" characteristics. If so, a strategy of vertical differentiation would allow banks to charge higher loan rates and to soften competition.

Using panel data of Norwegian banks over the period 1993-1998, Kim, Kristiansen and Vale (2004) only find empirical support for the ability to avoid loan losses, measured by the ratio of loss provisions. A doubling of the loss provisions relative to the mean implies a reduction in the interest rate spread of about 56*** bp. Other evidence for willingness to pay for bank reputation is provided in Billett, Flannery and Garfinkel (1995). They find that announcements of banks loans granted by lenders with higher credit ratings are associated with larger abnormal returns on the borrowing firm shares.

Another element leading to vertical differentiation stems from network effects (see Carletti (2005)). For example, depositors exhibit a higher willingness to pay for banks with a larger ATM network. The size of this network also hinges on the degree in which depositors can use rivals' ATMs. The ATM market has exhibited a varying degree of compatibility between networks. Over time, networks in several countries moved from incompatibility towards compatibility. However as documented in Knittel and Stango (2004) new ATM charges to rivals' clients reintroduces some incompatibility. We expect that such rival charges have a larger impact on depositors of banks owning few ATMs.

Knittel and Stango (2004) evaluate the effect of the introduction of such surcharge fees on deposit account prices, measured as the ratio of annual income associated to deposit accounts over deposit account balances. Indeed they find that (i) a doubling of the number of ATMs in the local market increases bank's deposit account prices by 5-10%, and (ii) incompatibility strengthens the link between own ATMs and deposit account prices and weakens the link between rival's ATMs and deposit account prices.

ATMs also have aspects of horizontal differentiation, as customers prefer banks with conveniently located ATMs. Banks also compete for clients by establishing branches and locating them optimally. Optimal location allows the banks to increase market share and to avoid perfect competition as clients may have preferences over locations. In other words, branching provides local market power.

Some papers start from an equilibrium situation, taking branching decisions as exogenously given, and address whether there is evidence for localized competition. Barros (1999) for example documents for Portugal that the volume of deposits banks attract hinges on the network of branches. He also finds indirect evidence for the importance of

transportation costs: urban markets have higher transportation costs than rural markets. In Degryse and Ongena (2005a) we find evidence of spatial price discrimination in Belgium: borrowers that are located close to the loan-granting branch and far from competing branches pay significantly higher loan rates.

Other papers also endogenize bank branching decisions. When deciding on the location of their branches, banks take into account all existing networks and their expectations of rivals' future location and network choices. The papers endogenizing branching decisions incorporate features of both horizontal and vertical product differentiation, as *all* consumers may have a preference for larger networks but clients may disagree on the optimal location of specific branches. Using panel data from Norwegian banks, Kim and Vale (2001) report that a bank specific branch-network positively affects market shares in loan markets, but does not affect the total size of loan markets. On the other hand, Kim, Kristiansen and Vale (2004) find no evidence for the size of bank branch network as a quality variable for borrowers in the Norwegian banking market.

Product differentiation also dictates in how far different types of financial institutions are perceived as substitutes. As indicated in the methodology section Cohen and Mazzeo (2004) present results for thrifts, multi-market banks, and single-market banks operating in the US. They find that competition is more intense between financial institutions of the same type than between institutions of differing types. This suggests that there is substantial differentiation between types of financial institutions.

IV. Switching Costs

Switching costs for bank customers are a source of considerable rents for banks. There are fixed technical costs of switching a bank (Klemperer (1995)) that may be relevant in all deposit markets. Think about the shoe-leather and other search costs a depositor incurs when looking for another bank branch, the opportunity costs of her time of opening the new account, transferring the funds, and closing the old account. Such costs are mostly exogenous to both the depositor's and the banks' behavior, but allow the incumbent bank to lower deposit rates to captured customers. Switching costs are endogenous when banks charge leaving customers for closing accounts.

In loan markets it is often conjectured that, in addition to these fixed technical costs of changing banks, there are informational switching costs. Borrowers will face these costs when considering a switch, as the current "inside" financier is more informed about borrower quality and recent repayment behavior. Such switching costs may provide the informed relationship bank with extra potential to extract rents.[13] Of course, the existence of switching costs may fan competition to draw customers, so that some of these rents will be competed away ex-ante.

Given their elusive character we first review the evidence on *existence*, *magnitude*, and *determinants* of switching costs in loan, deposit and interbank markets. We highlight loan renewal and bank distress event studies suggesting their existence and review studies assessing the magnitudes and determinants involved. In a second and third step, we discuss the impact of switching costs on bank *conduct* and *strategy* in the different markets.

A. Evidence on the Existence, Magnitude and Determinants of Switching Costs

1. Loan Markets

Evidence on the existence, the magnitude, and the determinants of switching costs in credit markets comes from a variety of studies. Analyses of firm value following bank loan, distress, and merger announcements provide indirect evidence on the existence and magnitude of the informational problem and resulting switching costs facing credit market participants. Studies of the duration of bank-firm relationships probe for the determinants of the switching costs.

a) Existence of Switching Costs

(1) Loan Renewal Announcements

Motivated by Fama (1985)'s conjectures regarding the uniqueness of bank loans and following work by Mikkelson and Partch (1986), James (1987) studies the average stock price reaction of firms that publicly announce a bank loan agreement or renewal.[14] The results in the seminal paper by James (1987) are key in our current thinking of the role banks play in credit markets. The second row of Table 3 summarizes his findings. James finds that bank loan announcements are associated with *positive* and statistically significant stock price reactions that equal 193*** bp in a two-day window, while announcements of privately placed and public issues of debt experience zero or negative stock price reactions. This result holds independently of the type of loan, the default risk and size of the borrower. The positive stock-price reaction supports the Fama (1985) argument that a bank loan provides accreditation for a firm's ability to generate a certain level of cash flows in the

future.

Results in James (1987) spawned numerous other event studies. The top panel in Table 3 exhibits key results. To concentrate on the possible existence of switching costs we highlight Lummer and McConnell (1989). They divide bank loan announcements into first-time loan initiations and follow-up loan renewals. Because loan initiations are loans to new customers while renewals are loans to established customers, the difference in stock price reactions between the two categories should act as a measure of the value of an established relationship. Consistent with this argument, Lummer and McConnell (1989) find that stock price reactions to bank loan announcements are driven by renewals. The abnormal returns in the event period associated with announcements of initiations are not statistically different from zero, while renewals are positive and statistically significant.

The results in Lummer and McConnell (1989), however, have been difficult to duplicate.[15] Slovin, Johnson and Glascock (1992), Best and Zhang (1993), and Billett, Flannery and Garfinkel (1995), for example, document positive and significant price reactions to both initiation and renewal announcements, but find little difference in price reactions between the two categories. Best and Zhang (1993) do find that price reactions to renewal announcements are significantly larger than initiations when analyst uncertainty about the loan customer is high. In their study, Billett, Flannery and Garfinkel (1995) argue that the Lummer and McConnell (1989) results may be driven by their system for classifying loans into initiation and renewal categories. Overall, the evidence on the differential wealth effects of loan renewals versus loan initiations is inconclusive.

In addition, the entire literature on loan announcements has increasingly become under scrutiny. First, the literature may be suffused with insidious reporting issues (James

and Smith (2000)) as both firms and newspaper editors may push only "positive news" stories; Australian evidence by Fery, Gasborro, Woodliff and Zumwalt (2003) is suggestive in this regard. Second, it is not clear that initiations or renewals in the U.S. still result in excessive returns during the 1990s (Berry, Byers and Fraser (2002), Andre, Mathieu and Zhang (2001)), raising some doubt about the robustness of the initial findings. Finally, there may be substantial differences across countries in loan announcement returns (Boscaljon and Ho (2005)).

(2) Bank Distress and Merger Announcements

Another important event study containing evidence on the value of bank relationships and hence the existence of switching costs is an innovative paper by Slovin, Sushka and Polonchek (1993). They examine the influence of the 1984 impending insolvency of Continental Illinois on the stock price of firms with an ongoing lending relationship with that bank. Slovin, Sushka and Polonchek (1993) report an average abnormal two-day return of -420*** bp around the insolvency announcement and an abnormal increase of 200** bp upon the announcement of the FDIC rescue. They argue that such large price changes are estimates of the potential value tied directly to this specific firm-bank relationship. The existence of these quasi-rents implies that borrowers are bank stakeholders.

There are many event studies that have sought to replicate and extend the initial results by Slovin, Sushka and Polonchek (1993). We summarize the results in the bottom panel of Table 3. All studies focus on other countries than the US and many trace the impact on the borrowers' stock prices of bank events other than distress such as scandals, transfers, and

bank mergers that could also be unsettling to the borrower-bank relationship.

Most studies find smaller and seemingly more temporary effects than the initial -4.2*** percent documented by Slovin, Sushka and Polonchek (1993). In addition, the three studies that actually check whether returns differ between firms related to the affected banks and all other firms find that the differences are not significant (Ongena, Smith and Michalsen (2003), Brewer, Genay, Hunter and Kaufman (2003), Miyajima and Yafeh (2003)). Of course, the different results across the various studies may stem from heterogeneity in the value of the specific bank relationships that are being considered.

b) Magnitude of Switching Costs

Kim, Kliger and Vale (2003) provide the first estimates of switching costs faced by the average bank borrower. Kim, Kliger and Vale (2003) develop a novel structural estimation technique to extract switching cost estimates. They employ Norwegian loan market share data for the period 1988-1996. Their findings imply average annualized bank rents of roughly 4 percent of the banks' marginal cost of funding. Switching costs drop to almost zero for customers of large banks. In Degryse and Ongena (2005a) we study borrowers of a large Belgian bank in 1997. The increase of the loan rate for the average bank-firm relationship points to annual "information rents" of less than 2 percent of the bank's marginal cost of funding. This estimate may actually constitute a lower bound in case the resolution of uncertainty for the inside bank results in actuarially better setting of loan rates over time. However, at this point it should also be noted that empirical results in the literature on relationship duration and loan rates yields rather mixed results. We return extensively to this issue in section IV.B. Finally, and in a very different setting, Yasuda (2005) finds that pre-existing relationships with firms issuing corporate bonds in the US

allow the underwriting banks to charge 1 to 4 percent (of the issue size) extra.

Research has recently started to focus on the magnitude and determinants of borrower switching rates, a natural corollary to the contours of borrowers' switching costs (Karceski, Ongena and Smith (2005)). Table 4 lists estimates of the length of bank-firm relationships culled from a variety of studies. Comparisons of estimates present a challenge as (1) relationship definitions may differ across studies and (2) censoring issues are often left unrecognized, as in numerous cases the end of the sample period or firm age prevents researchers from observing the entire relationship spell.

Nevertheless two broad patterns seem to emerge. First, there is substantial variation in duration of relationships across countries. For example, small US and Belgian firms report relationships to last between 5 to 10 years on average, while small Italian and French firms report 15 years or more. Second, there are also substantial differences between firms within the same country, often related to firm size. As an illustration, consider small and large firms in Germany. Small firms report durations between 5 to 12 years, while large firms report more than 22 years.

The pattern in relationship duration across countries is reminiscent of the cross-country variation in the number of relationships recently documented by Ongena and Smith (2000b). They find that roughly speaking the number of relationships increases "going south", from 1 in northern to 15 in southern Europe. While theoretical work is continuing to explore this surprising cross-country variation in the number of relationships (for example, Carletti (2004), Carletti, Cerasi and Daltung (2004), Detragiache, Garella and Guiso (2000), von Rheinbaben and Ruckes (2004), Volpin (2001)), there is hardly any theoretical or empirical work linking cross-country variation in the number of bank

relationships with duration.

c) Determinants of Switching Costs

Recent papers, however, started to explore the impact of *relationship*, *firm*, *bank*, and *market* specific characteristics on the duration of bank-firm relationships within a country. Table 5 summarizes the findings. Take duration itself. Both Ongena and Smith (2001) and Farinha and Santos (2002) find that the estimated hazard functions display positive duration dependence, indicating that the likelihood a firm replaces a relationship increases in duration or alternatively, and as symbolized in the Table, that the continuation of a relationship is negatively affected by duration itself. The number of bank relationships the firm maintains also negatively influences the length of a relationship. Hence both duration and the number of (other) bank relationships decrease borrowers' reticence to drop a relationship. An increase in duration may result in fiercer holdup making switching more attractive. Alternatively, relationship continuation and/or multiplicity may impart a good repayment record to competing banks thereby lowering borrowers' switching costs.

