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ABSTRACT

The Impact of Competition on Bank Orientation and Specialization*

How do banks react to increased competition? Recent banking theory offers conflicting predictions about the impact of competition on bank orientation – i.e., the choice of relationship based versus transactional banking – and bank industry specialization. We empirically investigate the impact of interbank competition on bank branch orientation and specialization. We employ a unique dataset containing detailed information on bank-firm relationships and industry classification. We find that bank branches facing stiff local competition engage considerably more in relationship-based lending and specialize somewhat less in a particular industry. Our results illustrate that competition and relationships are not necessarily inimical.

JEL Classification: G21, L11 and L14
Keywords: bank industry specialization, bank orientation, competition and lending relationships

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I. Introduction

Arguments about the fundamental incompatibility between relationships and competition have acquired prominence in economics. Employers for example may be reluctant to invest in training, when other employers can easily poach the trained workers in a competitive labor market (Becker (1975)). More in general, Schumpeter argued that market monopolies offer better incentives for innovation, as sunk R&D expenditures are recoupable only through the generation of future rents flowing to a monopolist-innovator (Blundell, Griffith and van Reenen (1999); Etro (2004)).

In their seminal paper in the *Quarterly Journal of Economics* Petersen and Rajan (1995) investigate the effects of competition between banks on the loan rate and the availability of bank credit to firms. Petersen and Rajan model how especially lower quality firms 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 market). Petersen and Rajan document that young firms in more concentrated banking markets obtain more relationship benefits, i.e., lower loan rates and easier access to bank credit, than firms in more competitive banking markets.

However, recent theoretical and empirical work is starting to question whether credit market competition is always inimical to the formation of mutually beneficial relationships between firms and banks. Boot and Thakor (2000), for example, revisit the presumed incompatibility between competition and relationship finance and argue that the source of competition matters in the determination of *bank orientation* (i.e., relationship-based versus transactional lending) and *bank industry specialization*. In their model, *capital market competition* reduces the relative amount of relationship lending chosen by banks but *interbank competition* actually increases relationship lending. Their reasoning is that banks when faced with stiffer interbank competition have greater incentives to offer relationship loans. Relationship lending (compared to transactional lending) allows banks to shield rents more effectively, as relationship banking differentiates the lending bank better from competing banks. Boot and Thakor reason that competition also affects the banks' willingness to invest in industry specialization. Fiercer interbank competition reduces bank industry specialization as the marginal returns to specialization decline.

Elsas (2004) carefully studies the determinants of relationship lending. Elsas employs a cross-sectional data set containing bank credit files on 122 large German firms to investigate the relationship between local bank market concentration and the likelihood a bank assesses itself to be the "Hausbank" of a firm. He documents a mostly decreasing relationship between concentration and the incidence of the Hausbank status.

The empirical approach taken by Elsas (2004) nicely complements Petersen and Rajan (1995), who have to resort to employing cross-sectional data to infer loan rate smoothing and increased availability of credit over the lifetime of their sample firms (Black and Strahan (2002), p. 2812, f. 4). Indeed, Elsas' Hausbank measure seems better suited for cross-sectional exploration and captures relationship formation far better than any individual loan rate or credit availability measure (because of bank fees and cross-selling, for example). His study of the lending arrangement *per se* can be further motivated we think by the observation that in "relationship models" the ultimate welfare effects of changes in competition may be ambiguous, but the effects on bank orientation and specialization typically are not.

Our paper aims to break new ground in this literature by analyzing a unique data set containing loans to 13,098 firms (mainly single-person businesses), comprising the entire loan portfolio of an important bank in Belgium. This data set allows us for the first time to study how local and national competition affects both *orientation* and *industry specialization* of the branches of the bank. We find, in line with Boot and Thakor (2000), that when local interbank competition is fiercer a bank branch is more likely to engage a borrower in relationship banking. In particular the presence in the postal zone of the borrower of many other banks with equal market shares or the presence of banks with multiple contacts across other postal zones results in substantially more relationship lending (but only somewhat less industry specialization).

We further document that borrowers located closer to the bank branch are more likely to be engaged as relationship borrowers. That is borrowers take other bank services and are serviced over a longer time period when living in the proximity of the bank branch. Finally, we report that larger bank branches lend substantially more on a transactional basis, a result suggestive of organizational size effects modeled by Stein (2002), but are less likely to be specialized in particular industries.

We organize the rest of the paper as follows. Section II reviews the theoretical predictions regarding interbank competition, bank orientation and bank industry specialization, and presents recent empirical findings. Section III introduces the data and discusses the variables used in our empirical analysis. Sections IV and V display and discuss the empirical results on bank orientation and industry specialization. Section VI concludes.

II. Theoretical Predictions and Recent Empirical Findings

A. Interbank Competition and Bank Orientation

Theory offers conflicting views on the relation between interbank competition and a bank's willingness to engage in relationship lending (Figure 1 summarizes the predictions of the different theoretical models). A first set of theories argues that competition and relationships are incompatible. Mayer (1988) is the first to apply this insight to banking competition and relationship formation. Mayer hypothesizes that long-term relationships, allowing firms to intertemporally share risks with their banks, only arise if banks enjoy the possibility to extract profits over time, i.e. when the flexibility of the borrowing firms to switch banks is limited. Vigorous competition in the banking market undermines a firm's ability to commit towards future compensation of a bank's initial losses.[1]

Petersen and Rajan (1995) model the impact of bank market power on the possibilities to intertemporally share risks. Market power is exogenous in their framework and a monopolistic bank extracts the high future surplus generated by the firm by backloading interest payments. A bank in a competitive (future) market does not have the same latitude to share surplus intertemporally and consequently the bank may be less willing to initiate a relationship and offer credit.[2] Especially lower quality firms are negatively affected by competition, as banks are unwilling to incur losses that can never be recouped. Hence, credit will be more widely available in banking markets where banks enjoy market power.[3]

Boot and Thakor (2000) extensively revisit the presumed incompatibility between competition and the nature of relationship financing. They argue that more interbank competition leads to more relationship lending. Boot and Thakor distinguish between two sources of competition, i.e., capital market competition and interbank competition, and they allow banks to choose between relationship lending and transactional lending. In their model stiffer capital market competition reduces relationship lending, while interbank competition actually increases the relative amount of relationship lending. A bank offering a relationship loan augments a borrower's success probability. 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.[4]

Relationship lending is non-monotonically related to the degree of concentration in banking markets in Dinç (2000), Anand and Galetovic (2001), and Yafeh and Yosha (2001). Dinç (2000) focuses on the impact of credit market competition on the bank's incentive to keep its commitment in case the borrower's credit quality deteriorates. If a bank enjoys market power and earns rents as one of a few "arm's length operators", a relationship commitment may not be profitable. On the other hand, reputational rents ultimately decrease with the number of banks that already have a good reputation, making the reputation mechanism most effective with an intermediate number of banks.

Establishing a relationship involves a sunk cost in Anand and Galetovic (2001).[5] Corresponding the so-called "loose linkage" between relationships and services in their model, banks cannot directly charge their customers for these costs. In addition the information gathered during relationships is non-excludable. For example competing (transactional) banks could be shown relevant loan offers or could try to poach loan officers from the relationship bank. Consequently, relationships only arise through implicit contracting between banks sustained by intertemporal threats of reverting to a competitive outcome, in particular when few banks with similar market share can cooperate (resulting in an intermediate to high concentration).

Finally, Yafeh and Yosha (2001) analyze intra-temporal competition between a bank offering both relationship and arm's length loans and banks offering arm's length loans only. Starting from exogenously imposed market frictions, they find that increased competition in the arm's length market first increases relationship lending. The non-monotonicity is a result of the surplus sharing between banks and firms. Increased competition in the arm's length market forces the bank to increase the share of the surplus that goes to firms seeking relationship loans, making investment in relationships ultimately less profitable.

B. Interbank Competition and Bank Industry Specialization

Theory also provides hypotheses concerning the relation between interbank competition and bank industry specialization (Figure 1 again summarizes the predictions of the different models). For example, competition affects the banks' investment in industry expertise and hence the "value" of bank-firm relationships in Boot and Thakor (2000). In their model interbank competition reduces bank industry specialization in relationship loans as on the margin the returns to industry specialization decline. Hence, the value added of the relationship loan for the borrower also decreases.

More interbank competition leads to more bank specialization across both arm's length and relationship loan categories in Dell'Ariccia and Marquez (2003) and Hauswald and Marquez (2003a).[6] Hauswald and Marquez (2003a) assume that the precision of the information signal deteriorates in the "informational distance" between bank and borrower. The informational distance increases for example when the firm operates in one industry and the bank specializes in another. Adverse selection problems faced by uninformed transactional banks exacerbate in "distance" (to the uninformed transactional bank) and the incidence of relationship banking increases in "the vicinity" of the informed relationship bank. Hence, an increase in the number of banks in Hauswald and Marquez (2003a) may lead to both more relationship banking and more bank industry specialization.

To conclude, how interbank competition affects bank orientation and bank industry specialization seems ultimately an empirical question, but we are unaware of any studies that have investigated this question comprehensively.

C. Empirical Findings on Interbank Competition and Bank Orientation

Most empirical work so far has investigated the effects of interbank competition on indirect measures of bank orientation (Figure 2 summarizes the main empirical findings). In their seminal paper Petersen and Rajan (1995) investigate the effect of local interbank competition on the loan rate and the availability of bank credit for credit-constrained (e.g., young or distressed) firms in the 1988 U.S. National Survey of Small Business Finance dataset. They employ a Herfindahl – Hirschman Index (HHI) in the local market for deposits to measure concentration. Petersen and Rajan find that young firms in more concentrated 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.[7]

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.[8]

Recent papers by Fischer (2000) and Elsas (2004) 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 (2004) studies the determinants of relationship lending. His results are very interesting. He documents a non-monotonic relationship between local bank market concentration and the probability a bank is designated as "Hausbank". In particular, 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.[9]

To conclude, many empirical papers have investigated the effects of interbank competition on indirect measures of bank orientation. However none of the aforementioned papers employs direct measures of bank orientation (with the exception of Elsas (2004)), controls for both local and nation-wide competition jointly, and/or studies the effects of interbank competition on bank industry specialization.

III. Data and Variables

A. Data

The unique data set we analyze consists of loans granted to 13,098 firms by an important Belgian bank that operates all over Belgium. The sample includes all existing loans at the bank as of August 10, 1997 that were initiated after January 1, 1995. Degryse and Van Cayseele (2000) and Degryse and Ongena (2004) employ the same data set. For each borrower we take the characteristics at the time of the first contract observed in the bank's loan portfolio.

Critical elements of both the Belgian financial landscape and the bank itself make this data ideally suited to investigate the effect of local and nation-wide interbank competition on bank orientation and bank industry specialization. Previous studies show that the highly developed Belgian banking market is very representative for many other banking markets around the world in terms of concentration and competition. For example, Barth, Caprio and Nolle (2004) report that the three largest banks in the market account for 57% of all bank assets, while foreign banks hold 24%. The average percentages in their sample covering 55 countries are 50% and 36% respectively, ranking (from high to low) the Belgian banking sector in 21st and 23rd position. Claessens and Laeven (2004) report that the Panzar and Rosse (1987) H-statistic for Belgium equals 0.73 for the years 1994-2001,[10] while the average for the 50 countries in their sample is 0.67. In addition to a representative banking sector, the Belgian financial system was characterized by a high degree of capital market stability before and during the sample period, hence we can safely abstract from changes in capital market competition in our empirical work.

The bank we study is one of a handful of truly national and general-purpose banks operating in Belgium in 1997. As such the bank lends to firms located in most postal zones[11] and is active in 50 different industries (according to a two-digit NACE classification).[12] Around 83% of the firms in its portfolio are single-person businesses and most borrowers obtain just one, relatively small, loan from this bank. Small Belgian firms typically do not tap into the equity or bond markets for their external financing.

Formalized interviews with bank managers indicated that loan officers located in the bank's branches enjoyed substantial autonomy when granting and pricing small business loans. The officer's own assessment of the development of the relationship with the firm apparently played a key role in any lending decision. In addition, Degryse and Ongena (2004) document substantial variation in loan rates across bank branches and patterns of spatial price discrimination at the branch level, in effect substantiating *de facto* branch autonomy and profit maximization.

Table 1 provides summary statistics for the 13,098 fully identifiable borrowers. Table 1 shows the definition, mean, standard deviation, minimum, and maximum of our variables, broken down into seven sets of characteristics: (1) dependent variables measuring bank orientation and bank industry specialization, (2) competition measures, (3) distance variables, (4) the bank branch characteristic, (5) postal zone variables, (6) firm size and legal form dummies, and (7) other firm characteristics. We turn to each of these sets of variables in the next subsections.

B. Dependent Variables Measuring Bank Orientation and Industry Specialization

1. Bank Orientation

Our main dependent variable measuring bank orientation reflects both the duration and the scope of the engagement between bank and borrower. Boot (2000) and Ongena and Smith (2000a) argue that both duration and scope characterize relationship banking.[13] In addition we note that Petersen and Rajan (1995) focus on intertemporal pricing during a relationship, while Boot and Thakor (2000) highlight the scope of an existing relationship to enhance project success. We define a dummy *Relationship Banking* to equal one if the length of the relationship with the borrower exceeds one year and if the bank considers itself as the Main Bank, and to equal zero otherwise.

A firm - bank relationship starts when a firm buys for the first time a product from that bank. The average duration of the relationship in the sample is around eight years. Duration proxies for the increased time for a firm to experience the banks' products and to appreciate the added flexibility the bank has to maintain and fulfill implicit contracts. While the bank gains private information about a firm to tailor its products, the firm may also become locked-in (for example, Boot and Thakor (1994), Sharpe (1990), and Rajan (1992)).

We find justification for using a duration cut-off of only one year in Angelini, Di Salvo and Ferri (1998) and Cole (1998), who document that credit availability does not increase much beyond the first years of a relationship (we replace one year by three years in robustness exercises). We also note that the repayment duration of more than 60% of the observed loans is shorter than or equal to one year. Hence it seems likely that for the majority of the borrowers rollovers of loans take place within the first year of the relationship.

Main Bank captures the scope of the relationship and indicates whether this bank considers itself as the main-bank of the firm or not. The definition used by the bank to determine whether it is the main-bank is the firm is "having a monthly 'turnover' on the current account [14] of at least BEF 100,000 (€ 2,500),[15] and is buying at least two products from the bank." Only 54% of all borrowers are classified as Main Bank customers. In addition, de Bodt, Lobez and Statnik (2001), for example, document that small Belgian firms employ on average two banks. Consequently our Main Bank variable must capture variation beyond the mere mechanical outcome of the firms' choices for single bank relationships.

We frame the dependent variable as a dummy variable because theory suggests a dichotomy between relationship and transactional lending. However we will employ the duration of the relationship and Main Bank separately as dependent variables in robustness exercises (hence in the former case we employ a continuous dependent variable).

Additional advantages of our dummy approach are that: (1) given our definition about half the firms are engaged as relationship borrowers (i.e., the mean of our independent variable is close to 50%); (2) the reported partial derivatives allow for a straightforward percentage interpretation; and (3) comparison with results in other papers, in particular Elsas (2004), is possible.

2. Bank Industry Specialization

We construct a second dependent variable measuring bank industry specialization. For every borrower we know which specific bank branch granted the loan. We classify the borrowers in the 50 two-digit NACE code classes and for each branch calculate a variable *Industry Specialization* as the proportion of loans of the bank branch loan portfolio in the same industry as the borrower.

Our measure assumes that the bank's knowledge about a particular industry flows from observing the loan repayments by all bank borrowers active in that industry.[16] However, in Boot and Thakor (2000) the degree of industry specialization is chosen ex-ante and is not derived from the actual composition of the realized loan portfolio. In addition, the degree of industry specialization is observable in their model by the individual borrower upon their first contact with the bank. We doubt the bank branches we study ever recorded their "*ex ante*" choices and costs of industry specialization but we consider these costs unlikely to be observable by the borrowers in any case. In that sense our *ex post* measure relying on portfolio composition may be a reasonable proxy for the branch's selected degree of specialization as the bank's clientele in an industry may have been partially observable by (and even "advertised" by the branch to) interested firms from that industry.

Our measure also implies more observations for firms engaged by large bank branches with high degrees of industry specialization (in both cases, there are more borrowers in the sample). We employ a Weighted Least Squares procedure to reduce the weight of branch size and specialization in a robustness check. Specialization may further entail fixed costs and/or learning. Hence we also rerun all exercises after taking the natural logarithm of our measure.

Finally, we note that in Boot and Thakor (2000) the bank first chooses the degree of industry specialization followed by its orientation. Its specialization decision is conditioned on the assessed probability distribution over borrower quality, while the orientation decision is made on the basis of the actual (representative) borrower's quality. For any outside observer (uninformed about the bank's initial assessment and decision) the two decisions appear inseparable and estimating two reduced-form equations containing orientation and specialization respectively (as dependent variables) seems appropriate. The borrower can decide to go to either the capital market or the banking market in between the bank's industry specialization and orientation decision. The corresponding selection issue appears minimal for most firms in our sample that have no access to the capital market anyway. The first-round matching with the banks is stochastic (borrowers also don't know the degree of bank specialization in the model) and is followed by the orientation decision and random competitive bidding by outside banks. Hence no additional selection takes place.

C. Herfindahl – Hirschman Index of Market Concentration

As of December 31st, 1994, we identify 7,477 branches,[17] operated by 145 different banks and located in 837 different postal zones. Each postal zone carries a postal code between 1,000 and 9,999 (the first digit in the code indicates a geographical region, which we call "postal area" and which in most cases coincides with one of the ten Provinces in Belgium). A postal zone covers on average 26 sq km,[18] and contains approximately six bank branches. A postal area covers 3,359 sq km on average. Not surprisingly borrowers are often located in more densely banked areas, with on average more than 17 bank branches per postal zone.

Previous research has argued that the relevant loan market is local in nature for small businesses.[19] Branch proximity continues to play an important role in determining bank choice by borrowers in both the US and Europe. For example, results reported in Degryse and Ongena (2004) show that loan rates in Belgium are not uniform across borrowers or across branches. In addition, physical distance between borrower and local financier affects loan conditions. We therefore *a priori* select each postal zone as the relevant market.[20]

The median borrower in our sample is located less than 2.5 kilometers from the lending bank branch.[21] This distance seemingly hasn't increased by much since the mid-seventies (Degryse and Ongena (2004)).[22] As the number of bank branches decreased by only around 4% during the last two decades and few nationwide entries or M&As took place, local branch configurations most likely hardly changed.[23]

Our main measure of competition is the *Herfindahl – Hirschman Index* (*HHI*). This variable is widely used as a measure of concentration in the literature;[24] Petersen and Rajan (1995) for example employ the HHI as a measure of competition in their empirical work, while in Boot and Thakor (2000) the number of banks and hence by extension the HHI delineates the degree of competition in their model. We define HHI as the summed squares of bank market shares by the number of branches in each postal zone.[25] For postal zones without bank branches we set the HHI equal to one to facilitate decomposing the concentration index later in the paper (by corollary the *Number of Banks,* another competition variable introduced shortly, is also set equal to one). However, as a robustness check, we remove branchless postal zones in part of the exercises.