Most studies find that young, small, high-growth, intangible, constrained, or highly leveraged firms switch bank faster *ceteris paribus*. But there are some notable exceptions. Interestingly enough, the direction in which particular firm variables affect switching rates changes sign going "north to south" in Europe, not unlike the increase that is observed in the number and duration of relationships. For example, small firms severe relationships more easily than large firms in Norway, Denmark and Belgium, at the same rate in the UK and Germany, but at a slower rate in Portugal and Italy. Hence in Norway small firms may churn bilateral relationships, while in Italy small firms cherish their multiple relationships. On the other hand, in Norway large firms nurture a few steady relationships; while in Italy

large firms continue to juggle, and drop, (too) many relationships.

A few studies also include bank and market characteristics. Larger and to a lesser extent more liquid and efficient banks seem to retain borrowers longer. Berger, Miller, Petersen, Rajan and Stein (2005) shows it is the number of branches that matter for borrower retention, not bank asset size. The latter variable is actually negatively related to duration. Borrowers of target banks in a merger are often dropped. Market characteristics seem mostly to have no effect on the drop rate.

2. Deposit Markets

There are only a few studies on the magnitude and determinants of customer switching cost in bank deposit markets. Shy (2002) for example illustrates the application of a methodology similar to Kim, Kliger and Vale (2003) by estimating depositor switching costs for four banks in Finland in 1997. He finds that costs are approximately 0, 10, and 11 percent of the value of deposits for the smallest to largest commercial bank and up to 20 percent for a large Finnish bank providing many government services.

Kiser (2002) focuses on the length of household deposit relationships with their banks and on the determinants of their switching costs. She uses US Survey data for 1999. Median US household tenure at banks equals 10 years. The geographical stability of the household and the quality of the customer service offered at the bank are key factors in determining whether or not customers stay with the bank. Switching costs seem non-monotonic in income: higher income as well as more educated households and lower income as well as minority households switch less often. Hence, the opportunity cost of time for the first group and the information available to households in the other group may play a role in

determining household switching.

3. Interbank Market

While the existence and importance of relationships between borrowers/depositors and banks has been widely documented and discussed by bankers and academics alike, recent preliminary evidence by Cocco, Gomes and Martins (2003) shows that even in the anonymous and highly liquid interbank market, relationships between banks may play a role in overcoming informational problems and in the provision of insurance. Especially smaller, less profitable, risky banks that are subject to frequent liquidity shocks seem to rely on relationships.

4. Interplay between Markets

Interesting questions arise about how switching costs in one market may be linked to behavior in another market. *Switching costs in deposit markets* may have consequences for *behavior in loan markets*. Berlin and Mester (1999) for example tie bank funding to orientation (relationship versus transactional banking). In particular Berlin and Mester show that banks with better access to rate inelastic core deposits engage in more loan rate smoothing (relationship lending) than banks that lack such access. In other words, banks enjoying market power in core deposits can insulate their borrowers from adverse credit shocks by loan rate smoothing.

B. Switching Costs and Conditions: Relationships as a Source of Bank Rents?

Are relationships a source of bank rents? If yes, how do banks extract rents? Do relationship banks simply charge higher loan rates or also impose more stringent loan conditions? Are banks applying the "bargain then rip-off" strategy; that is are they first

competing fiercely for new customers and then charge above marginal cost prices (e.g., Sharpe (1990))? To commence answering these questions many studies have run reduced-form regressions of the cost of credit for the borrowing firms on *duration* and/or *number* of bank-firm relationships (studies typically control for a variety of firm, bank, and market characteristics). Some studies also include proxies for the *scope* of the relationship such as the number of other bank products the borrower obtains from the relationship bank.

Panel A in Table 6 lays out the many findings.[16] The results seem rather mixed. Most US studies document loan rates actually decrease by around 3** to 9** bp per relationship year, while many European studies find that loan rates are either unaffected or increase by around 1*** to 10*** bp per year (though there may even be regional variation within countries in this respect). The impact of the number of relationships on the loan rate seems equally mixed. Most US studies find loan rates increase by 10*** to 30*** bp per additional bank, while many European studies (again with a few exceptions) report that loan rates are either unaffected or decrease by around 1*** to 10*** bp per extra bank. A few US studies find no or a small negative effect of scope and the same seems true in Europe with a few exceptions (that document large positive or negative coefficients).

Overall it seems that only European banks extract rents from their relationship borrowers (i.e., those with long relationships and few banks) through higher loan rates, while US banks actually charge lower rates. What could account for these remarkably divergent results? We offer a number of tentative explanations. First, the set and definition of control variables that are included differ from study to study. However, the overlap seems large enough to make results comparable. Second, the definition of what constitutes a bank-firm relationship diverges across studies. For example, in some cases frequent past

borrowing defines a relationship, in other cases firms or banks assess and report whether or not a relationship existed.

Third, the cost of credit, the dependent variable, differs across studies. Often spreads are used, in some cases reference interest rates are included on the right hand side. Following Berger and Udell (1995) some studies consider only lines of credit, while others include all type of corporate loans. However *a priori* it may seem unclear why banks would extract rents from relationship customers through only one class of loans. Loan fees, on the other hand, are potentially a thornier problem. Fees are not relevant in most European studies. For example, there are no fees on lines of credit in Italy or small loans in Belgium. But fees may play a role in the US, though most studies do not adjust for it (Hao (2003)).

Fourth, the composition of the pool of borrowers may change over (relationship) time as banks get to know their customers better and favor certain types. Controls in cross-sectional studies may fail to capture these dynamic effects and differences in the average (median) duration across studies therefore may complicate comparisons.

Finally, most studies implicitly assume the loan collateral decision to be taken either independently or sequentially after the loan granting decision but before the determination of the loan rate. Under these assumptions most studies find that relationship borrowers pledge less collateral, i.e. an increase in the duration of the relationship increases the probability that no collateral is pledged while the number of relationships decreases that probability (Table 6, Panel B). Not surprisingly, increasing the scope of the relationship increases collateral pledging, presumably to cover the increase in products and bank exposure. Similarly most studies find that relationship borrowers (longer duration, fewer banks) have better access to credit (Table 6, Panel C).

A recent paper by Brick, Kane and Palia (2004) revisits the US NSSBF data but relaxes the independence assumption and examines the joint impact of duration and number of relationships on loan rate, fees, and collateral (again Panel A). They find that endogenizing collateral and fees actually eliminates any significant negative impact of duration on loan rates and introduces a weakly significant negative impact of –14* bp of the number of banks on the rate. Hence, joint estimation makes the US results more comparable to the European findings estimated under the independence assumption. However, not only fees but also collateral may play a smaller role in a few European samples, making the modeling of fee and collateral decisions less influential. For example in Degryse and Van Cayseele (2000) only 26 percent of loans are collateralized, while in Berger and Udell (1995) 53 percent is.

However, the point raised by Brick, Kane and Palia (2004) is more general, we think, once also the cross-selling of loans and other commercial bank products are considered (see also Jiangli, Unal and Yom (2004)). A number of recent papers find indeed evidence of relationship tie-in pricing between investment and commercial bank services (Drucker and Puri (2005), Bharath, Dahiya, Saunders and Srinivasan (2004)) and document the importance of cross-selling efforts towards larger firms at the level of the relationship manager (Liberti (2002)).

To conclude, estimating the impact of relationship characteristics on the loan rate fielding a single equation could be problematic, in particular when loan fees, collateral requirements, and cross-selling opportunities are important.

C. Market Structure and Market Presence: Bank Orientation and Specialization

1. Local Markets: Indirect and Direct Evidence

Switching costs may further play a key role in how market structure determines bank strategy and market presence. Theory offers conflicting views on the relation between interbank competition and bank orientation (relationship versus transactional banking) and specialization (see also Degryse and Ongena (2005b)). A first set of theories argues that competition and relationships are incompatible. Mayer (1988) and Petersen and Rajan (1995) hypothesize that long-term relationships, allowing firms to intertemporally share risks with their banks, only arise if banks enjoy the possibility to extract profits later on in the relationship, i.e. when the flexibility of the borrowing firms to switch banks is limited.

On the other hand Boot and Thakor (2000) argue that more interbank competition leads to more relationship lending. A bank offering a relationship loan augments a borrower's success probability in their model. Relationship lending then allows extracting higher rents from the borrower. Fiercer interbank competition pushes banks into offering more relationship lending, as this activity permits banks to shield their rents better.[17]

Most empirical work so far has investigated the effects of interbank competition on indirect measures of bank orientation. Figure 3 summarizes the main empirical findings. In their seminal paper Petersen and Rajan (1995) find that young firms in more concentrated banking markets (HHI > 0.18) obtain lower loan rates and take more early (trade credit) payment discounts (i.e., have easier access to bank credit) than firms in more competitive banking markets. Banks seemingly smooth loan rates in concentrated markets and as a result provide more financing, in line with the predictions of their theoretical model.[18]

Black and Strahan (2002) revisit the local competition – bank orientation issue exploring an alternative measure of local credit availability. In particular, they investigate the rate of new business incorporations across U.S. states. They find that deregulation of bank branching restrictions positively affects new incorporations and, more importantly, that in contrast to Petersen and Rajan (1995) deregulation reduces the *negative* effect of banking market concentration on new incorporations. They also find that the widespread presence of small banks decreases business formation.[19]

Recent papers by Fischer (2000) and Elsas (2005) investigate the local competition – bank orientation correspondence using German data. Fischer (2000) focuses on the transfer of information and the availability of credit and finds that both are higher in more concentrated markets. Elsas (2005) studies the determinants of relationship lending as measured by the Hausbank status. He finds that the incidence of Hausbank status is actually the lowest for an intermediate range of market concentration with an HHI of around 0.2, though he notes that most observations of the HHI are also in that low range. Nevertheless his findings broadly suggest the presence of more relationship banking in more competitive markets.

In Degryse and Ongena (2005b) we employ detailed information on bank-firm relationships and industry classification of more than 13,000 Belgian firms to study the effect of market structure on bank orientation and specialization. We find that bank branches facing stiff local competition engage considerably more in relationship-based lending (the effect is convex in HHI but decreases for most observed values of HHI) and specialize somewhat less in a particular industry. Our results may illustrate that competition and relationships are not necessarily inimical.

2. National and Cross-Country Studies

Other papers study the effect of *nationwide* competition on commitment and relationship banking. Farinha and Santos (2002), for example, study the switching from single to multiple bank relationships by new Portuguese firms. They find that the arrival of new banks, potentially leading to less concentrated and more competitive banking markets, increases switching rates. There are also *cross-country* studies. Steinherr and Huveneers (1994), for example, document a negative correspondence between the share of foreign banks and equity investment by banks in 18 countries, Cetorelli and Gambera (2001) find that industries that rely heavily on external finance grow faster in countries with more concentrated banking systems (than those in countries with competitive systems), while Ongena and Smith (2000b) highlight the positive effect of concentration of the national banking markets on the incidence of single bank relationships. The latter two studies measure concentration by calculating the percentage assets by the largest three commercial banks.

V. Location

A. Distance versus Borders

To structure our discussion we distinguish between "distance" and "borders" (see also Degryse and Ongena (2004)). We think of *distance* as pertaining to physical proximity that can be bridged by traditional modes of transportation, say car or train travel. By spending distance-related costs banks or their clients can communicate across the distance and engage in transactions with one another. For given locations of banks and borrowers, distance *per se* is exogenous and bridging it (i.e., the lender visiting the borrower and/or the borrower visiting the lender) may be adequate to reduce informational problems for the lender concerning its decision about granting and pricing the loan. Competing banks, therefore, play no (or a rather mechanical) role in theoretical competition models featuring only distance.

Borders, on the other hand, are not merely bridgeable by car or train travel, or even more modern technological ways of interacting. Borders introduce a "discontinuity": they endogenously arise through the actions of the competing lenders, or result as an artifact of differences in legal practice and exogenous regulation (Buch (2002)). In this Section V on "Location", we discuss only the effects of informational borders that arise because of adverse selection, relationship formation, or (lack of) information sharing between banks. The next Section VI on "Regulation" deals with the e*xogenous* borders that can consist of differences in legal, supervisory and corporate governance practices, and political, language or cultural barriers but can also be "regulatory borders" that may simply prohibit "foreign" banks from engaging borrowers, setting up branches, and/or acquiring local banks.

B. Distance and Conditions: Spatial Pricing

Recent theory highlights the importance of distance for the pricing and the availability of bank loans. Lending conditions may depend on both the distance between the borrower and the lender and the distance between the borrower and the closest competing bank. We discuss *spatial pricing* in this Section V.B and return to *spatial rationing* in Section V.C.

Distance may determine the pricing of loans because either the *transportation costs* incurred by the borrower (Lederer and Hurter (1986), Thisse and Vives (1988)), the *monitoring costs* incurred by the lender (Sussman and Zeira (1995)), or the *quality of information* obtained by the lender (Hauswald and Marquez (2005)) are distance related (see also Degryse and Ongena (2005a)). Most theories featuring distance related costs or informational quality generates spatial pricing: loan rates decrease in the distance between the borrower and the lender, but increase in the distance between the borrower and the closest competing bank (these loan rate schedules hold for a given number of banks). The availability of information to the borrowers, experience, and other product characteristics may abate the strength of this distance – loan rate correspondence.