We also employ the total *Number of Branches* and the *Number of Banks* in each postal zone as competition measures. The former measure assumes no coordination can occur between the branches of the same bank, while the latter measure presupposes coordination effectively takes place. We invert both variables to account for the decreasing effects of additional bank branches and banks. Inversion also facilitates the interpretation of the estimated coefficients and comparisons across the competition variables, in particular with the HHI measure. Both transformed *Number* measures are bound between zero and one, with zero indicating no market concentration and one indicating maximum concentration. As some borrowers reside in postal zones without bank branches (i.e., the lending bank branch is located in another, possibly adjacent, postal zone), we add one to the *Number of Branches* before inverting (remember that for postal zones without bank branches we already set the *Number of Banks* equal to one).

D. Multi-Market Contact

The postal zone is our *a priori* chosen banking market. However, many banks are operating in more than one postal zone and often compete with other multi-location banks across zones (Barros (1999) or Park and Pennacchi (2003)). Edwards (1955) introduced the "linked oligopoly" hypothesis that predicts cross-market contacts among banks to increase the incentives for banks to collude. The hypothesis implies that banks compete less when geographical market-overlap increases. Multi-market contact facilitates anti-competitive "mutual forbearance", as the punishment for deviation from collusion becomes large (Heggestad and Roades (1978), Bernheim and Whinston (1990)),[26] and coordination between banks then fosters relationship banking as in Anand and Galetovic (2001).

However, other theoretical work points towards a possible pro-competitive effect of multi-market contact (Scott (1982)). Mester (1987), for example, presents a Cournot competition model in which banks have incomplete information about their rivals' marginal costs. As a result banks claim to have low marginal costs to sway competitors to produce less. If costs are imperfectly correlated across markets, multi-market banks have an incentive to put larger quantities on the market than the profit-maximizing level. "In markets with high concentration, control is in the hands of a few banks. Thus incentives for these [banks] to mislead other [banks] are greater since they stand to gain more" (p. 540). Similarly, but in a different setting, Park and Pennacchi (2003) show that the presence of large multi-market banks promotes local competition, in particular in highly concentrated markets.

We construct a *Multi-Market Contact* measure as proposed in Evans and Kessides (1994).[27] The variable can be defined succinctly as the sum of all bank pairs in the borrower's postal zone weighted by the relative frequency of their bilateral contacts in other postal zones. The variable is bounded between zero (banks in the postal zone have no contact elsewhere) and one (all banks in the zone have contact with all other banks across all other postal zones).

E. Distance Variables

Location may determine the degree of competition for a borrower when either borrower (Hotelling (1929); Salop (1979)) or lender (Sussman and Zeira (1995)) face transportation costs. In standard spatial models, borrowers select the closest bank and the location of the median borrower determines the intensity of competition. However, there is no distinction in these models between "relationship" and "transactional" banking, as borrowers seek only one bank product in a single period.

In *multi-product* spatial models, firms in need of multiple products may engage a single bank, most likely the closest one, in order to minimize transportation and search costs (Armstrong and Vickers (2001)). Consequently in multi-product spatial models firms close to the lender may be more likely to opt for "relationship banking" (in *scope*).

Alternatively, in *multi-period* spatial models in which borrowers can switch lender, "close" borrowers may be more likely to stay than the borrowers located farther away from their first-period lender (Dell'Ariccia (2001)). Again, close borrowers are destined to be "relationship borrowers" (now in *duration*) on the basis of their proximity to the lender. In addition, this effect may actually strengthen (Hauswald and Marquez (2003a)) if the number of local banks increases.

To control for the effects of transportation costs, we calculate the distance between the borrower and both the lending bank and the branches of all other, competing banks located in the same postal zone as the borrower. We employ both web-based MapBlast.com and PC-based MS Mappoint to track the shortest traveling time (in minutes) by car between the borrower and each bank branch (Degryse and Ongena (2004) provide details). Address recording errors, incomplete map coverage, changes in street names and borrower relocation cut in our sample. We further conservatively remove the 1-% borrowers located farthest from their lending bank and drop borrowers located in postal zones without competing banks. We end up with *Distance to Lender* and *Distance to Closest Competitors* measures for 11,222 borrowers (we call this reduced sample the "Distance sample").[28]

We transform both measures to (1 + Distance to Lender)$^{-1}$ and [1 – (1+Distance to Closest Competitors)$^{-1}$], respectively. Again, both transformations account at once for the possibly decreasing effects of distance and constrain the variables to be between zero ("around the corner from the lender") and one ("really far away from the lender") enabling easier benchmarking. For example, if both distance measures equal one, the borrower is located close to the observed lender but really far from a competing bank. Conditioning on the fact that we observe the close lender granting the loan, we expect, as in a multi-product problem or in a multi-period setting as in Dell'Ariccia (2001), that the engagement is more likely to be relationship-based. On the other hand, if both distance measures equal zero, the borrower is located far from the observed lender but really close to a competing bank. Conditioning on the fact that we observe a far-away lender granting the loan, we can expect the engagement to be transactional.

F. Control Variables

We introduce bank branch size, postal zone variables, and firm size, legal form and industry dummies in the base regressions. We include additional firm characteristics in robustness exercises.

Start with the variable *Branch Size*. Berger, Demsetz and Strahan (1999) argue that organizational diseconomies of engaging in different type of lending activities may prevent large banks from efficiently providing both transaction-based lending to large corporations and relationship-based lending to small businesses. Large hierarchical banks in Stein (2002) only succeed when information is "hard" enough to flow freely inside the bank. On the other hand, only loan officers at small banks may have the proper incentives to collect and take advantage of "soft" information (that cannot "travel" so easily up the chain of command), precisely the type of information that could be needed to advance relationship banking.[29]

We conjecture that Stein's arguments may also apply when assessing the lending activities of bank branches. Large branches may have one or two hierarchical layers. As a result, loan officers employed in large branches then are less willing to engage in the collection of soft information and relationship lending suffers. We include *Branch Size* to control for the size differences across the branches. In effect, we pursue a more stringent test of some of the "size" implications of Stein's model as all branches belong to the same bank. We measure Branch Size by the proportion of the bank's business loan portfolio at each branch (we take the number of loans at a branch over the total number of loans). There are substantial differences in Branch Size across the bank. The mean bank branch accounts for 44 loans (0.25%) while the largest branch reports 161 of all 17,776 loans

(0.91%). The smallest branch has only one business loan.

To control for regional variation in corporate demand for banking services, we introduce a set of postal zone variables that also includes eight Postal Area Dummies. The variable *Number of Firms* measures the number of registered firms in the borrower's postal zone, while the variable *Assets of Firms* averages the amount of assets of registered firms in the borrower's postal zone. Both variables are constructed using *Belfirst*. We use the database containing end-of-1994 information on 176,382 Belgian firms. We similarly construct *Industry Concentration* to measure the proportion of registered firms in the borrower's postal zone in the industry of the borrower. Finally, we introduce a dummy variable *Urban* to control for general differences between businesses located in rural and urban communities. Urban may further capture heterogeneity in information available to banks. For example, banks in urban areas may rely more on hard information while rural banks may collect more soft information (Klein (1992)). Urban equals one when the borrower is located in an agglomeration with more than 250,000 inhabitants,[30] and zero otherwise.

To control for other firm characteristics, we include two firm size,[31] four legal form and as many as 49 industry dummies (in addition to the base case). We can distinguish between Single-Person Businesses (82.8% of the sample), Small (16.0%), and Medium and Large (1.6%) Firms; and between Sole Proprietorships (82.1%), Limited Partnerships (12.1%), Limited Partnerships with Equal Sharing (1.0%), Corporations (3.9%), and Temporary Arrangements (0.9%). In the regressions, we exclude the dummies for Single-Person Businesses and Sole Proprietorships.

To control further for firm characteristics we also focus on the 9,213 (70.3%) of the borrowers that are both Single-Person Business and Sole Proprietorship (this reduced sample we call the "SPB & SP sample"), collect Age for 1,991 firms (the "Age sample"), and glean Assets, Earnings / Assets, and Short-Term Debt / Assets from *Belfirst* for 645 firms (the "Augmented sample"). We will employ each of these samples in robustness exercises. We display some key sample statistics in Table 2.

IV. Empirical Results on Bank Orientation

In this section we analyze the regressions of the dependent variable(s) measuring bank orientation on the set of competition and control variables. The correlations displayed in Table 3 between the main dependent and the discussed competition variables already indicate the direction of some of our results. We start discussing the effects of the competition variables and return to a discussion of all the control variables at the end of the section. We first discuss the results for the dependent variable Relationship Banking and turn to the alternative measures of bank orientation, i.e., Duration and Main bank in robustness checks.

A. Postal Zone Competition and Relationship Banking

1. Various Measures of Competition

Since *Relationship Banking* is a binary dependent variable, we employ a Probit model.[32] In Table 4 we report the partial derivatives, in percent, at the means and significance levels based on t-ratios for the coefficients. To conserve space we neither display partial derivatives for most of the control variables nor the standard errors.

In Model I we start with the commonly used (and previously detailed) measure of market concentration, i.e., the *Herfindahl – Hirschman Index* (*HHI*). The coefficient on this measure is statistically insignificant and economically small. For example, an increase of

0.1 in the HHI, say from a competitive (HHI < 0.10) to a “highly concentrated” (HHI > 0.18) market,[33] would only increase the probability of Relationship Banking by around 0.3%.

We replace HHI by respectively $(1 + \text{Number of Branches})^{-1}$, $(1 + \text{Number of Adjacent Branches})^{-1}$, or $(\text{Number of Banks})^{-1}$, but none of the coefficients is statistically significant or economically relevant (we chose not to tabulate the results).

In Model II we add HHI^2 to capture the non-monotonicity present in for example Dinç (2000), Anand and Galetovic (2001), or Yafeh and Yosha (2001). Both coefficients are statistically significant, though in sign opposite to the non-monotonicity predictions, and economically modest but relevant. An increase in the HHI from 0.05 to 0.50 decreases the probability of observing relationship banking by close to 5%. Replacing HHI and HHI^2 by a set of dummies that equal one if HHI is situated in a certain range and are zero otherwise yields similar results. Adding squared terms to the specifications featuring $(1 + \text{Number of Branches})^{-1}$, $(1 + \text{Number of Adjacent Branches})^{-1}$, or $(\text{Number of Banks})^{-1}$ yield statistically insignificant and economically irrelevant results.

The regressions so far left two possibly important factors determining borrower engagement unaccounted for. First, banks may take into account exactly whom their competitors are in the postal zone given contact in other postal zones, i.e., banks may care about Multi-Market Contact. Second, as argued above, proximity could encourage firms to frequent the same bank for multiple services during a longer time period.

2. Controlling for Multi-Market Contact and Distance

To control for either pro- or anti-competitive effects arising from Multi-Market Contact, we introduce the contact variable in Model III in Table 4. To control for spatial effects, we add the two distance measures in Model IV. Removing Multi-Market Contact in Model IV does not alter the results and we center our discussion on Model IV (even though it is employing a somewhat smaller sample).

The coefficients on both HHI variables remain significant and actually become substantially larger in Model IV. Figure 3 displays the resulting schedule (at the means of the other variables). The percentage probability of observing Relationship Banking is measured along the vertical axis, while HHI is on the horizontal axis. The scale on the horizontal axis is proportionate to the number of observations with particular values for HHI. Increasing HHI from 0.10 to 0.18, indicated by vertical lines in the Figure, decreases Relationship Banking by 3.1% (from 55.0 to 51.9) while increasing the HHI from 0.05 to 0.50 decreases the probability by almost 10%. We further note (jumping ahead somewhat in the discussion of the coefficients) that a 10% change is similar in magnitude to the effect of distance: a borrower located around the corner from the bank is 11.3% more likely to be engaged as a relationship customer than a borrower located far away. Consequently the effect of local market concentration (admittedly measured with some error) on relationship banking is similar to the effect of distance (probably measured more precisely) and hence the concentration effect should be assessed to be sizeable and economically relevant.

These findings confirm a key result in Boot and Thakor (2000) but are at odds with either Petersen and Rajan (1995) or the non-monotonicity predictions in Dinç (2000), Anand and Galetovic (2001), or Yafeh and Yosha (2001)). Branches seemingly engage in more relationship banking with fiercer banking competition.

At this point we also note that our findings regarding the HHI – Relationship Banking correspondence are qualitatively similar to the (somewhat stronger) non-monotonicity documented in Elsas (2004). In his paper the incidence of the Hausbank status drops from 80% to 40% as HHI increases from zero to 0.2, and then sharply increases to 100% for an HHI equal to 0.45. We conjecture that the differences in firm size and the corresponding number of bank engagements between his and our sample are responsible for this result.[34] The 11,222 firms in our "distance" sample are much smaller than the 122 firms in his sample;[35] hence our firms are possibly more opaque and may seek to engage fewer – sometimes one – banks to satisfy their credit needs.[36] As a result, an increase in the number of banks on the market may result in a smaller increase in the degree of competition for the firms in our sample than for the large firms in Elsas (2004) that had engaged many (all) banks in the local market already or had engaged only large banks.

3. Very Concentrated Markets

The substantial increase in Relationship Banking for HHI values close and equal to one requires further exploration. Replacing HHI and HHI^2 by a set of dummies that equal one if HHI is situated in a certain range and are zero otherwise (to partly neutralize the effects of these observations) yields qualitatively similar results. Similarly, the partial derivative on HHI equals -20.5** and -27.3*** respectively, if we drop HHI^2 and remove observations for HHI equal to one or larger than 0.9. Hence the derivative remains statistically significant and economically relevant in both exercises.

If Relationship Banking decreases with concentration in less concentrated markets, why then do we observe more relationship banking in very concentrated markets? Physical proximity, as pointed out earlier, could compel a firm to frequent a close-by bank for all its needs. A monopolist in a postal zone then simply satisfies this *demand* by providing all services, in particular when banks in other postal zones are far away. An increase in

Relationship Banking for high HHI values then merely affirms our a-priori choice of the postal zone as the relevant geographical market.

Alternatively, we note that Boot and Thakor (2000) predict that a monopoly bank should engage in little or no Relationship Banking. However, the monopolist bank may become an industry specialist at zero or low cost (by servicing all firms in the vicinity) and hence *supply* relationship banking nevertheless. This is not modeled in Boot and Thakor, as in their model even a monopolist incurs specialization costs (that are not a function of market structure in their model).

B. Multi-Market Contact

Next we focus on the coefficient of *Multi-Market Contact* in Model IV. Multi-Market Contact carries a positive sign, is statistically significant, and economically relevant. An increase in the variable from 0 to 0.33 (the observed range) increases the probability of observing Relationship Banking by almost 10%. However, removing both HHI variables causes the coefficient on Multi-Market Contact to become insignificant, possibly indicating the need to control for market concentration and multi-market contact simultaneously. The contact variable is significantly and negatively correlated with HHI (see Table 3), and this is partly by construction. Indeed, an increase in the number of banks in a postal zone increases the likelihood that some bank pairs also meet in another postal zone hereby increasing Multi-Market Contact. However, an increase in the number of banks also decreases market concentration as measured by HHI.

Multi-Market Contact between banks across postal zones stimulates Relationship Banking. Hence, the contact variable possibly captures a pro-competitive effect if this variable would cut in the same direction as HHI. However, to shed further light on this issue we first examine more closely what occurs at the postal zone level (following Anand and Galetovic (2001)) and then turn to interacting HHI with Multi-Market Contact (as in Mester (1987) and Park and Pennacchi (2003)).

Recall that in Anand and Galetovic (2001) only coordination between a few banks with equal market shares fosters relationship banking. To test whether the effect of concentration on Relationship Banking arises through a decrease in the number of banks or through the inequality of bank market shares, we decompose HHI in *(Number of Banks)*$^{-1}$ and *[HHI – (Number of Banks)*$^{-1}$*]*. Column 1 in Table 5 reports the splits for the Base Model. The results are remarkable and suggest that it is only the change in the number of banks, and not the change in their market shares, that is driving our results (though admittedly our measure based on the number of bank branches is rather coarse when measuring market shares). An increase in the number of banks from 3 to 37 increases the probability of Relationship Banking by 8.5% (from 40.9 to 49.4%). Consequently the observed lender seemingly doesn't coordinate with other banks at the local level in offering relationship banking (as in Anand and Galetovic (2001)).

Alternatively we decompose HHI in *(Branch Share of the Lender)*^{2} and *[HHI – (Branch Share of the Lender)*^{2}*]* to check for possible coordination between branches of the observed lender. And indeed, a variety of specifications suggest that a larger relative presence of the lender increases Relationship Banking at about the same rate as the relative presence of other lenders decreases it, though the coefficients are not always statistically significant. Taken together these results suggest that within one postal zone, branches of the lending bank may coordinate (independently) among themselves but not with the branches of the other banks present there.

Now, given the local discretion in setting loan conditions (an assessment that is as already mentioned based on formal interviews and loan rate variation), it would be surprising if the bank would succeed in coordinating with other banks at the national level to achieve relationship orientation at the local level. To test for the occurrence of national coordination versus a pro-competitive effect more directly, we interact HHI and HHI^2 with Multi-Market Contact. Mester (1987), for example, argues that if the Contact variable measures "mutual forbearance" then the Contact variable itself should have the same sign as HHI (a result we did not have so far) while the interaction terms should equal zero.

Column 2 in Table 5 tabulates the coefficients. Results are somewhat mixed. The size and also the sign of the coefficients on the interaction terms suggest no coordination takes place, but multicollinearity seemingly robs the coefficients of their significance. The coefficient on the Multi-Market Contact variable is still positive and opposite the coefficient on HHI but much smaller than in earlier specifications. To conclude, coordination may occur between branches of our bank, but none of the exercises suggests coordination takes place either locally or nationally between banks.

C. Distance Measures

Now we return to the distance measures in Model IV in Table 4. The coefficient on the transformed *Distance to Lender* is positive, statistically significant, and economically relevant, confirming either a multi-product or multi-period switching hypotheses emanating from spatial models. The probability of observing Relationship Banking for a borrower close to the Lender (i.e., $(1 + \text{Distance to Lender})^{-1} = 1$) is more than 11% higher than for a far-away borrower (i.e., $(1 + \text{Distance to Lender})^{-1} = 0$). On the other hand, the transformed *Distance to Closest Competitor* is not statistically significant.

These results are unaffected if we remove either one of the two HHI and/or Multi-Market Contact variables. Similarly, removing both distance variables in Model IV leaves the other coefficients unaffected. Hauswald suggests that we may observe more relationship banking for close-by borrowers in markets with many banks. Motivated by Hauswald and Marquez (2003a) we further interact HHI and/or HHI^2 with our distance measures. The coefficients on HHI and HHI^2 remain broadly the same in sign and magnitude, but are no longer significant. The interaction terms are insignificant as well. We suspect collinearity problems.