Petersen and Rajan (2002) are among the first to provide evidence of spatial loan pricing. They find for example that a small business located one mile from the lending bank *ceteris paribus* pays on average 38*** basis points less than a borrower located around the corner from the lending bank. In Degryse and Ongena (2005a) we also include the distance to the closest competitors. We find a somewhat smaller impact of physical distance on the loan rates than Petersen and Rajan (2002), but the impact we measure is still highly statistically significant and economically relevant. The impact on the loan rate of both distance to the lender and distance to the closest competitor is actually similar in absolute magnitude, but

of an appropriate opposite sign, which in itself is also evidence suggestive of spatial price discrimination. For example, for small loans loan rates decrease 7*** basis points per mile to the lender and similarly increase 7*** basis points per mile to the closest (quartile) competitor. We further deduce that, given current transportation costs and opportunity costs of travel, the average first-time borrower in our sample needs to visit the lender between two and three times to obtain a bank loan.

Spatial price discrimination caused by either (borrower) transportation costs, (lender) monitoring costs, or asymmetric information may explain the results in both Petersen and Rajan (2002) and Degryse and Ongena (2005a). Transportation cost may provide the most consistent and comprehensive interpretation of all the results documented in Degryse and Ongena (2005a). Inferred changes in lending technology may make an interpretation of the results in Petersen and Rajan (2002) more difficult.

In Degryse and Ongena (2005a) we also run through a number of straightforward exercises but cannot find any trace of adverse selection increasing in the (admittedly short) distances to the uninformed lenders. In either case, our results suggest that the distance to the closest competitors is important for competitive conditions and that the actual location of the bank branches may be relevant when assessing the intensity of competition. Our estimates also indicate that spatial price discrimination targeting borrowers located near the lending bank branch yields average bank rents of around 4 percent (with a maximum of 9 percent) of the bank's marginal cost of funding. Taken at face value, our findings substantiate an important additional source of rents accruing to financial intermediaries, based on location.

C. Distance and Conditions: Availability

Distance also affects the availability of credit. Stein (2002), for example, models the organizational impact of the ease and speed at which different types of information can "travel" within an organization. "Hard" information (for example, accounting numbers, financial ratio's, etc.) can be passed on easily within the organization while "soft" information (for example, a character assessment, the degree of trust) is much harder to relay. Hence, if the organization employs mostly soft information, a simple and flat structure, and local decision-making may be optimal. Recent empirical evidence by Liberti (2002) indeed confirms bank centralization and the intensity of usage of hard information go hand in hand.

The type of information, hard or soft, that is needed and available to arrive at optimal lending decisions also translates into a correspondence between distance and credit rationing. For example lines embedded in credit cards are extended solely on the basis of a quantitative analysis of hard and easily verifiable information (for example, age, profession, address, etc. of the applicant). As a result credit cards are offered by mail and across large distances in the US (Ausubel (1991)).

A lot of small business lending on the other hand is still "character" lending. To screen successfully, loan officers need to interact with the borrower, establish trust, and be present in the local community. This is "soft" information and is difficult to convey to others within the organization. As a result small (opaque) firms borrow from close, small banks (Petersen and Rajan (2002), Saunders and Allen (2002)), while large banks mainly lend to distant, large firms employing predominantly hard information in the loan decision (Berger et al. (2005), Cole, Goldberg and White (2004); see also Strahan (2005) in this volume).

Small firms then may be subject to credit rationing when seeking financing across larger distances.

However, from an empirical point of view, the severity of credit rationing affecting small firms is not entirely clear. For example, the results in Petersen and Rajan (2002) indicate that the effect may be economically rather small in the US, while preliminary findings by Carling and Lundberg (2002) seemingly indicate the absence of distance related credit rationing in the Swedish banking sector. Alternatively, results in Degryse and Ongena (2005a) suggest that transportation costs that are fixed per loan (i.e., do not vary by loan size) may explain why larger loans are obtained across larger distances (mainly by larger firms).

D. Distance and Strategy: Branching

Only very few papers study the importance of distance in determining the strategy of banks, i.e. in determining their market presence via branching or servicing within certain areas (the cell "Location / Strategy" in Figure 2). A recent paper by De Juan (2003) is an exception. She studies how distance between own branches influences bank branching decisions in Spain. She finds that the number of own branches in a particular (sub) market has a positive (but small) effect on the further entry decision of the bank in that market. Hence, her results suggest that branch expansion is partly affected by the proximity of other branches of the same bank (see also Felici and Pagnini (2004)).

Results by Berger and DeYoung (2001) may provide a partial explanation for these findings. Berger and DeYoung (2001) document how efficiency of bank branches slips somewhat as the distance between branch and headquarters of the bank increases (see also

Bos and Kolari (2006)). Hence in order to guarantee consistency in servicing across bank branches, banks may decide to branch out methodically across certain areas rather than to build isolated outposts.

E. Borders and Conduct: Segmentation

Next we turn to the impact of borders on conduct and strategy. A recent literature investigates how different types of borders shape lending conditions and result in segmentation of credit markets. National borders that often coincide with many of the exogenous economic borders discussed earlier continue to play an important role across the world. Buch, Driscoll and Ostergaard (2003) for example suggests that national borders in Europe still hold back cross-border bank investments. As a result, European banks "over"-invest domestically and it is in particular country-specific credit risk that does not seem fully reflected in the interbank rates.

But other types of borders also result in segmented credit markets. Empirical evidence suggests that "outside" lenders often face difficulties (or hesitate) in extending credit to mainly small local firms (Shaffer (1998), Berger, Klapper and Udell (2001), Harm (2001), Guiso, Sapienza and Zingales (2004)). This happens in particular when existing relationships between incumbent banks and borrowers are strong (Bergström, Engwall and Wallerstedt (1994)) or when the local judicial enforcement of creditor rights is poor (Fabbri and Padula (2004), Bianco, Jappelli and Pagano (2003)). In all these cases borders will lead to market segmentation and difficulties for cross-border outside banks to engage any local borrowers. In effect this market segmentation highlights the importance for the outside banks to strive to build an actual physical presence in the targeted market.

F. Borders and Strategy: Entry and M&As

1. Entry

Indeed, academics and bankers alike have long recognized borders as important factors in impelling bank entry and cross-border bank mergers and acquisitions. A literature going back to Goldberg and Saunders (1981) and Kindleberger (1983) assert that banks often pursue a "follow-the-customer" strategy when deciding upon cross-border market entry (see also Grosse and Goldberg (1991), Ter Wengel (1995), Brealey and Kaplanis (1996), Buch (2000), Buch and Golder (2002), and Boldt-Christmas, Jacobsen and Tschoegl (2001)). Recent evidence however casts some doubt on the "follow-the-customer" strategy as the only game in town (Pozzolo and Focarelli (2006)). In particular banks entering the US market have not primarily a follow-the-home-country-customer motive but apparently engage many local borrowers (Seth, Nolle and Mohanty (1998), Stanley, Roger and McManis (1993), Buch and Golder (2001)).

However banks encounter many difficulties (in other countries than the US) in successfully pursuing a strategy of engaging local firms by cross-border entry through local branches. DeYoung and Nolle (1996) and Berger, DeYoung, Genay and Udell (2000) for example document how most foreign bank affiliates are less efficient than domestic banks, the exceptions being the foreign affiliates of US banks in other countries and most foreign bank affiliates in for example Eastern Europe and South-America. The latter affiliates are often financially sounder than the domestic banks (Crystal, Dages and Goldberg (2002)). Why are most foreign bank affiliates less efficient than the local crowd? A paper by Buch (2004) documents the inefficiencies by foreign bank affiliates are mostly due to the presence of economic borders (language, culture, etc.) and do not seem driven by physical

distance.[20] Similarly, Gobbi and Lotti (2004) find that outside banks only enter new markets, when the provision of financial services that do not require the intensive use of proprietary information seems profitable in these markets.

But there may be a second reason why banks shy away from following-the-customer, apart from the fear of getting stuck with inefficient branch outposts. Findings by Berger, Dai, Ongena and Smith (2003) suggest customers are not that interested in being followed![21] Indeed, they find that foreign affiliates of multinational companies choose host nation banks for cash management services more often than home nation or third nation banks. This result is consistent with so-called "concierge" benefits dominating "home cookin´" benefits. This is a surprising finding given that these large multinationals might be expected to be prime targets for preferential treatment by their home nation banks. On the other hand, the opening of a foreign affiliate may be a good occasion for a firm to escape a hold-up problem at "home". In this way, the establishment of new plants or subsidiaries in foreign countries is an opportunity to add a new (foreign) bank relationship.

Berger et al. (2003) also find that bank reach (global versus local) is strongly associated with bank nationality. For example, if a host nation bank is the choice of nationality, then the firm is much less likely to choose a global bank. Finally, they also find that bank nationality and bank reach both vary significantly with the legal and financial development of the host nation. For example, firms appear to be much less likely to choose a host nation bank and more likely to choose a global bank when operating in the former socialist nations of Eastern Europe.

Berger et al. (2003) conclude on the basis of this evidence that the extent of future bank globalization may be significantly limited as many corporations continue to prefer local or

regional banks for at least some of their services (see also Berger and Smith (2003)). Of course this conclusion is reached within a particular financial architecture, and hence predicated on the continuing (and endogenous) absence of foreign direct investment and possibly more importantly cross-border mergers taking place (Dermine (2003)). The point being that if more FDI and mergers in particular take place, firm preferences may change.

2. M&As

Cross-border bank mergers and acquisitions (M&As) are still a rare species in many parts of the world. Focarelli and Pozzolo (2001) for example demonstrate that cross-border bank M&As occur relative to within-border M&As less frequently than cross-border M&As in other industries, *ceteris paribus*, while Berger, Demsetz and Strahan (1999) show that cross-border bank M&As occur less frequently than domestic bank M&As (see also Danthine et al. (1999)). And it is again economic borders,[22] not distance, that make cross-border bank M&As less likely (Buch and DeLong (2004)).

Hence taken together these studies suggest that not only exogenous economic borders (that also affect other industries) but also endogenous economic borders specific to the banking industry (information asymmetries in assessing target bank portfolios) may make it hard to pull off a successful cross-border bank M&A.

Bank managers are apparently aware of the difficulties awaiting them when engaging in a cross-border M&A and seem to refrain from undertaking many. But also investors recognize the dangers. A recent study by Beitel, Schiereck and Wahrenburg (2004) for example documents that the combined cumulative abnormal returns for stocks of bidder and target bank in cross-border bank M&As in Europe over the last few decades is actually zero or negative! This finding stands in stark contrast with other industries where the

combined CARs of cross-border M&As are typically found to be positive. Hence investors seemingly evaluate cross-border bank M&As as destroying value. Beitel, Schiereck and Wahrenburg (2004) results are quite similar to findings in DeLong (2001). She reports that in the US only the combined CARs of geographically focused bank M&As are positive, although it is not entirely clear what factors are driving this empirical finding.

The evidence presented so far makes not clear whether it are exogenous or endogenous (informational) economic borders that create most problems in making a cross-border bank M&A possible and successful. A recent paper by Campa and Hernando (2004) suggests exogenous borders may play a role. Their study shows that the combined CARs of M&As are typically lower in industries, such as banking, that until recently were under government control or are still (or were) most heavily regulated. CARs of cross-border M&As in these industries are actually negative, evidence in line with Beitel, Schiereck and Wahrenburg (2004). One possible interpretation is that the (lingering) effects of regulation make for harder economic borders.

Bank industry observers sometimes note that for example bank organization and corporate governance may be an area shaped in ways that may hinder merger activity. The mutual structure of dominant banks in France and Germany in particular (for example, Credit Agricole, Landesbanken) is often passed of as a major hurdle for these banks to initiate and pursue a successful M&A (Wrighton (2003)). But exogenous economic borders may also make cross-border bank M&As result in complex holding structures (Dermine (2003)) possibly further complicating future M&A activity (see also Barros, Berglof, Fulghieri, Gual, Mayer and Vives (2005)).

The impact of endogenous (informational) economic borders on cross-border bank M&A

activity is less researched. It is possible that the domestic merger activity, we have observed until now in Europe, creating so-called "National Champions" is partly made possible by the existence of informational borders. Outside banks seeking to acquire a local bank find it more difficult than incumbent banks to assess the value of the loan portfolio of the possible target banks. As a result outside banks refrain from stepping in and most M&A activity, driven by for example (revenue and cost) scale and scope considerations, occurs between domestic banks. However as the domestic banks increase in size and possibly partly refocus their lending towards larger firms they become easier-to-value targets. Moreover, national competition policy concerns may hinder further domestic consolidation. Hence one could argue that informational borders may have a tendency to partly and endogenously self-destruct and that "National Champions" will almost inevitably metamorphose into "European Champions".