As an alternative, we split the sample in firms that are closer to the lender than to the closest bank competitor (we call these firms the "relatively close" firms) and those firms that are closer to the closest bank competitor than to the lender (the "relatively far" firms). The coefficients on our competition measures in both subsamples retain the same sign, significance, and magnitude. The distance measures are only significant for the firms that are "relatively far".

Taken together, these results suggest the distance variables may proxy for other factors (transportation costs as in Degryse and Ongena (2004)?) than those picked up by our postal zone and national competition measures. By introducing branch effects we will shortly (in the robustness section) corroborate that Relationship Banking and Distance are seemingly not driven jointly by an omitted variable and that Distance (marked as a complement and not a substitute to Relationship Banking) may not proxy for the intensity and ease of informational flows as in Petersen and Rajan (2002). Given the short distances involved these findings probably shouldn't come as a surprise.

To conclude, the observed lender engages more borrowers in relationship banking if many other banks (possibly with equal market shares) operate in the same postal zone or if the banks in the postal zone have multiple contacts across other postal zones. Coordination between banks does not seem to play a role in or across postal zones, such that the observed lender turns to protecting rents by engaging in relationship lending as in Boot and Thakor (2000). More relationship banking is also being observed when firms are located close to the bank.

D. Robustness Checks

1. Subsample of Single-Person Businesses and Sole Proprietorships

Model V in Table 4 focuses on the 9,213 firms that are both Single-Person Businesses (SPB) and Sole Proprietorships (SP). There are a number of reasons to believe that the possible correspondence between competition and bank orientation will appear sharpest in this subsample. First, remember that we are looking at the loan portfolio of one single bank and that we now retain just one type of firm. Consequentially, important firm characteristics potentially clouding our previous results are controlled for. Second, Single-Person Businesses / Sole Proprietorships are the smallest (possibly most opaque and locally restricted) firms that are affected most by the structure of the local banking market.

The findings in Model V confirm this expectation and strengthen our earlier results. The non-monotonicity in HHI is again economically relevant. For example, increasing HHI from zero to 0.4 decreases the probability of Relationship Banking by almost 15%, from 60 to 45%. We again replace HHI and HHI^2 by range dummies and confirm these findings.

2. Additional Independent Variables and Branch Effects

Models VI and VII in Table 4 add Age and other firm characteristics (Assets, Earnings /

Assets, Short-Term Debt /Assets) to the specification. The main results go through almost unaffected, even though the samples are substantially reduced and quite different in their composition (for example, the Distance sample contains 83% single-person businesses, 16% small and 1% medium and large firms, the Age sample only 6% single-person businesses, 89% small and 5% medium/large, and the Augmented sample 5%, 87% and 8% respectively).

We further add Multi-Market Contact^2 to Model III and all possible combinations of Multi-Market Contact^2, (1 + Distance to Lender)$^{-2}$, [1 – (1 + Distance to Closest Competitors)$^{-1}$]^2 to specifications IV to VII. Admittedly we know of little theoretical justification for doing so (hence we choose not to tabulate the results). However, the coefficients of HHI, HHI^2, Multi-Market Contact, and (1 + Distance to Lender)$^{-1}$ are virtually unaffected in significance, sign and size in all specifications and only the coefficient on the newly added (1 + Distance to Lender)$^{-2}$ becomes negative and significant at a 10% level in a few specifications.

We further replace Branch Size by random branch effects,[37] remove Industry Dummies (to avoid collinearity problems), and employ OLS to re-estimate the main specifications. Branch effects could capture omitted variables that could be correlated with bank orientation, such as branch service quality and local firm presence and/or competition (Cetorelli (2001)), for which we couldn't construct reasonable proxies. However, results are unaffected if anything they are even more "striking" in statistical significance and economic relevance.

3. Alternative Definitions of the Dependent Variable

As the duration cutoff of one year in the construction of the dependent variable

Relationship Banking was somewhat arbitrarily chosen (remember however that results in Angelini, Di Salvo and Ferri (1998) and Cole (1998) suggested a short duration cutoff), we also run all specifications with a three-year cut-off. Results are virtually unaffected.

Next we employ our other two variables capturing bank orientation, i.e., Duration and Main Bank. Elsas (2004), for example, argues that duration may be a poor proxy for the significance of the relationship; hence we employ *Main Bank* (by itself) as the dependent variable. We report the almost unaffected results in Appendix Table A1. We also estimate a Tobit model (censored at zero) with *ln(Duration of Relationship)* as the dependent variable and report the results in Table A2. Again the results are very similar to the ones reported above, seemingly contradicting the claim of non-relevancy of duration as a measure of relationship importance by Elsas (2004). We again conjecture that the differences in firm size and the corresponding number of bank relationships between his and our sample are responsible for this result. The firms in our sample are much smaller and may have fewer bank relationships. As a result, for the firms in our sample the observed duration of a relationship may capture or at least be correlated with relationship orientation.

4. *Omitted Factors*

We are further concerned that duration is affected by factors that also caused current market concentration. For example, a pool of high-quality firms in the postal zone 20 years ago may have contributed to the longevity of the observed relationships as both relationships and firms survived (on the other hand high-quality firms may have had less need for a relationship lender). But circumstances in the postal zone 20 years ago that led to the high quality of the firm pool may also have attracted other banks to set up branches there in the period since then. To deal with this pernicious problem we toss out all observations with durations exceeding 10 (7) years and rerun most specifications. Even though we loose more than one third (one half) of the sample, the competition results are almost unaffected.

E. Control Variables

Finally, we return to the coefficients on the control variables, starting with *Branch Size*. We reported the coefficient on Branch Size in all Tables discussed so far. The coefficient is almost always significant at a 1% level and economically quite relevant. The partial derivative at the means for both Relationship Banking and Main Bank varies around -14, indicating that an increase from the smallest to the largest branch (0.006 to 0.905) decreases the incidence of relationship banking by around 13%. The partials in the Duration Tobit models (Table A2) suggest an equivalent decrease by around 3 years in the length of the observed relationship for a similar increase in branch size. Hence, *ceteris paribus*, larger bank branches pursue more transactional banking.

Berger, et al. (2002) document that larger banks have less exclusive and shorter relationships than smaller banks. To make our results better comparable to theirs, we replace Branch Size by *ln(Branch Loan Volume)* defined as the natural logarithm of the loan portfolio of the branch in 1000s of US$ (they employ the log of bank assets). We estimate logit and OLS models with Relationship Banking and ln(1 + Duration of Relationship) as the dependent variables and report the results in the Table 6. For easy comparison we also tabulate their results (in the shaded columns). The resulting coefficients are comparable in magnitude, for duration as the dependent variable but not for Main Bank as the dependent variable. However, notice that the definition of their scope variable (dummy = 1, if only lender) differs from our Relationship Banking variable.

Coefficients on the other control variables are reported in Table A3 in the Appendix. We report the representative coefficients from Model IV, VI, and VII. None of the four postal zone coefficients are consistent in sign, size, or statistical significance. The legal form dummies in Model IV are highly significant. Banks engage Sole Proprietorships less likely in a Relationship and profitable firms more likely, possibly because of bankruptcy risks. As such the specifications highlights the need to control carefully for firm characteristics, as we do in Models V to VII.

V. Empirical Results on Bank Industry Specialization

Next we analyze the regressions of the dependent variable(s) measuring bank industry specialization on the same set of competition and control variables.

A. Competition and Industry Specialization

We first employ ordinary least squares. The dependent variable, *Industry Specialization*, is by construction always larger than zero, but it is censored at 100. However, as the variable is equal to 100 for only 19 borrowers we disregard this minor censoring issue. We follow the same line-up of exercises as for bank orientation and report the results in Table 7. Overall our results indicate that market concentration is hardly economically relevant in explaining industry specialization and that any reported statistical relationship is weak and seemingly not robust to model alterations.

We start by focusing on the full sample. In Model I in Table 7, we introduce *HHI* as the measure for concentration. The coefficient turns out to be both statistically and economically insignificant. Theory suggests potential non-monotonicity; hence, we incorporate HHI^2 in Model II. The results remain insignificant providing no evidence in favor of banks specializing in an industry when competition is high (Dell'Ariccia and Marquez (2003)) or intermediate (Boot and Thakor (2000)). Model III in Table 7 incorporates the *Multi-Market Contact* variable. If more contact implies a pro-competitive effect, Boot and Thakor (2000) hypothesize less industry specialization should be observed, whereas according to Dell'Ariccia and Marquez (2003) more industry specialization should be observed. Our empirical results are in line with the former suggesting that more competition leads to less specialization. But the effects seem rather modest. For example, an increase in the contact variable from 0 to 0.33 (minimum to maximum) decreases Industry Specialization by around 3% (Industry Specialization has a mean of 18.2%).

We again arrive at our Base Model (IV) by incorporating the two distance measures. Our transformed *Distance to Lender* is again statistically significant, but only at a 10% level, and negative. The closer the borrower the less specialization we observe. But the effects also seem modest. Industry Specialization for a close borrower is only 1.4% lower than for a borrower far away. The transformed *Distance to Closest Competitors* is not significant.

The Base Model also suggests a concave relationship between HHI and specialization, but the coefficients are seemingly small. Figure 4 plots the resulting schedule (at the means of the other variables) using a similar setup as in Figure 3. An increase in HHI from 0.10 to 0.18 (the vertical lines marking the regions with varying degree of competition), for example, increases industry specialization by only 0.4% (from 17.8 to 18.3%). Figure 4 broadly confirms that competition reduces industry specialization at the branch level, but also suggests small economic relevance.

To conclude, the branches of the analyzed bank engage somewhat fewer borrowers in the same industry if local market concentration decreases or when banks in the postal zone have more contacts across other postal zones. Branches possibly reduce industry specialization as competition intensifies. But the effects seem at best rather modest, both in terms of statistical significance and economic relevance. Less industry specialization is also being observed when firms are located closer to the bank. In that case, industry specialization may become less prevalent because borrowers are less discriminate about their choice of bank branch.

B. Robustness Checks and Control Variables

In Model V in Table 7 we again restrict the sample to the 9,213 firms that are both Single-Person Businesses (SPB) and Sole Proprietorships (SP). However, we continue to assume that Industry Specialization is based on the entire loan portfolio of the branch. As expected (as these firms are possibly more opaque), results are statistically somewhat more significant and economically relevant. Next we add Age in Model VI and other Firm Characteristics in Model VII. Now all coefficients on the Competition variables become insignificant confirming our earlier assessments of relatively weak statistical significance.

In Boot and Thakor (2000) competition affects bank industry specialization only for *relationship borrowers*. We run all models on the set of borrowers we identified as relationship borrowers, (i.e., Relationship Banking = 1). We first assume that industry specialization should be measured only for the portfolio containing these relationship borrowers. Appendix Table A4 contains the results. Most coefficients are similar in sign and size, but somewhat less statistically significant. Next we measure industry specialization for the entire loan portfolio of the branch (assuming some positive knowledge spillovers from transactional lending) and re-run all seven models for the same sets of relationship borrowers as in Table A4. Results are virtually unaffected and we choose not to tabulate them.

Next we are concerned about overweighing industry specialization by large branches (by definition many borrowers belong to those industries that large branches specialize in). We weigh all observations by the inverse of the number in each industry – branch group. None of the coefficients on the competition variables are statistically significant or economically relevant any longer indicating that only large branches adjust their degree of specialization in their focused industries somewhat to competition. This interpretation may also explain the percentage-wise small adjustments we pick up.

Our “linear” industry specialization measure may further fail to accommodate for the possible presence of fixed specialization costs and/or learning. We take the natural log of Industry Specialization and rerun all OLS and WLS exercises. Results are qualitatively unaffected.

Finally, we discuss the control variables. The coefficient on *Branch Size* is always negative, significant, and economically relevant in Table 7. Increasing Branch Size from the smallest to the largest branch decreases Industry Specialization by around 6.5% to 12.5%. The other control variables are hardly statistically significant (see Table A3)

VI. Conclusion

Are competition and relationships necessarily inimical? We addressed this issue employing a unique data set containing detailed information on both bank-firm relationships and the local banking market structure. Interbank competition seemingly affects bank orientation and to a much lesser extent bank industry specialization. Fiercer competition results in more relationship banking (in most observed cases) and somewhat less industry specialization. Borrowers located closer to the bank branch are more likely to consume other bank services and to be engaged over a longer time period. Finally, larger bank branches lend substantially more on a transactional basis but are less likely to be specialized in particular industries.

Taken at face value these results cannot reject hypotheses proposed by Boot and Thakor (2000), among others, suggesting competition and relationships are not necessarily inimical. However the results seem at odds with insights and results by for example Petersen and Rajan (1995). Reconciling both sets of hypotheses and results seems a natural but challenging task for future research.

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FIGURE 1. THEORETICAL PREDICTIONS

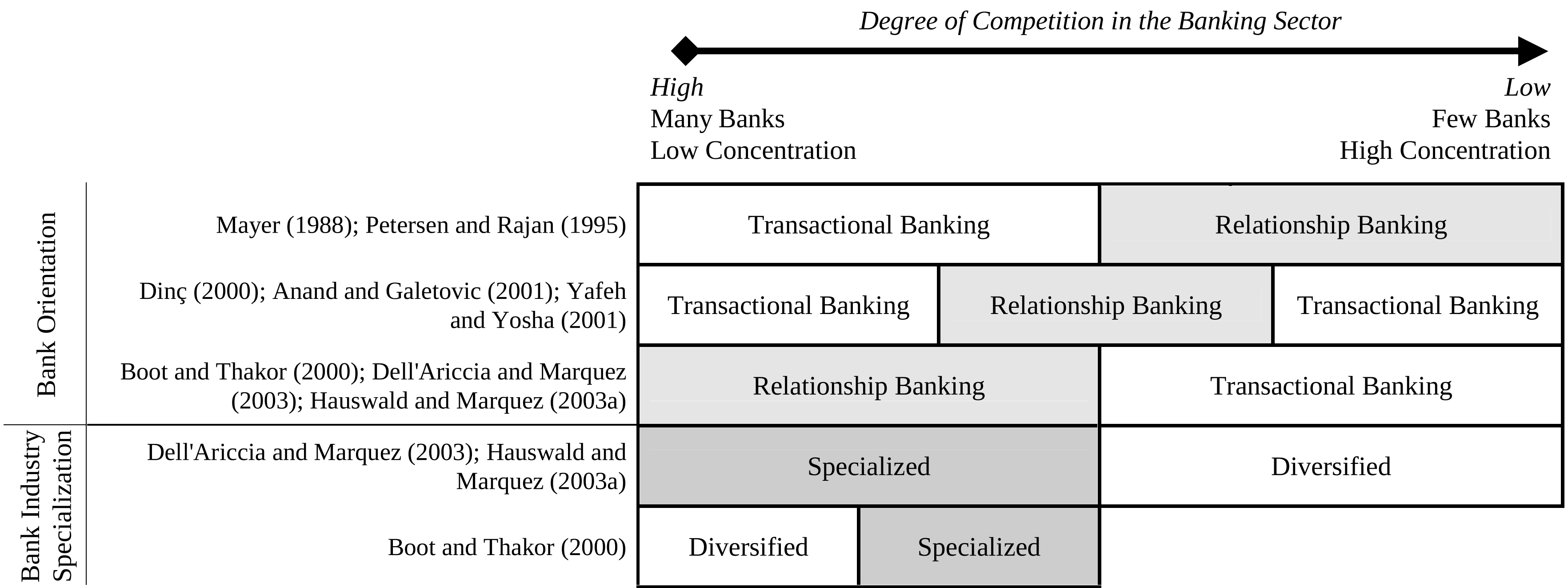

FIGURE 2. EMPIRICAL FINDINGS ON COMPETITION AND BANK ORIENTATION

Paper	Sample	*Degree of Competition in the Banking Sector*: *High* → *Low*		
Local Markets		0 — HHI in Local Market for Deposits — 1		
Petersen and Rajan (1995)	US NSSBF 3,404 Small Firms 1988	Transactional Banking	Relationship Banking: Lower loan rate & more early trade credit discounts taken (= more bank credit available) by young firms	
Black and Strahan (2002)	US Dun & Bradstreet 823 State / Years 1976-1994	Relationship Banking: Probability of business formation.	Transactional Banking	
		0 — HHI in Local Market, by Number of Bank Branches — 1		
Fischer (2000)	Germany IfO 403 Firms 1996	Transactional Banking	Relationship Banking: More information transfer & more credit	
Elsas (2004)	Germany IfK-CFS 122 Firms 1992-1996	Relationship Banking: Higher % of Hausbank status	Transactional Banking	Relationship Banking: Higher % of Hausbank status