A natural question is then how borrowers will be affected by cross-border bank M&As. It is possible that "in the first round" small local firms serviced by domestic target banks suffer somewhat as with domestic mergers (Sapienza (2002), Bonaccorsi di Patti and Gobbi (2002), Karceski, Ongena and Smith (2005)). Eventually niche banks may arise taking over part of the lending activities ceased by the merged bank (Berger, Saunders, Scalise and Udell (1998)).

VI. Regulation

A. Regulation and Market Structure

Banking is an industry that in most countries is subject to a tight set of regulations (Vives (1991) and Fischer and Pfeil (2004) provide reviews). Some of the regulations tend to *soften competition*. Examples include restrictions on the entry of new banks or limitations of the free deployment of competitive tools by banks. Other regulations *restrict banking activities* in space and scope, putting limitations on the bank's potential to diversify and exploit scale / scope economies. Finally there is *prudential* regulation that alters the competitive position of banks vis-à-vis other non-bank institutions (see for example Dewatripont and Tirole (1994)). In the last two decades, several countries including the European Union-countries and the US have implemented a series of deregulatory changes with the objective to stimulate competition and to enhance financial integration.

A number of papers investigate whether specific deregulatory initiatives have changed competition. Angelini and Cetorelli (2003) for example consider the impact of the Second European Banking Directive on competition within the Italian banking industry, by analyzing data over the period 1983-1997. Using a conjectural-variations model they compute a Lerner index L for bank i:

$$L \equiv \frac{p_i - MC_i}{p_i} = \frac{-\frac{\theta_i}{\tilde{\varepsilon}}}{p_i},$$

with θ_i is the conjectural elasticity of total industry output with respect to the output of bank i, and $\tilde{\varepsilon} = \frac{\partial Q / \partial p}{Q}$ is the market demand semi-elasticity to the price. The computed

Lerner index remained constant during the 1983-1992 period but steadily decreased thereafter, suggesting a substantial increase in the degree of competition after 1993.

Angelini and Cetorelli (2003) further explore whether the changes in the Lerner index after 1993 can be attributed to the Second Banking Directive. After controlling for changes in market structure (HHI, number of banks operating in each regional market, number of branches per capita) and some other exogenous variables, they find that a dummy variable equal to one for years in the period 1993-1997 explains a considerable fraction of the drop in the Lerner-index. The Lerner index drops from about 14 percentage points before 1992 to about 6 percentage points after 1992. The deregulation dummy can explain about 5 percentage points of this drop.

Gual (1999) studies the impact of European banking deregulation over the period 1981-1995 on the European banking market structure. He computes the elasticity of concentration to competition (which is directly measured by deregulation): evaluated at the sample means, an increase in deregulation of 10 percent leads to an increase in the CR5 ratio of 0.86 percent.

Finally, in a widely cited study Spiller and Favaro (1984) look at the effects of entry regulation on oligopolistic interaction in the Uruguayan banking sector. Before June 1978 entry was totally barred. They find unexpectedly that following the relaxation of the legal entry barriers the degree of oligopolistic interaction among the leading banks actually reduces, pointing to less competition.

B. Regulation and Conduct

How does banking regulation contribute to bank interest margins? Jayaratne and Strahan (1998) find that permitting statewide branching and interstate banking in the US decreased operating costs and loan losses, reductions that were ultimately passed on to borrowers in lower loan rates. And using data from banks covering 72 countries a recent paper by Demirguc-Kunt, Laeven and Levine (2004) examines the impact of banking regulation on bank net interest margins. The information on commercial banking regulation is taken from Barth, Caprio and Levine (2001). Regulatory variables include the fraction of entry that is denied, a proxy for the degree to which banks face regulatory restrictions on their activities in for example securities markets and investment banking, and a measure of reserve requirements. They also employ an indicator of "banking freedom", taken from the Heritage Foundation, which provides an overall index of the openness of the banking industry and the extent to which banks are free to operate their business. The different regulatory variables are entered one at a time in a regression that also features bank-specific and macroeconomic controls.

The results in Demirguc-Kunt, Laeven and Levine (2004) indicate that restrictive banking regulation substantially hikes net interest margins. For example, a one standard deviation increase in entry or activity restrictions, reserve requirements, or banking freedom, result respectively in 50***, 100***, 51*, and 70*** basis points extra for the incumbent banks. However, when including, in addition to the bank-specific and macro-economic controls, also an index of property rights, the regulatory restrictions turn insignificant and do not provide any additional explanatory power. Demirgüç-Kunt, Laeven, and Levine interpret this result as indicating that banking regulation reflects something broader about the

competitive environment. Their interpretation fits with findings in Kroszner and Strahan (1999) and more recently Garrett, Wagner and Wheelock (2004), who investigate the political and economic drivers of bank branching deregulation across US states, and with results in Jayaratne and Strahan (1996) showing that loan rates decrease with 30** bp on average following deregulation.

C. Regulation and Strategy

How does the presence of foreign banks influence competition? Foreign owned banks may not only compete in different ways than domestically owned institutions, but could also be affected differently by domestic regulation. Levine (2003) distinguishes between entry restrictions for foreign versus domestic banks (he thus further refines the analysis by Demirguc-Kunt, Laeven and Levine (2004)). Levine substantiates that foreign bank entry restrictions determine interest rate margins,[23] while domestic bank entry restrictions do not. In contrast to the contribution of foreign ownership of domestic banks on banking efficiency in developing nations, the fraction of the domestic banking industry held by foreign banks does not determine bank interest margins.

State-owned banks may also compete in different ways than privately owned institutions. Government ownership of banks remains pervasive around the world, in particular in developing countries (La Porta, Lopez-de-Silanes and Shleifer (2002)). Cross-country exercises indicate that more state-ownership of the banking sector leads to less competition (Barth, Caprio and Levine (2004)) and slower subsequent financial development (La Porta, Lopez-de-Silanes and Shleifer (2002)). However, firms that actually borrow from state-owned banks pay less than the firms that borrow from the privately owned banks (Sapienza

(2004)).

D. Regulation and Financial Stability and Development

Do regulatory restrictions offer benefits in other dimensions? Beck, Demirguc-Kunt and Levine (2004) examine the link with financial stability. They study the impact of bank concentration, bank regulation, and national institutions fostering for example competition or property rights on the likelihood of experiencing a banking crisis. They find that fewer regulatory restrictions – lower barriers to bank entry and fewer restrictions on bank activities – lead to less banking fragility, suggesting that regulatory restrictions are not beneficial in the stability dimension. Black and Strahan (2002) find that the deregulation of restrictions on branching and interstate banking stimulated rates of incorporation in the US, suggesting that access to finance increases following deregulation.

Deregulation also generates interesting dynamic effects. When deregulation induces a more competitive outcome, then we can expect that "good banks" should survive and grow faster, whereas "weak banks" should shrink and eventually exit. Stiroh and Strahan (2003) for example assess the competitive dynamics in terms of market share and industry exits after the deregulation in the US banking industry. Banks that are performing well are more likely to gain market share after deregulation. Moreover they find an interesting heterogeneity in line with deregulatory forces: the strengthening in the performance-market share link is strongest in unit-banking states and in more concentrated markets. Branching deregulation had the largest impact for small banks whereas interstate deregulation had its greatest impact for large banks. They also find that the poorest performing banks were shrinking after deregulation; that the exit-rate increased by 3.6 percent after a state removed its interstate banking restrictions; and that the relative profitability of banks exiting

increased after deregulation. Finally, Buch (2003) explores the impact of deregulation on gross financial assets of banks. She finds that the EU-single market program and the Basel Capital Accord have a positive impact on intra-EU asset holdings and lending to OECD countries, respectively.

VII. Conclusion

Trying to summarize in a few sentences the many results this vast empirical literature on competition in banking has generated is reckless and bound to ignore the many subtleties involved. Figure 4 nevertheless aims to offer a very crude and simple meta-analysis of the many studies we canvassed, by providing averages of the spreads banks are estimated to collect. A few broad results seem to emerge.

(1) Market definition is key, but studies continue to find that average market concentration compared to a situation with a zero HHI results in significant spreads in both deposit and loan markets of up to 50 basis points. Decreases in bank market concentration could lower spreads, but may also lead to more bank efforts to shield rents by tying customers in purposely built relationships in which fees and cross selling achieve renewed primacy.

(2) Current studies do not uniformly link relationship duration to positive spreads. Spreads at average duration range from almost +200 in Norway to –23 basis points in the US. However, methodological issues have been raised recently that could explain or even overturn the negative impact results. On the other hand, in the few studies addressing the issue mostly indirectly, relationship borrowers seem to enjoy lower collateral requirements and less credit rationing.

(3) Few studies have looked at location as a source for bank rents. The few that have, find that close borrowers pay a higher loan rate. Borrowers at an average distance seem to pay between 10 and 130 basis points more as a result. Effects of distance on credit availability, however, seem small. Though distance effects on branch efficiency seem

minimal, to cross borders to enter or merge with another bank continues to be an adventurous endeavor.

(4) Finally, regulation continues to be a fine source of rents for banks in many countries. Estimates range from 30 to 100 basis points on average. Though branching and entry is mostly permitted now on both sides of the Atlantic, M&As are still often blocked in Europe by regulators under the pretext of the safe and sound management doctrine.

To conclude, more empirical research estimating bank rents seems warranted.

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FIGURE 1. EVOLUTION OF RESEARCH ON THE IMPACT OF BANK CONCENTRATION AND COMPETITION ON BANK PERFORMANCE

The figure displays the changes that took place in the literature investigating the impact of bank concentration and competition on bank performance. The figures contrasts the models, the measures of concentration, the measures of conduct, the empirical models, and the data sources that were used in the early 1990s with those that are used today. Source: Berger et al. (2004).

	Early 1990s	Now Also
Models	SCP Hypothesis	Various Models of Competition
Measures of Concentration	HHI or CRn	Bank Size & Type (Foreign, State) Broader Measures of Competition
Measures of Conduct	Bank Prices Bank Profitability	Bank Efficiency, Service Quality, Risk Firms' Access to Credit Banking System Stability
Empirical Models	Static Cross-Section Short-Run	Dynamic Effects Over Time of Bank Consolidation
Data	U.S. MSAs or non-MSA Counties	Differently Defined U.S. Markets Other Countries

FIGURE 2. ROAD MAP OF THIS PAPER

The figure displays the structure of the paper. Section II reviews the six groups of standard methodologies displayed in the gray box in the upper left corner. Section III discusses research employing these standard methodologies on the effects of market structure on bank conduct and strategy. Sections IV to VI discuss findings employing other methodologies on the effects of switching costs, location, and regulation on bank conduct and strategy.