Figure 3: Bank Market Concentration and Bank Orientation

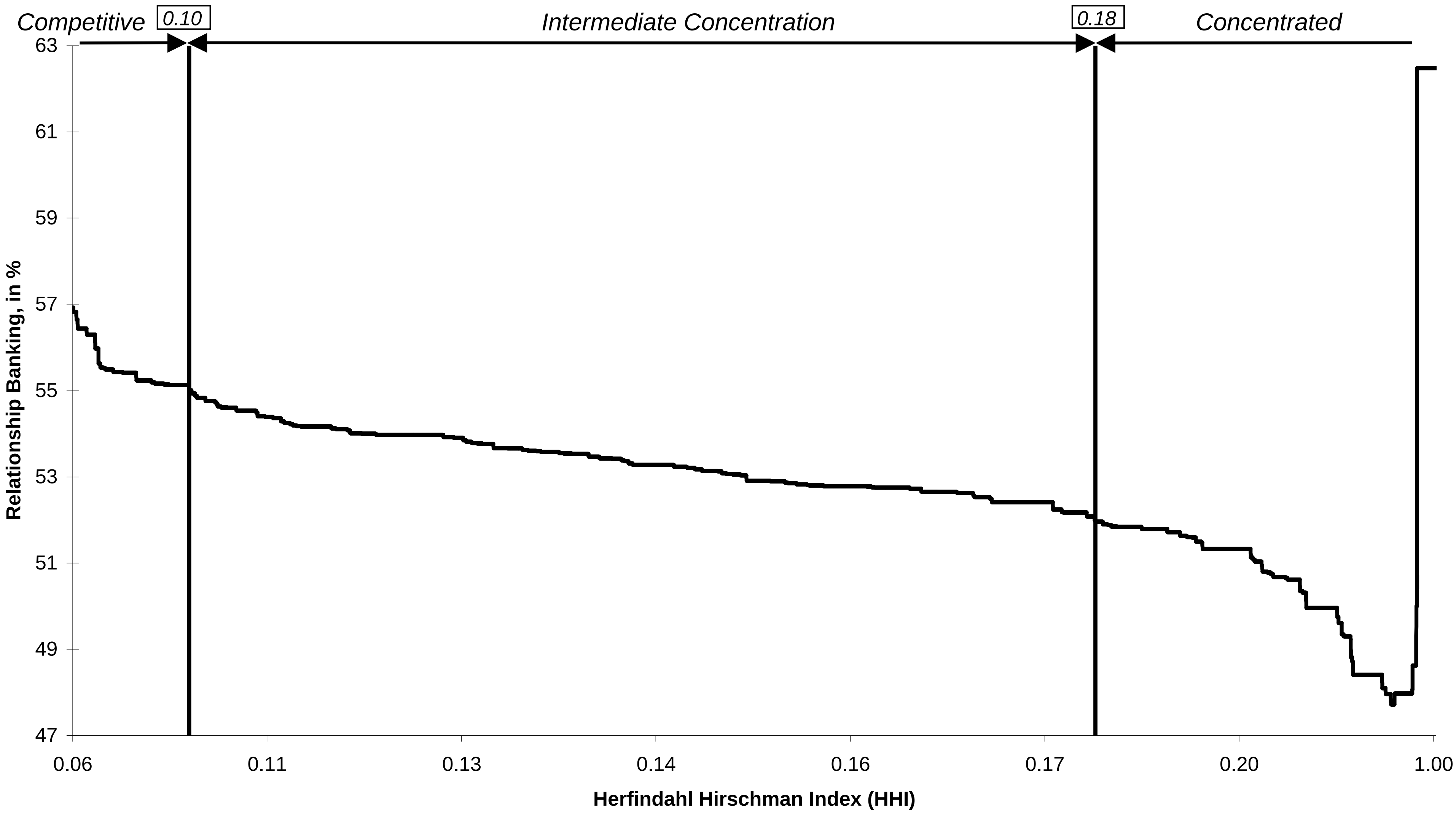

Figure 4: Bank Market Concentration and Bank Industry Specialization

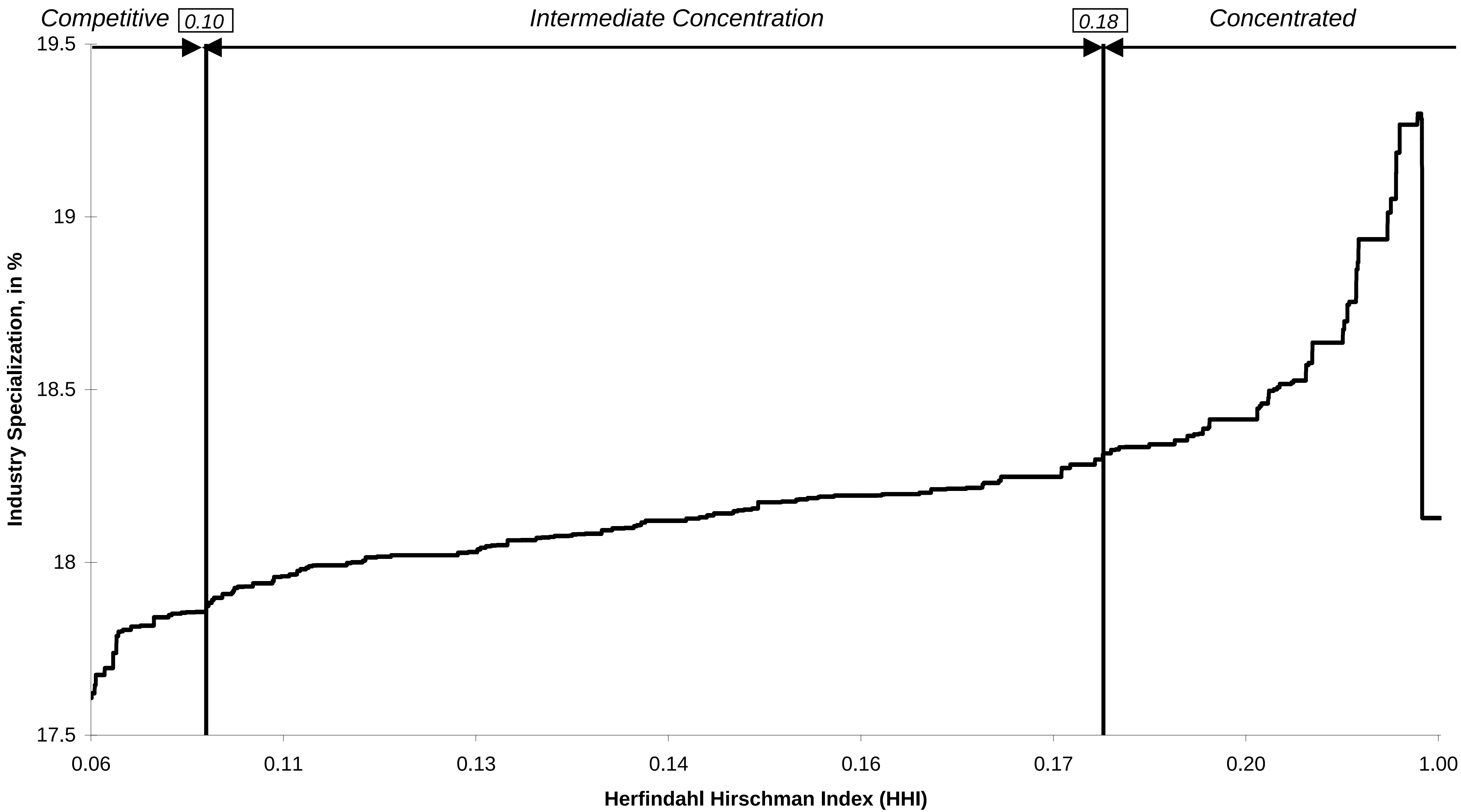

TABLE 1. DATA DESCRIPTION

Obs is the number of observations. [a] The definition used by the bank to determine whether it is the main bank is: for Single-Person Businesses and Small Firms, have a "turnover" on the current account of at least BEF 100,000 per month and buy at least two products from that bank. [b] We set HHI = 1 and (Number of Banks)$^{-1}$ = 1 if the Number of Branches = 0. [c] 40 Belgian Francs (BEF) are approximately equal to 1 Euro. [d] The dummies for Single-Person Businesses and Sole Proprietorships are suppressed in the regressions, hence not included in the Table.

Variables	Definition	# Obs	Mean	St.dev	Min	Max
Dependent Variables						
Relationship Banking	= 1 if the length of the relationship with the borrower exceeds one year and if the bank considers itself as main bank,[a] in percent	13,098	52.4	49.9	0	100
Duration of Relationship	Length of relationship with current lender, in years	13,098	7.8	5.5	0	26.3
Main Bank	= 1 if bank considers itself as main bank,[a] in percent	13,098	54.3	49.8	0	100
Industry Specialization	Proportion of branch loan portfolio in industry of borrower, in percent	13,098	18.2	13.9	0.6	100
	ln(1 + Duration of Relationship)	13,098	1.9	0.8	0.0	3.3
Competition Variables						
Number of Branches	Number of bank branches in borrower's postal zone	13,098	16.4	15.6	0	103
Number of Adjacent Branches	Number of bank branches in borrower's and adjacent postal zones	13,098	70.9	47.1	0	471
Number of Banks	Number of banks in borrower's postal zone	13,098	8.3	4.8	0	37
HHI	Herfindahl – Hirschman Index, i.e. the summed squares of bank market shares by number of branches in borrower's postal zone	13,098	0.205	0.194	0.057	1[b]
Multi-Market Contact	Sum of the bank pairs in borrower's postal zone weighted by the relative frequency of their bilateral contacts in other postal zones (see Appendix).	13,098	0.174	0.080	0	0.335
	(1 + Number of Branches)$^{-1}$	13,098	0.123	0.178	0.009	1
	(1 + Number of Adjacent Branches)$^{-1}$	13,098	0.047	0.175	0.001	1
	(Number of Banks)$^{-1}$	13,098	0.183	0.199	0.027	1[b]
	HHI^2	13,098	0.079	0.214	0.003	1
	HHI – (Number of Banks)$^{-1}$	13,098	0.021	0.023	0	0.875
	(Number of Banks)$^{-2}$	13,098	0.073	0.214	0.000	1[b]
	[HHI – (Number of Banks)$^{-1}$]^2	13,098	0.001	0.010	0	0.765
	(Number of Banks)$^{-1}$ [HHI – (Number of Banks)$^{-1}$]	13,098	0.002	0.004	0	0.140

Distance Variables						
Distance to Lender	Shortest traveling time, in minutes	11,222	6.7	7.2	0	51
Distance to Closest Competitors	Shortest traveling time to closest quartile competitor in borrower's postal zone, in minutes	11,222	3.7	2.3	0	24
	$(1 + \text{Distance to Lender})^{-1}$	11,222	0.223	0.151	0.019	1
	$1 – (1 + \text{Distance to Closest Competitors})^{-1}$	11,222	0.734	0.148	0	0.960
Bank Branch Characteristic						
Branch Size	Proportion of bank loan portfolio at the bank branch, in percent	13,098	0.249	0.152	0.006	0.905
Postal Zone Variables	Including 8 Postal Area Dummies					
Number of Firms	Number of registered firms in the borrower's postal zone, in thousands	13,098	0.749	0.891	0.002	6.103
Assets of Firms	Average amount of assets of registered firms in the borrower's postal zone, in billions of BEF[c]	13,098	0.068	0.131	0.000	3.739
Industry Concentration	Proportion of registered firms in borrower's postal zone in industry of borrower, in percent	13,098	1.9	3.4	0	66.6
Urban	= 1 if located in agglomeration > 250,000 inhabitants, in percent	13,098	9.9	29.8	0	100
Firm Dummies[d]	Including 49 Industry Dummies					
Small Firm	= 1 if < 10 employees and turnover < 250 million BEF,[c] in percent	13,098	16.0	36.7	0	100
Medium and Large Firm	= 1 if > 10 employees or turnover > 250 million BEF,[c] in percent	13,098	1.2	11.1	0	100
Limited Partnership	= 1 if firm is limited partnership, in percent	13,098	12.1	32.6	0	100
Limited Partnership w/ ES	= 1 if firm is limited partnership with equal sharing, in percent	13,098	1.0.	10.3	0	100
Corporation	= 1 if firm is corporation, in percent	13,098	3.9	19.4	0	100
Temporary Arrangement	= 1 if firm is a temporary arrangement, in percent	13,098	0.9	9.5	0	100
Firm Characteristics						
Age	in years	1,991	16.4	24.3	0	96.2
Assets	in billions of BEF[c]	645	0.014	0.049	0.000	0.878
Earnings / Assets	in percent	645	0.117	0.148	-0.528	1.252
Short-Term Debt / Assets	in percent	645	0.406	0.216	0.001	0.957