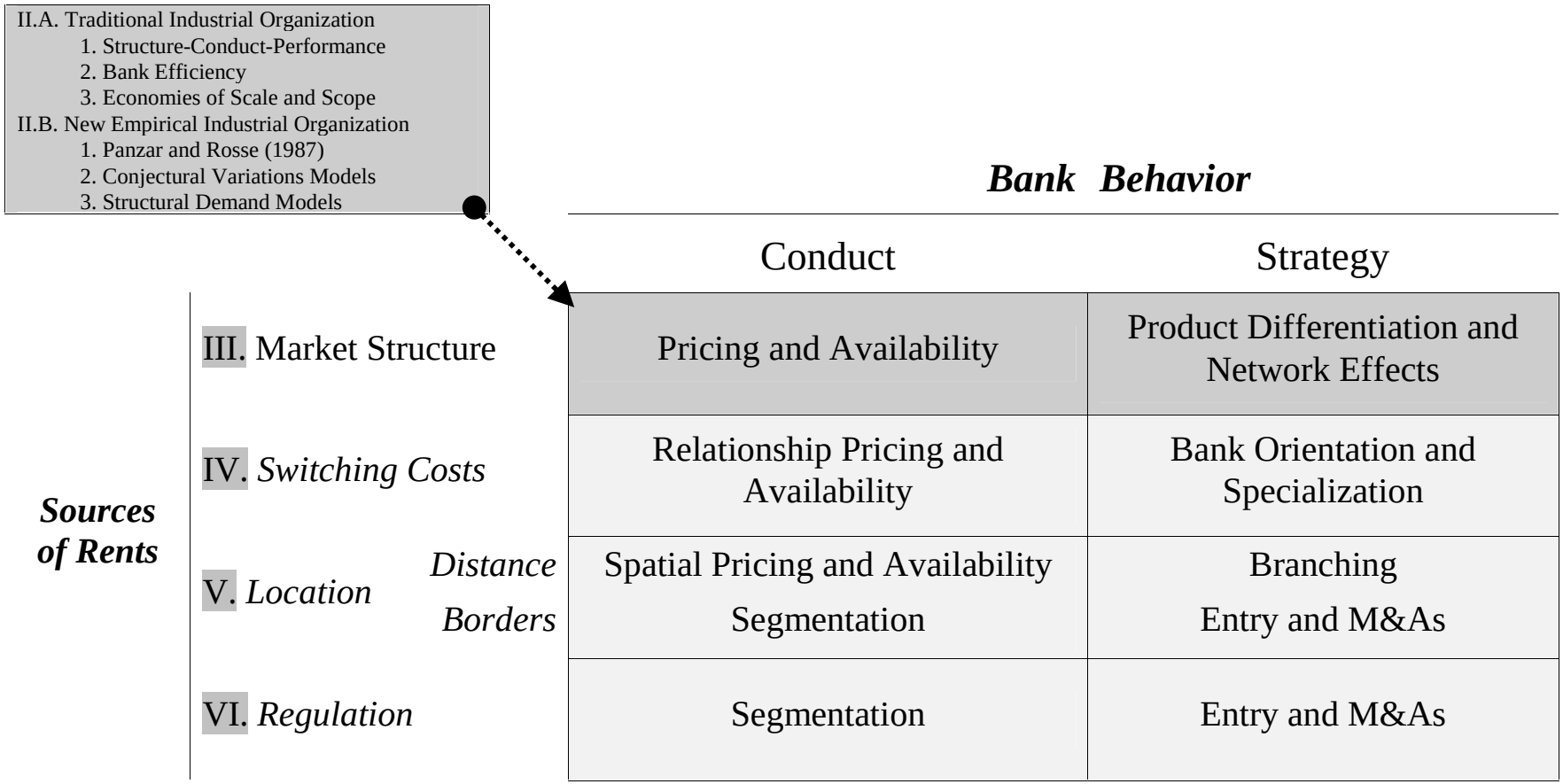
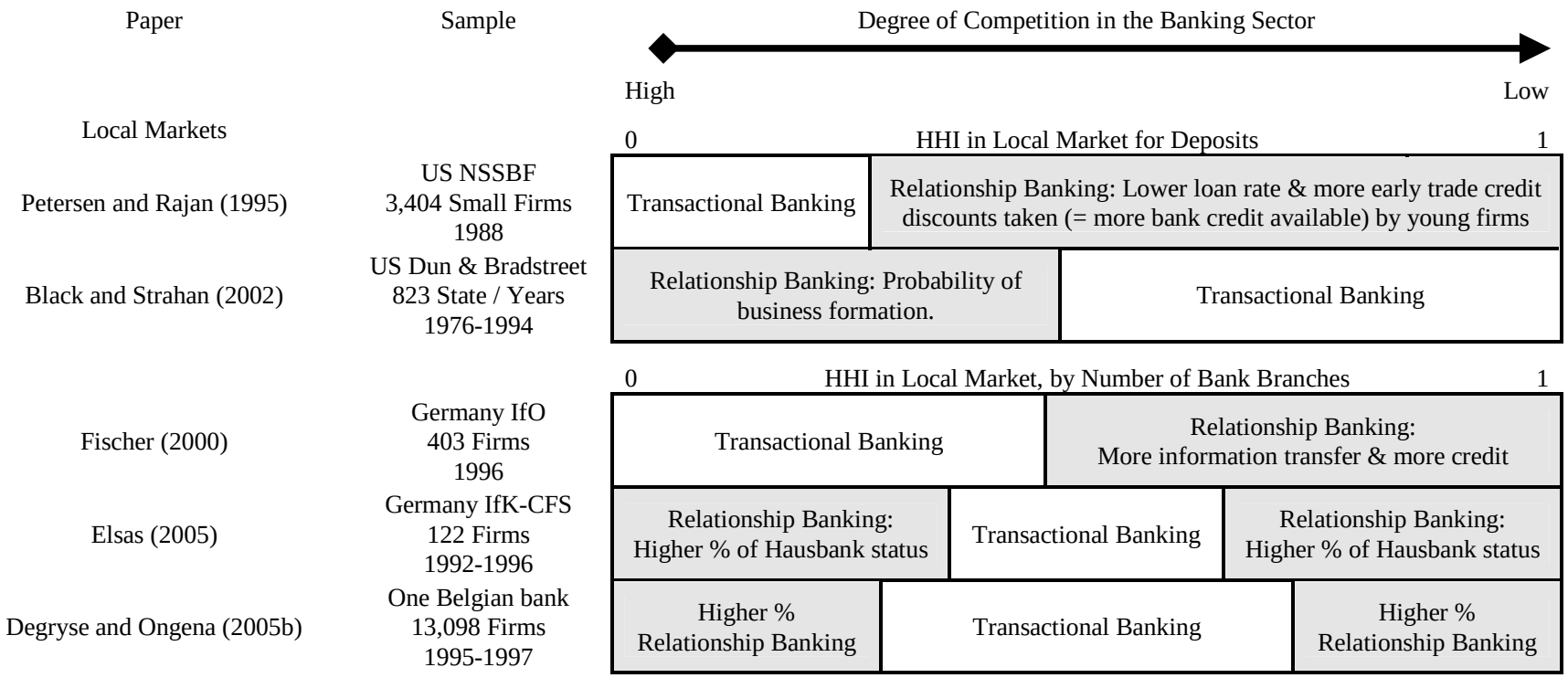


FIGURE 3. EMPIRICAL FINDINGS ON COMPETITION AND BANK ORIENTATION

The figure displays the empirical results of research on the impact of competition on direct and indirect measures of bank orientation. The figure lists the paper and the sample being used, and graphically represents the findings of each paper. Panel A reports findings for local markets, Panel B for national markets. Source: Degryse and Ongena (2005b).

Panel A: Local Markets



Panel B: National Markets

Paper	Sample	Degree of Competition in the Banking Sector: High → Low
National Market(s)		Many → No: Arrival of New banks
Farinha and Santos (2002)	Portugal ±2,000 Small Firms 1980-1996	Multiple bank relationships | Single bank relationships
		High → Low: Share of Foreign Banks
Steinherr and Huveneers (1994)	18 Countries 88 Largest Banks 1985-1990	Transactional Banking | Relationship Banking: Higher equity investment by banks
		High → Low: H-Statistic
Weill (2004)	12 Countries 1,746 Banks 1994-1999	Banks are cost inefficient | Banks are cost efficient
		0% → 100%: Percentage of Assets by Largest Three Commercial Banks
Cetorelli and Gambera (2001)	41 Countries 36 Industries 1980-1990	"Transactional Banking" | Industries dependent on external finance are hurt less by bank concentration
Ongena and Smith (2000b)	18 European Countries 898 Largest Firms 1996	Multiple bank relationships | Single bank relationships

FIGURE 4. BROAD SUMMARY OF DOCUMENTED BANK BEHAVIOR IN LOAN MARKETS

The figure broadly summarizes representative findings on bank behavior in loan markets. For each source of rents the figure reports the impact on loan conditions (spreads / credit availability) and the impact on loan market presence (branch / bank level). Numerical values are the averages of estimates from earlier tabulated papers for relevant proxies and ranges. For *market structure* we report the effects when increasing HHI from 0 to the sample average, for *switching costs* when increasing relationship duration from 0 to the sample average, for *location* when increasing distance from 0 to the sample median, and for *regulation* when going from after to before deregulation.

Sources of Rents	**Loan Conditions** *First Row: Spreads in Basis Points* *Second Row: Credit Availability*	**Loan Market Presence** *First Row: at the Branch Level* *Second Row: at the Bank Level*
HHI [0 to Sample Average]	**40***** → **-7**[1] N/a	Loan Loss Avoidance Location, Branching, Type
Duration [0 to Sample Average]	[NO]**188*****[2], [EU]**34**[3], [US]**-23*****[3] Less Collateral & Rationing	%Relationship Banking: [BE]**-6%**, [DE]**-40%**[8] No Effect on Specialization
Distance [0 to Sample Median]	[US]**126*****[4], [BE]**14*****[5] Small to No Effect	No Effect on Branch Efficiency Cross-Border Entry/M&As Difficult
Regulation [After to Before Deregulation]	[WO]**50-100*****[6], [US]**30****[7] N/a	Branching/Entry Now Allowed M&As Still Often Blocked in EU

N/a: as far as we are aware no studies document results. [BE]: Belgium. [EU]: European Union countries. [NO]: Norway. [US]: United States. [WO]: World. [1] For each study in Table 1 we set insignificant coefficients equal to zero and multiply the resulting minimum and maximum coefficients times the average HHI. We average and determine significance levels across all US and West European data studies. [2] We multiply the marginal value of lock-in (0.16) in Table 4 in Kim, Kliger and Vale (2003) times an approximate mean loan rate (0.118). [3] For each study in Table 6 Panel A we set insignificant coefficients equal to zero, where applicable average, and multiply the resulting coefficients times the average duration in Table 4. We average and determine significance levels across studies. [4] We multiply the coefficient on the predicted distance variable (0.546) in Table VIII Model I in Petersen and Rajan (2002) times the log of one plus the median actual distance (9 miles). [5] We multiply the coefficient on the distance variables (8.3) in Table V Model V in Degryse and Ongena (2005a) times the log of one plus the median distance (6.9 minutes). [6] The effect of a one standard deviation change in regulatory variables in Demirguc-Kunt, Laeven and Levine (2004). [7] The effect of state branching deregulation in Jayaratne and Strahan (1996). [8] Approximate estimates of percentage relationship orientation from Degryse and Ongena (2005b) and Elsas (2005) respectively. *** Significant at 1%, ** at 5%, * at 10%.

TABLE 1. EMPIRICAL WORK INVESTIGATING THE IMPACT OF MARKET CONCENTRATION ON LOAN RATES AND CREDIT AVAILABILITY

The table lists the main findings of selected empirical work investigating the impact of bank market concentration on bank loan rates and measures of bank credit availability. The measure of concentration in all studies is the Herfindahl – Hirschman Index (HHI), which can be calculated by squaring the market share of each bank competing in the market and then summing the resulting numbers (0 < HHI < 1). Source: Degryse and Ongena (2003).

Papers	Data Source & Years # Observations in Regressions Observation Type	Concentration in Bank Markets Geo Span: Avg. Pop. / Area Average HHI	Loan Rate or Credit Measure Impact of Concentration **Impact of ΔHHI = 0.1, in Basis Points**
Hannan (1991)	STB ± 8250 US firms	Bank deposits 4,725 0.14	Loan rate Mostly Positive **-6 to 61*** **
Petersen and Rajan (1995)	NSSBF 1987 ± 1,400 US small firms	Bank deposits ± 2,250,000[a] 0.17[a]	Most recent loan rate (prime rate on RHS) Mostly Negative, especially for Young Firms 0 yrs: **-170**, 10 yrs: **-3,** 20 yrs: **46**[a]
Hannan (1997)	FRB Survey 1993 1,994 / 7,078 US banks	Bank deposits ± 2,500,000[a] 0.14	Small business floating loan rate Positive **31*** ** (unsecured), **12*** ** (secured)
Cavalluzzo, Cavalluzzo and Wolken (2002)	NSSBF 1993 ± 2,600 US small firms	Bank deposits ± 2,500,000[a] 0.14	Most recent interest rate on line of credit No effect, but positive for Hispanics All: **-8**, Hispanic: **124****
Cyrnak and Hannan (1999)	FRB Survey 1996 511 / 2,059 US banks	Bank deposits ± 2,750,000[a] 0.16	Small business floating loan rate Positive **55*** ** (unsecured), **21*** ** (secured)[1]
Sapienza (2002)	Credit Register 107,501 Italian firms	Bank loans 600,000[a] 0.06	Loan rate – prime rate Positive **59*** **
Degryse and Ongena (2005a)	One Bank 15,044 Belgian small firms	Bank branches 8,632 0.17	Loan rate Mostly Positive **-4 to 5*** **
Kim, Kristiansen and Vale (2004)	Central Bank of Norway 1,241 Norwegian firms	Bank business credit 250,000[a] 0.19	Credit line rate – 3 month money market rate Insignificantly Positive **3**[b]
Fischer and Pfeil (2004)	Survey 1992-1995 [s] 5,500 German banks	Bank branches n/a ± 0.20 (West) / ± 0.30 (East)	Bank interest margins Positive **20***

Claeys and Vander Vennet (2005)	Bankscope 1994-2001 2,279 Banks 36 European Countries	Bank loans 30,000,000[a] 0.10	Bank net interest margin Positive (West) / Often Negative (East) West: **14*** ** to **23*****; East: **-110*** ** to **190*****
Corvoisier and Gropp (2002), Corvoisier and Gropp (2001)	ECB 2001 ±240 EU countries – years	Bank loans 30,000,000[a] 0.13	Country-specific loan rate margin Positive **10** to **20****[c] and **50*****[d]
Petersen and Rajan (1994)	NSSBF 1987 ± 1,400 US small firms	Bank deposits ± 2,250,000[a] 0.17[a]	% Total Debt / Assets Positive **36*****
Petersen and Rajan (1995)	NSSBF 1987 ± 1,400 US small firms	Bank deposits ± 2,250,000[a] 0.17[a]	% Trade credit paid before due date Positive, especially for Young Firms **140***** to **280*****,[p] ≤10 yrs: **175**** to **740**,[r] >10 yrs: **150*** to **0**[r]
Cavalluzzo, Cavalluzzo and Wolken (2002)	NSSBF 1993 ± 2,600 US small firms	Bank deposits ± 2,500,000[a] 0.14	Various credit availability measures No effect overall but significant positive effects for African Americans and Females
Zarutskie (2004)	SICTF 1987-1998 ± 250,000 US firms – years	Bank deposits ± 2,250,000[a] 0.19	% Outside Debt / Assets Positive **19** to **77*****
Scott and Dunkelberg (2001), Scott (2003)	CBSB 1995 ± 2,000 US small firms	Bank deposits ± 2,500,000[a] 0.19	No credit denial Positive + to +++[e]
Angelini, Di Salvo and Ferri (1998)	Survey 1995 2,232 Italian small firms	Bank loan Median: < 10,000 0.42	Perceived Access to Credit No effect **0**

[a] Authors' calculations or estimates. [b] For HHI increasing from 0.09 to 0.19. [c] Their models 2 and 5. CBSB: Credit, Banks and Small Business Survey collected by the National Federation of Independent Business. [d] Coefficients in regressions for short-term loans in their models 3, 5, and 6. [e] Based on the COMPETITION variable, not on the HHICTY. NSSBF: National Survey of Small Business Finance. [p] Linear approximation using their Table IV coefficients and assuming that the mean HHI below 0.1 equals 0.05 and above 0.18 equals 0.59. [r] Linear approximation assuming that the mean HHI below 0.1 equals 0.05 and above 0.18 equals 0.59, based on means and medians in their Table V. SBIF: Chilean Supervisory agency of Banks and Financial Institutions. SICTF: Statistics of Income Corporate Tax Files. STB: Federal Reserve's Survey of the Terms of Bank lending to business. yrs: years. 0: Included in the specifications but not significant. *** Significant at 1%, ** at 5%, * at 10%. +++ Positive and significant at 1%, ++ at 5%, + at 10%. ↔↔↔ Negative and significant at 1%, ↔↔ at 5%, ↔ at 10%.

TABLE 2. EMPIRICAL WORK INVESTIGATING THE IMPACT OF MARKET CONCENTRATION ON DEPOSIT RATES

The table lists the main findings of empirical work investigating the impact of bank market concentration on bank deposit rates. The measure of concentration in all studies is either the Three-Bank Concentration ratio (CR3) or the Herfindahl – Hirschman Index (HHI), which can be calculated by squaring the market share of each bank competing in the market and then summing the resulting numbers ($0 < HHI < 1$).

Papers	Data Source & Years # Observations in Regressions Observation Type	Concentration in Markets Geo span: Avg. Pop. / Area Average CR3 or HHI	Deposit Rate Measure The Impact of Concentration on the Deposit Rate **Impact of ΔCR3 = 0.3 or ΔHHI = 0.1,[b] in BP**
Berger and Hannan (1989)	FRB Survey 1985 4,047 US banks	Bank deposits 2,000,000[a] CR3: n/a	Bank rates **-18*****(demand), **-12***** to **-1** (time), **-19*****(savings)
Calem and Carlino (1991)	FRB Survey 1985 444 / 466 US banks	Bank deposits 2,000,000[a] CR3: 0.45	Bank rates **-17***** (time), **-5** (savings)
Neumark and Sharpe (1992)	FRB Survey 1983-1987 49 months, 255 banks US banks – years	Bank deposits 2,000,000[a] HHI: 0.08	Bank deposit rates **-26***** (time), **-27***** (savings)
Sharpe (1997)	FRB Survey 1983-1987 49 months, 222 banks US banks – years	Bank deposits 2,000,000[a] HHI: 0.08	Bank deposit rates Restricted market: **-19***** (time), **-20***** (savings) Liberalized market: **-7***** (time), **-4** (savings)
Neuberger and Zimmerman (1990)	California 1984-87 3,415 Californian NOW Accounts	Bank deposits n/a CR3: 0.63	NOW account rate **-5*****
Hannan (1997)	FRB Survey 1993 ±330 US Banks	Bank deposits 2,500,000 [a] HHI: 0.14	Bank rates **-5** (demand), **-5** (time), **-6*** (savings)[1]
Radecki (1998)	FRB Survey 1996 197 US Banks	Bank deposits MSA=2,650,000; State=10,240,000 HHI: MSA = 0.17; State = 0.11	Bank rates MSA = mixed; State = negative MSA[2] = **10*** (demand), **3** (time), **5** (savings) State[3] = **-4** (demand), **-6** (time), **-33***** (savings)
Hannan and Prager (2004)	Reports of C&I 1996 / 1999 6,141 / 5,209 US banks – years	Bank deposits 96 = 1,034,000; 99 = 1,092,000 HHI: 1996 = 0.23; 1999 = 0.22	Bank rates 96[1] = **-4***** (demand), **-3***** (time), **-1** (savings) 99[1] = **-4*** (demand), **-7***** (time), **-4***** (savings)

Heitfield and Prager (2004)	Reports C&I 1988, 92, 96, 99 ±11,500/10,250/8,250/7,250 US banks – years	Bank deposits ±1,000,000 HHI: ±0.22	Bank rates 1999 Local = **-1*** ** (demand), **-0** (savings) 1999 State = **-23*** (demand), **-8*** ** (savings)
Rosen (2003)	Reports C&I 1988 - 2000 89,166 US banks – years	Bank deposits ±1,000,000 HHI: 0.35	Bank rates Urban: **-8*** ** (demand), **-7*** ** (savings) Rural: **-1** (demand), **1** (savings)
Fischer and Pfeil (2004)	Survey 1992-1995 [s] 5,943 / 5,873 German banks	Bank branches n/a HHI: ±0.20 (West) / ±0.30 (East)	Bank interest margins **9** (time), **-2****(savings)
Corvoisier and Gropp (2002)	ECB 2001 246 EU country – years	Bank deposits 30,000,000[a] HHI: 0.13	Country-specific deposit rate margins[c] **-70*** ** (demand)**, 50*** ** (time)**, 140*** ** (savings)[6]

[a] Authors' calculations. [b] Assuming equal market shares for the three largest banks and market shares of the other atomistic banks that can be disregarded, an increase in the CR3 from 0.1 to 0.4 increases the HHI from 0.003 to 0.053, while an increase in the CR3 from 0.3 to 0.6 increases the HHI from 0.03 to 0.12. BP: Basis Points. [c] The margin in their paper is the money market rate minus the deposit rate. For consistency reasons we multiply all results by (-1). C&I: Condition and Income. MSA: Metropolitan Statistical Area. [s] Source: Fischer (2001). [1 2 3 6] Their models 1, 2, 3, or 6. *** Significant at 1%, ** at 5%, * at 10%.

TABLE 3. EVENT STUDIES ON THE IMPACT OF LOAN, DISTRESS, AND MERGER ANNOUNCEMENTS ON BORROWING FIRM STOCK PRICES

The table lists the main findings of event studies tracing the impact of bank loan, bank distress, or bank merger announcements on the stock prices of borrowing firms. The first column provides the Paper citation. The second column reports the Country affiliation of the affected firms and the Period during which the announcements were made. The Average (Median) *Firm Size* column lists both the size measure and the average (median) size of the firms in millions of US$. The fourth column reports on the first row the type of Announcement and the number of Events and on the second row the number of Affected Borrowers. The final column provides on the first row a Two-Day Mean Abnormal Return, in most cases over either [-1,0] or [0, 1] interval, in percent. If two-day CARs are not reported over either interval, the shortest reported interval including either one of these two-day periods is used. The second row provides a breakdown of the announcements in key categories reported in the paper (in parentheses we report whether the differences in mean abnormal returns between reported groups of announcements are significantly different from zero) or key results from any cross-sectional exercises reported in the paper as an answer to the question "Which firms suffer the least?" Between brackets we report if abnormal returns differ between affected and unaffected firms (i.e., firms not borrowing from the affected bank at the time of the announcement). Source: Ongena and Smith (2000a).

Paper	Country Period	Avg. (Med.) Size, in mln $	Announcement (Events) Affected Borrowers	**2-Day Mean AR, in %** Cross-Sectional Results (Difference?)
Mikkelson and Partch (1986)	US 1972-82	n/a	Credit Agreements (155)	**0.89*** **
James (1987)	US 1974-83	L: 675 (212)	Bank Loan Agreement (80)	**1.93*** **
Lummer and McConnell (1989)	US 1976-86	n/a	Bank Credit Agreement (728) Renewals (357) / New (371)	**0.61*** ** 1.24*** / -0.01 (n/a)
Slovin, Johnson and Glascock (1992)	US 1980-86	E: 281 (68) For initiations	Loan Agreement (273) Renewals (124) / Initiations (149) Small Firms (156) / Large Firms (117)	**1.30*** ** 1.55*** / 1.09*** (n/a) 1.92*** / 0.48 (n/a)
Best and Zhang (1993)	US 1977-89	n/a	Bank Credit Agreement (491) Renewals (304) / New (187) Noisy Renewals[a] (156)/Accurate New[a] (187)	**0.32** ** 1.97** / 0.26 (no) 0.60** / -0.05 (*)
Billett, Flannery and Garfinkel (1995)	US 1980-89	E: 316 (79)	Loan (626) Renewals (187) / New Banks (51) Banks' Rating: AAA (78) / < BAA (29)	**0.68*** ** 1.09*** / 0.64* (no) 0.63*** / -0.57 (no)
Berry, Byers and Fraser (2002)	US 1980-00	E: 4,615 (113) BA: 1,111 (176)	Bank Loan Renewal (454) 1980-1990 (179) / 1991-2000 (275)	**0.80*** ** 1.31*** / 0.48 (n/a)
Aintablian and Roberts (2000)	Canada 1988-95	n/a	Corporate Loan (137) Renewals (35) / New (69)	**1.22*** ** 1.26*** / 0.62 *** (*)[a]
Andre, Mathieu and Zhang (2001)	Canada 1982-95	n/a	Bank Credit Agreement (122) Lines of Credit < 1988 (13) / > 1988 (33) Term Loans < 1988 (22) / > 1988 (54)	**2.27*** ** 4.82 / 0.32 1.14 / 3.30***

Boscaljon and Ho (2005)	Asia 1991-02	n/a	Commercial Bank Loans (128) Renewals (72) / New (56) Before Crisis (57) / After Crisis (71) HK (44) / SK (39) / Taiwan (25)/ Thai (20)	**1.25***** 1.23 *** / 1.27*** (no) 0.13 / 2.14*** 1.63*** / 2.61*** / 0.21 / -0.94
Fery et al. (2003)	Australia 1983-99	n/a	Signed Credit Agreements (196) Published: Single (18) / Multiple (22) Non-Published: Single (56) / Multiple (89)	**0.38*** 1.62** / 0.89 0.02 / 0.25
Slovin, Sushka and Polonchek (1993)	US 1984	E: 1,085 (692)	Continental Illinois Distress (1) 29 Firms (Direct Lender/Lead Manager)	**-4.16***** Firms with low leverage and other banks
Ongena, Smith and Michalsen (2003)	Norway 1988-91	S: 400	Bank Distress (6) 217 Main Bank firms	**-1.7**** Equity-issuing firms w/ undrawn credit (No)
Karceski, Ongena and Smith (2005)	Norway 1983-00	S: ±500	Completed bank mergers (22) 342 Acquirers, 78 Targets, 1,515 Rivals	**0.29, -0.76**, 0.06** Firms w/ relationship w/ acquiring banks
Chiou (1999)	Japan 1997-98	A: 3,913 (1110)	Daiwa Bank Scandal (1) 32 Main Bank firms	**-0.98***** Large firms & w/ no Main Bank
Brewer et al. (2003)	Japan 1997-98	A: 1,450	Three Bank Failures (3) 327	**0.17; -1.32***; -0.49**** Firms with alternative financing (No)
Miyajima and Yafeh (2003)	Japan 1995-01	A: 2,293[a]	Actions (11), Downgrading (5), Mergers (3) 9,250 + 4,016 + 2,606	**n/a; -3.1[n/a]; 0** Large, profitable, tech, low debt, bonds (No)
Hwan Shin, Fraser and Kolari (2003)	Japan 19.08.99	S: 790 (716)[a]	3-Way alliance (1) 570	**-0.31***** Main Bank, high debt, profitable
Bae, Kang and Lim (2002)	S-Korea 1997-98	BA: 404	Negative Bank News (113) 486	**-1.26***** Healthy, unconstrained firms
Sohn (2002)	S-Korea 1998	A: 324[a]	Closure / transfer of five banks (1) 118	**-4.85***** Firms with no prior relationship
Djankov, Jindra and Klapper (2005)	Indonesia Thailand S-Korea 1997-99	n/a	Closures (52) Foreign Sales (209) Domestic Mergers (92) Nationalizations (94)	**-3.94***** **-1.05*** **-1.27** **3.14***** Large Firms (No)

A: assets. [a] Authors' calculations. Avg.: average. [b] Their Table 1b does not specify which firm size measure is used (the usage of market equity is possibly implied in the text). BA: book assets. E: market equity. HK: Hong Kong. L: total liabilities. Med.: median. Mln: million. n/a: not available. S: sales. w/: with. Thai: Thailand. *** Significant at 1%, ** significant at 5%, * significant at 10%.

TABLE 4. DURATION OF BANK RELATIONSHIPS

The table lists the reported duration of bank relationships. The first column provides the *Paper* citation. The second column reports the *Country* affiliation of the related firms and the third column the sample *Year(s)*. *Sample Size* is the number of firms (unless indicated otherwise). The *Average (Median) Firm Size* column lists both the size measure and the average (median) size of the firms in millions of US$ or number of employees. The final column provides the Average (Median) *Duration* of firm-bank relationships in years.

Paper	Country	Year(s)	Sample Size	Firm Size	Duration, in years
Bodenhorn (2003)	US	1855	2,616	Small Firms	4.1
Petersen and Rajan (1995)	US	1987	3,404	Employees: 26 (5)	10.8
Blackwell and Winters (1997)	US	1988	174	Book Assets: 13.5	9.01
Cole (1998)	US	1993	5,356	Book Assets: 1.63	7.03
Brick, Kane and Palia (2004)	US	1993, 1998	1,125	Sales: 2.1[l] (2.8)	7.60 (5)
Scott (2004)	US	2001	1,380	Employees: 16.6 (6)	4.5 (4.5)
Angelini, Di Salvo and Ferri (1998)	Italy	1995	1,858	Employees: 10.3	14.0
Guiso (2003), Herrera and Minetti (2005)	Italy	1997	4,267	Employees: 67.7	16.1
Castelli, Dwyer and Hasan (2005)	Italy	1998-2000	10,764	Employees: 80 (30)[a]	17.6 (15)
Canovas and Solano (2003)	Spain	1999	153	Sales: 10.0 (4.1)	16.1 (15)
Farinha and Santos (2002)	Portugal	1980-1996	1,471	Employees: 46.0	(4.7)
Ziane (2002)	France	2001	244	Employees: 32 (22)	14.4 (10)
Degryse and Van Cayseele (2000)	Belgium	1997	17,776 loans	Employees: (1)	7.82
de Bodt, Lobez and Statnik (2005)	Belgium (F)	2001	296	Total Assets: 0.03	11.7 (15)[a]
Elsas and Krahnen (1998)	Germany	1992-1996	125 / year	Sales: (30-150)	22.2
Harhoff and Körting (1998)	Germany	1997	994	Employees: ± 40 (10)	± 12
Lehmann and Neuberger (2001), Lehmann, Neuberger and Rathke	Germany	1997	357	SMEs	4.8[ac]
Thomsen (1999)	Denmark	1900-1995	948	Assets: 125	15.5
Ongena and Smith (2001)	Norway	1979-1995	111 / year	Market Equity: 150	(15.8 - 18.1)
Sjögren (1994)	Sweden	1916-1947	50	Largest Firms	> 20 (5-29)
Zineldin (1995)	Sweden	1994	179	Employees: (<49)	(>5)
Horiuchi, Packer and Fukuda (1988)	Japan	1962-1972	479	Largest Firms	(21)
Gan (2003)	Japan	1984-1993	11,393	All Publicly-listed	6.85 (7)
Menkhoff and Suwanaporn (2003)	Thailand	1992-1996	555	Assets: 880 (10)	7.96
Alem (2003)	Argentina	1998-1999	4,158	80% Corporations	8
Bebczuk (2004)	Argentina	1999	143	Sales: 3.9	19.6

[a]: authors' calculation. [l]: approximation on the basis of log size.

TABLE 5. DETERMINANTS OF THE DURATION OF BANK RELATIONSHIPS

The table summarizes the results from studies on the determinants of the duration of bank relationships. Positive signs indicate that an increase in the indicated variable corresponds to a significantly longer Duration of the Bank Relationships. The first column lists the variable names. The other columns contain the results from the respective papers. The *Paper* citations on the first row are abbreviated to conserve space. The cited papers are: BMPRS: Berger et al. (2005), BDSS: Bharath et al. (2004), SCS: Saparito, Chen and Sapienza (2004), S: Sapienza (2002), DMM: Degryse, Masschelein and Mitchell (2005), FS: Farinha and Santos (2002), HK: Harhoff and Körting (1998), HPW: Howorth, Peel and Wilson (2003), T: Thomsen (1999), OS: Ongena and Smith (2001), and KOS: Karceski, Ongena and Smith (2005). The second row lists *Country* codes. Country codes are: IT: Italy, PT: Portugal, BE: Belgium, DE: Germany, DK Denmark, NO: Norway. The third row lists the sample *Years*. The fourth row reports the number of *Observations* (Obs). The next row lists whether the employed empirical *Model* is a Logit, Probit, Duration (D), or Time-Varying Duration (TVD) model. The sixth row indicates the specific *Dependent* Variable used in the paper. Other rows list the sign and significance levels of the coefficients on the independent variables as reported in the paper. Significance levels are based on all reported exercises and the author's assessment.

	Paper	BMPRS	SCS	BDSS	S	FS	DMM	HK	HPW	T	OS	KOS
	Country	US	US	US	IT	PT	BE	DE	UK	DK	NO	NO
	Years	1993	1993	86-01	89-95	80-96	97-03	1997	1996	00-95	79-95	79-00
	Obs	1,131	935	401,699	50,000	1,471	600,000	1,228	±120	948	383	598
	Model	IV	Logit	Logit	Probit	TVD	Logit	Logit	Logit	Logit	D	TVD
	Dependent	Duration	Drop	Choose[s]	Drop	Hazard	Drop	Drop	Drop	Drop	Hazard	Hazard
Relations	Duration		**0**			↔↔↔				+/↔↔↔	↔↔↔	↔↔↔
	Switches					↔↔↔						
	Number						↔↔↔				↔↔↔	↔
	Scope		+++	+++								
	Trust		+++									
Firm	Age	+++			**0**	**0**	+++	**0**	↔	++	+	
	Size	+	**0**	+++	↔↔↔	↔↔↔	+++	**0**	**0**	++	+++	+++
	Growth		**0**			↔↔↔			**0**		↔	
	Cash Flow					++						
	Intangibles					**0**		↔	↔			
	Profitability			+++	+++	**0**	+++		**0**		↔↔	**0**
	Constrained							↔	↔↔↔			
	Leverage	**0**			↔↔↔	**0**	+++		++		↔↔↔	
	Bank Debt					↔↔↔						
	Urban							**0**				
Bank	Age	+++				**0**						
	Size	↔↔↔	**0**			**0**	+++	**0**		++	++	
	# Branches	+++										
	Growth					**0**						
	Liquidity					**0**	+++					
	Profitability		↔↔↔		**T:** +++	**0**	↔↔↔					
	Efficiency				**T:**↔↔↔		+++		++			
	Risk				**T:**↔↔↔		↔↔↔				**0**	
	Merged				**T:**↔↔↔		**T:**↔↔↔				**0**	**T:**↔↔↔
	State											+
Market	Local Banks			+++		**0**						
	Concentration	+	**0**			**0**		**0**				

A: acquiring banks. [s]: the signs of the independent variables are reversed to facilitate comparisons. T: target banks. 0: Included in the specifications but not significant.
+++ Positive and significant at 1%, ++ at 5%, + at 10%. ↔↔↔ Negative and significant at 1%, ↔↔ at 5%, ↔ at 10%.

TABLE 6. DURATION, NUMBER, AND SCOPE OF BANK RELATIONSHIPS AND THE COST / AVAILABILITY OF CREDIT AND COLLATERAL

The table reports the coefficients from studies on the impact of the duration, scope, and number of bank Relationships on the cost of credit. The first column lists the *Country* affiliation of the related firms and the second column provides the *Paper* citation. The third column reports the data *Source* and *Year(s)*, the fourth column the number of *Observations* and an indicative *Firm Size* (small, medium, and/or large). The fifth column gives a precise definition of the *Dependent Variable* and the next three columns indicate the impact on the dependent variable of an increase in *Duration* (by one year), *Number* (by one relationship), and *Scope* (from 0 to 1) of bank relationships. Coefficients and significance levels are based on the reported base specification. All coefficients for logged Duration or Number measures are averaged over the [1,4] interval.

Table 6 Panel A	Paper	Source Year	Observations Firm Size	**Cost of Credit**, in basis points	Duration Δ=1 year	Number Δ=1 bank	Scope Δ=1
US	Bodenhorn (2003)	1 Bank 1855	2,616 s	Loan rate - A1 commercial paper	-2.9**		
	Petersen and Rajan (1994)	NSSBF 1987	1,389 s	Most recent loan rate (prime on RHS)	3.7	32.1***	0.8 [che]
	Berger and Udell (1995)	NSSBF 1987	371 s	Line of credit - Prime rate	-9.2**		
	Uzzi (1999)	NSSBF 1987	2,226 s	Most recent loan rate (prime on RHS)	-1.3**		-4.2**
	Blackwell and Winters (1997)	6 Banks 1988	174 s	Revolver - Prime rate	-0.9		0.0
	Berger, Rosen and Udell (2002)	NSSBF 1993	520 s	Line of credit - Prime rate	-5.3**		
	Brick, Kane and Palia (2004)	NSSBF 93,98	1,125 s	Line of credit (prime on RHS)	-1.1	-14.2*	
	Hao (2003)	LPC 1988-99	948 l	Facility coupon + fees - LIBOR		8.0***[lf]	
	Bharath et al. (2004)	LPC 1986-01	9,709 l	Facility coupon + fees - LIBOR			-6.6***[a]
Canada	Mallett and Sen (2001)	CFIB 1997	2,409 s	Loan interest rate	0		0
Italy	Conigliani, Ferri and Generale (1997)	CCR 1992	33,808 m	Loan interest rate	-14.1***[cl]	-2***	
	Ferri and Messori (2000)	CCR 1992	33,808 m	Loan interest rate	nw: -19.1*	nw: -0.3	
					ne: -13.5[n/a]	ne: 0.7[n/a]	
					so: 9.6[n/a]	so: -13.6*[a]	
	D'Auria, Foglia and Reedtz (1999)	CCR 1987-94	120,000 l	Loan interest rate - Treasury Bill rate	2.5***	-1.3***	
	Angelini, Di Salvo and Ferri (1998)	Survey 1995	2,232 s	Line of credit	ccb: -1.8	-10.0***	
					oth: 6.4***		
	Cosci and Meliciani (2002)	1 Bank 1997	393 s	Interest Payments - Total Debt		-0.2	
	Pozzolo (2004)	CCR 1992-96	52,359	Loan interest rate	43***		
Spain	Canovas and Solano (2003)	Survey 1999	153 s	Avg. cost of bank finance - Interbank	0.4	4.9*	13.6
France	Ziane (2002)	Survey 2001	244 s	Credit interest rate	-20.2	51.4	20.1*
Belgium	Degryse and Van Cayseele (2000)	1 Bank 1997	17,429 s	Loan yield till next revision	7.5***		-39.3***
	Degryse and Ongena (2005a)	1 Bank 1997	15,044 s	Loan yield till next revision	11.0***		-40.7***
Germany	Harhoff and Körting (1998)	Survey 1997	994 s	Line of credit	1.7	-0.2	
	Elsas and Krahnen (1998)	5 Banks 1996	353 ml	Line of credit - FIBOR	0.3		-4.8

	Machauer and Weber (1998)	5 Banks 1996	353 ml	Line of credit - interbank overnight	-0.3	0.0	1.3
	Ewert, Schenk and Szczesny (2000)	5 Banks 1996	682 ml	Line of credit - FIBOR	0.7***	0.6	-22.1
	Lehmann and Neuberger (2001)	Survey 1997	318 sm	Loan rate - Refinancing Rate	1.8[a]		-5.6
	Lehmann, Neuberger and Rathke (2004)	Survey 1997	W: 267 sm	Loan rate - Refinancing Rate	w: 1.6		w: -2.0
			E: 67 sm		e: -0.5		e: 20.3
Finland	Peltoniemi (2004)	1 Bank 95-01	279 s	Effective loan rate	-12***		6.6[a1]
		1 Non-bank	576 s		-2*		
Japan	Weinstein and Yafeh (1998)	JDB 1977-86	6,836 l	Non-bond interest expenses - Debt			53***
	Miarka (1999)	1985-1998	1,288 sm	Interest Rate on Borrowing			-22.2***
Thailand	Menkhoff and Suwanaporn (2003)	9 Banks 92-96	416 l	Loan Rate - Min. overdraft rate	-0.9	-6.5**	-22.0**
Argentina	Streb, Bolzico, Druck, Henke, Rutman and Escudero (2002)	CDSF 1999	8,548	Highest overdraft interest rate		6.9***	-69.0***
Chile	Repetto, Rodriguez and Valdes (2002)	SBIF 1990-98	20,000	Interest rate paid	-65.1**[cl]	-47.0**	-26.5

Table 6 Panel B	Paper	Source Year	Observations Firm Size	**No Collateral**, in %	Duration Δ=1 year	Number Δ=1 bank	Scope Δ=1
US	Bodenhorn (2003)	1 Bank 1855	2,616 s	No guarantors	2.6**		
	Berger and Udell (1995)	NSSBF 1987	371 s	No collateral	12.1**		
	Chakraborty (2003)	NSSBF 1993	585 s	No collateral L/C	6.4**	-6.7***	-4.4
				No collateral non L/C	-3.9	-6.7***	17.1***
	Hao (2003)	LPC 1988-99	948 l	Not secured		1[lf]	
Italy	Pozzolo (2004)	CCR 1992-96	52,359	No real guarantees	-17***	5***	
				No personal guarantees	14***	1***	
Spain	Canovas and Solano (2003)	Survey 1999	153 s	No real guarantees	1.1	-5.6	18.8
France	Ziane (2002)	Survey 2001	244 s	No collateral	8.3	-2.3**	-2.8*
Belgium	Degryse and Van Cayseele (2000)	1 Bank 1997	17,429 s	No collateral	4.2*		-64.5***
Germany	Harhoff and Körting (1998)	Survey 1997	994 s	No collateral	7.0**	-10.0**	
	Machauer and Weber (1998)	5 Banks 1996	353 ml	Unsecured % of credit line	-0.1*	0.6**	-9.4***
	Elsas and Krahnen (2002)	5 Banks 1996	472 ml	No collateral			-17.6**
	Lehmann and Neuberger (2001)	Survey 1997	318 sm	No collateral	-0.8[a]		-4.1***
	Lehmann, Neuberger and Rathke (2004)	Survey 1997	W: 267 sm	No collateral	w:-1.6***		w:-15***
			E: 67 sm		e:5.2**		e:-12.9**
Finland	Peltoniemi (2004)	1 Bank 95-01	562 s	No collateral	-2 [a]		50*** [a1]

Table 6 Panel C	Paper	Source Year	Observations Firm Size	**Availability of Credit**, in %	Duration Δ=1 year	Number Δ=1 bank	Scope Δ=1
US	Petersen and Rajan (1994)	NSSBF 1987	1,389 s	% Trade credit paid on time	2.3**	-1.9**	
	Uzzi (1999)	NSSBF 1987	2,226 s	Credit Accessed	-0.1		0.5
	Cole (1998)	NSSBF 1993	2,007 s	Extension of credit	5.0***	-12.0***	-22.0[che]
	Cole, Goldberg and White (2004)	NSSBF 1993	585 s	Extension of credit by small banks	-0.0	-1.1	5.9**[che]
	Scott and Dunkelberg (2003)	CBSB 1995	520 s	Single credit search	21.5***	-25.7***	
Italy	Angelini, Di Salvo and Ferri (1998)	Survey 1995	2,232 s	No rationing	7.0**	-6.4**	
	Cosci and Meliciani (2002)	1 Bank 1997	393 s	1 – [Credit used / Credit offered]		23.3**	
	Guiso (2003)	SMF 1997	3,236 s	No loan denial	0.8	0.0	-0.1
France	Dietsch (2003)	1993-2000	2,530,353	Loans / Turnover	2.7**[a]	1.5**[a]	10.1**
Belgium	de Bodt, Lobez and Statnik (2005)	Survey [f] 2001	296 s	No rationing	20.0**[a]	-22.0**	
Germany	Lehmann and Neuberger (2001)	Survey 1997	318 sm	Credit approval	0.1***[a]		0.9***
Thailand	Menkhoff and Suwanaporn (2003)	9 Banks 92-96	416 l	Ratio L/C / (liabilities + L/C)	0.3	0.0	9.6***
Argentina	Streb et al. (2002)	CDSF 1999	8,548	Unused credit line Ratio		-2.7***	21.4
	Bebczuk (2004)	UIA 1999	139	Probability of obtaining credit	no		
Chile	Repetto, Rodriguez and Valdes (2002)	SBIF 1990-98	20,000	Debt / Capital	1.7**	11.9**	-45.4**

[a] Authors' calculations. [a1] for a doubling from 10 to 20 bank services taken. CBSB: Credit, Banks and Small Business Survey collected by the National Federation of Independent Business. ccb: Credit granted by Chartered Community Banks to CCB members. CCR: Central Credit Register. CDSF: Center of Debtors of the Financial System at the Central Bank of Argentina. CFIB: Canadian Federation of Independent Business. [che] Checking account at the bank. [cl] based on contract length. [d]: based on a dummy. [f] French-speaking part. JDB: Japan Development Bank. l: large. L/C: Line of Credit. LPC: Loan Pricing Corporation Dealscan database. [lf] Number of lenders in facility. m: medium. NSSBF: National Survey of Small Business Finances. ne: Northeast. nw: Northwest. oth: All other credit. RHS: Right Hand Side. s: small. so: South. SBIC: Small Business Investment Companies. SBIF: Chilean Supervisory agency of Banks and Financial Institutions. SMF: Survey of Manufacturing Firms. *** Significant at 1%, ** significant at 5%, * significant at 10%.

NOTES

[1] See Berger and Udell (1998), Berger (2003), Berger and Udell (2002), Bernanke (1993), Bhattacharya and Thakor (1993), Buch (2002), Carletti and Hartmann (2003), Danthine (2001), Danthine, Giavazzi, Vives and von Thadden (1999), Danthine, Giavazzi and von Thadden (2001), Davis (1996), Degryse and Ongena (2004), Dermine (2003), Freixas and Rochet (1997), Gertler (1988), Giannetti, Guiso, Jappelli, Padula and Pagano (2002), Gorton and Winton (2003), Greenbaum (1996), Hellwig (1991), Mayer (1996), Nakamura (1993), Neuberger (1998), Pagano (2002), Scholtens (1993), Swank (1996), Thakor (1995), Thakor (1996), Van Damme (1994), Vives (2001b), and Vives (2002), among others.

[2] For a general overview, see also Berger, Demirguc-Kunt, Levine and Haubrich (2004). We mention more specific reviews further in the text.

[3] In the *relative* market power hypothesis in Shepherd (1982) only banks with large market shares and well-differentiated products enjoy market power in pricing.

[4] As control variables they include time dummies, the one-year growth in market deposits, the proportion of bank branches in total number of branches of financial institutions (including S&L branches), a wage rate, per capita income, and a Metropolitan Statistical Area dummy variable.

[5] Recent work by Vander Vennet (2002) revisits the issue employing a large European dataset. He distinguishes between universal banks, financial conglomerates (institutions that offer the entire range of financial services), and specialized banks. In contrast to previous studies, he nicely allows for heterogeneity in bank types within each country. In line with Allen and Rai (1996) he finds large unexploited *scale* economies for the small-specialized banks. But in addition Vander Vennet (2002) also reports unexploited *scope* economies for the smallest specialized banks and for the largest financial conglomerates and universal banks.

[6] The conjectural variations approach has subject to a number of important criticisms. Corts (1999) for example argues that the conduct parameter λ may not only hinge on the firm's static first-order condition, but also on the dynamics, i.e. the incentive compatibility constraints associated with collusion. In the dynamic case, the estimated λ may be biased when the incentive compatibility constraints are a function of demand shocks.

[7] Shaffer introduces interaction terms between the price *P* and the exogenous variables *Y* and *Z*, as well as between these exogenous variables, in order to capture the rotation of the demand curve to identify λ.

[8] In certain specifications, researchers also include the price of capital, since this price may vary over time.

[9] The idea in the nested logit model is that consumer tastes are correlated across bank products *i*. Making a priori groups *G*, a product *i* belonging to one of the groups then provides a utility to consumer *c* equal to $u_{cij} \equiv \delta_{ij} + \varsigma_{cg} + [1-\sigma]\varepsilon_{cij}$, where ς_{cg} denotes the group specific component for individual *c*.

[10] As in the tables, we star the coefficients to indicate their significance levels: *** significant at 1%, ** significant at 5%, and * significant at 10%.

[11] Rosen (2003) finds that having more large banks in a market generally increases deposit rates at all banks but also increases their sensitivity to changes in the concentration ratio.

[12] Kashyap, Rajan and Stein (2002) for example link lending and deposit taking at the bank level.

[13] See Berger and Udell (2002), Boot (2000), and Ongena and Smith (2000a). Other reviews on various aspects of bank relationships include Berlin (1996), Bornheim and Herbeck (1998), Degryse and Ongena (2002), Eber (1996), Elyasiani and Goldberg (2004), Holland (1994), Ongena (1999), Rivaud-Danset (1996), and Samolyk (1997).

[14] Our discussion is partly based on Ongena and Smith (2000a).

[15] With the exception of Aintablian and Roberts (2000): they use Canadian bank loan announcements. Their reported statistics imply that mean excess returns on new loans and renewals differ at a 10% level of significance.

[16] There is only indirect evidence of the impact of relationship duration on the deposit rate. Sharpe (1997) for example shows that the amount of household migration, in most cases probably resulting in the severance of a deposit relationship, has a positive effect on the level of deposit interest rates. The magnitude of this effect in some cases depends on the degree of market concentration.

[17] See also Freixas (2005) and Gehrig (1998). Relationship lending is further non-monotonically related to the degree of concentration in banking markets in Dinç (2000) and Yafeh and Yosha (2001).

[18] Recent work by Zarutskie (2005), Bergstresser (2001a), Bergstresser (2001b), and Scott and Dunkelberg (2001) analyzing other U.S. datasets broadly confirm these findings. Closest in spirit to Petersen and Rajan's

study is the paper by Zarutskie (2005). She employs a dataset containing almost 200,000 small firm – year observations. She finds that the probability of small firms utilizing bank debt increases when the concentration (in local deposit markets) is high, though the effects seem economically small. Similarly Bergstresser (2001a) finds that in more concentrated markets there are fewer constrained consumer-borrowers, while Bergstresser (2001b) documents that in more concentrated markets banks raise the average share of assets lent. Scott and Dunkelberg (2001) find that more competition not only increases the availability of credit but also decreases the loan rate and improves service performance (including knowledge of business, industry, provision of advice, etc.) by banks.

[19] Cetorelli (2001), Cetorelli and Strahan (2005), Cetorelli (2003a), and Cetorelli (2003b) also find that banking market power may represent a financial barrier to entry in product markets. However Bonaccorsi di Patti and Dell'Ariccia (2004) find opposite results for Italy.

[20] Magri, Mori and Rossi (2005) find that physical distance negatively affected foreign bank entry in Italy during the period 1983 - 1998. However, they interpret distance to proxy for geographical and cultural *differences* between countries and in addition find that risk differentials between countries positively affected entry.

[21] In addition in particular large banks may face competition for their customers from other large home nation banks (Buch and Lipponer (2005)), in which case banks may not enter to avoid one another (for example Merrett and Tschoegl (2004)).

[22] Regulatory borders explicitly prohibiting bank M&As have been removed in Europe. However, national and political interests frequently result in the mobilization of the national anti-trust or banking safety apparatus to block cross-border bank M&As. We acknowledge these actions resort somewhere in the gray area between explicit prohibition of cross-border bank M&As (regulatory borders) and inherent political and cultural differences creating difficulties in making a cross-border bank M&A possible and successful (economic borders).

[23] Magri, Mori and Rossi (2005) for example document that foreign banks successfully entered the Italian banking market following the lowering of the regulatory barriers under the Second Directive enacted in 1992.