TABLE 2. SAMPLES' CHARACTERISTICS

Sample	All	Distance	SPB & SP	Age	Augmented
Number of Observations	13,098	11,222	9,213	1,991	645
Number of Postal Zones	922	737	717	509	309
Average Relationship Banking, in %	52.4	53.0	51.4	60.5	65.7
Average Industry Specialization, in %	18.2	18.1	18.7	15.7	15.6

TABLE 3. CORRELATION TABLE

The number of observations is 13,098 in the area (1) – (6) and 11,222 elsewhere. *, **, and *** = significant at 10%, 5% and 1% level, using Pearson-correlation.

		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Relationship Banking	(1)	0.963***	0.361***	0.041***	-0.010	-0.003	0.003	0.034***	0.008
ln(Duration of Relationship)	(2)	1	0.291***	-0.020**	-0.030***	-0.023***	0.028***	0.098***	0.014
Main Bank	(3)		1	0.043***	-0.007	-0.001	0.003	0.027***	0.009
Industry Specialization	(4)			1	0.016*	0.011	-0.006	-0.026***	0.023**
HHI	(5)				1	0.980***	-0.286***	-0.180***	-0.046***
HHI^2	(6)					1	-0.420***	-0.149***	-0.017*
Multi-Market Contact	(7)						1	-0.045***	-0.153***
$(1+\text{Distance to Lender})^{-1}$	(8)							1	-0.281***
$1-(1+\text{Distance to Closest Competitors})^{-1}$	(9)								1

TABLE 4. BANK ORIENTATION

The dependent variable is Relationship Banking. The definition of the variables can be found in Table 1. The table reports the partial derivatives at the means, in percent , from binary Probit models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships. The Pseudo R squared is calculated as in Zavoina and McElvey (1975).

Model	I	II	III	IV	V	VI	VII
Sample	All	All	All	Distance	SPB & SP	Age	Augmented
Number of Observations	13,098	13,098	13,098	11,222	9,213	1,991	645
HHI	3.1	-23.1*	-44.8***	-56.0***	-64.3***	-52.8	-118.1*
HHI^2		23.8**	46.0***	64.1***	67.4***	72.2*	158.7**
Multi-Market Contact			17.5*	28.0***	26.4**	47.4**	112.8***
$(1+\text{Distance to Lender})^{-1}$				11.3***	12.6***	11.9	33.0**
$1 – (1 + \text{Distance to Closest Competitors})^{-1}$				3.8	2.6	12.1	8.3
Branch Size	-14.3***	-14.9***	-14.3***	-13.7***	-11.7***	-27.7***	-11.4
Postal Zone Variables and Constant	#	#	#	#	#	#	#
Firm Size and Legal Form Dummies	#	#	#	#			
Industry Dummies	#	#	#	#	#		
Age						#	
Firm Characteristics							#
Pseudo R squared	0.406	0.406	0.406	0.406	0.404	0.392	0.404

TABLE 5. BANK ORIENTATION AND COORDINATION

The dependent variable is Relationship Banking. The definition of the variables can be found in Table 1. The table reports the partial derivatives at the means, in percent , from binary Probit models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships. The Pseudo R squared is calculated as in Zavoina and McElvey (1975).

	Model IV Anand and Galetovic (2001)	Model IV Mester (1987)
Sample	Distance	Distance
Number of Observations	11,222	11,222
(Number of Banks)$^{-1}$	-66.4***	
HHI – (Number of Banks)$^{-1}$	-21.7	
(Number of Banks)$^{-2}$	75.5***	
[HHI – (Number of Banks)$^{-1}$]^{2}	286.9	
(Number of Banks)$^{-1}$ [HHI – (Number of Banks)$^{-1}$]	11.1	
HHI		-53.5
HHI^{2}		62.2*
Multi-Market Contact	35.9***	13.4
HHI * Multi-Market Contact		118.3
HHI^{2} * Multi-Market Contact		-224.1
(1+Distance to Lender)$^{-1}$	11.2***	11.4***
1 – (1 + Distance to Closest Competitors)$^{-1}$	3.2	3.9
Bank Branch Characteristic		
Branch Size	-13.6***	-13.6***
Postal Zone Variables and Constant	#	#
Firm Size and Legal Form Dummies	#	#
Industry Dummies	#	#
Pseudo R squared	0.406	0.406

TABLE 6. BRANCH LOAN VOLUME

The dependent variable is Only Lender, Relationship Banking, or ln(1 + Duration of Relationship). Ln(Bank Asset Size) is the log of bank assets, in 1000s of US$. Ln(Branch Loan Volume) equals the natural logarithm of the loan portfolio of the branch, in 1000s of US$. The definition of the other variables can be found in Table 1. The table reports the coefficients from binary Logit and OLS models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. BMPRS: Berger, et al. (2002); SPB & SP: Single-Person Businesses and Sole Proprietorships. Goodness-of-fit measures: [a] Adjusted R squared, [p] Pseudo R squared, for IV as in Zavoina and McElvey (1975).

Model	BMPRS Table 6	IV	BMPRS Table 5	IV
Dependent Variable	Only Lender	Relationship Banking	Duration of Relationship	Duration of Relationship
Model Estimation	Logit/IV	Logit	IV	OLS
Sample		SPB & SP		SPB & SP
Number of Observations	1,131	11,222	1,131	11,222
HHI	-0.242	-2.263***	0.408*	-1.076***
HHI^2		2.597***		1.021***
Multi-Market Contact		1.236***		0.626***
$(1+\text{Distance to Lender})^{-1}$		0.497***		0.410***
$1-(1 + \text{Distance to Closest Competitors})^{-1}$		0.162		0.166***
ln(Bank Asset Size)	-0.526***		-0.150***	
ln(Branch Loan Volume)		-0.037		-0.070***
Postal Zone Variables and Constant		#		#
Firm Size and Legal Form Dummies		#		#
Industry Dummies		#		#
Other variables in BMPRS	#		#	
Goodness-of-fit measure	0.067[p]	0.406[p]	0.348[p]	0.106[a]

TABLE 7. BANK INDUSTRY SPECIALIZATION

The dependent variable is Industry Specialization. The definition of the variables can be found in Table 1. The table reports the coefficients from ordinary least squares models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships.

Model	I	II	III	IV	V	VI	VII
Sample	All	All	All	Distance	SPB & SP	Age	Augmented
Number of Observations	13,098	13,098	13,098	11,222	9,213	1,991	645
HHI	0.2	-1.6	7.4**	7.3*	9.4**	5.0	-0.5
HHI^2		1.7	-7.5**	-6.4	-8.1*	-0.8	3.8
Multi-Market Contact			-9.0***	-5.0**	-6.4**	2.2	7.0
$(1+\text{Distance to Lender})^{-1}$				-1.4*	-1.5*	-1.6	-4.9
$1 - (1 + \text{Distance to Closest Competitors})^{-1}$				1.1	1.1	1.2	-0.0
Branch Size	-8.7***	-8.7***	-14.0***	-8.1***	-7.2***	-10.3***	-10.5***
Postal Zone Variables and Constant	#	#	#	#	#	#	#
Firm Size and Legal Form Dummies	#	#	#	#			
Industry Dummies	#	#	#	#	#		
Age						#	
Firm Characteristics							#
Adjusted R squared	0.385	0.385	0.385	0.397	0.386	0.026	0.038

TABLE A1. BANK ORIENTATION: MAIN BANK

The dependent variable is Main Bank. The definition of the variables can be found in Table 1. The table reports the partial derivatives at the means, in percent , from binary Probit models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships. The Pseudo R squared is calculated as in Zavoina and McElvey (1975).

Model	I	II	III	IV	V	VI	VII
Sample	All	All	All	Distance	SPB & SP	Age	Augmented
Number of Observations	13,098	13,098	13,098	11,222	9,213	1,991	645
HHI	4.0	-18.9	-45.5***	-58.4***	-65.0***	-66.4*	-134.4**
HHI^2		20.9*	48.1***	68.6***	70.0***	86.6**	170.4***
Multi-Market Contact			21.4**	34.0***	30.1***	58.8***	114.1***
$(1+\text{Distance to Lender})^{-1}$				9.6***	10.3***	12.5	32.0**
$1 – (1 + \text{Distance to Closest Competitors})^{-1}$				3.9	2.9	10.4	8.6
Branch Size	-13.8***	-14.3***	-13.6***	-14.2***	-11.7***	-29.2***	-7.9
Postal Zone Variables and Constant	#	#	#	#	#	#	#
Firm Size and Legal Form Dummies	#	#	#	#			
Industry Dummies	#	#	#	#	#		
Age						#	
Firm Characteristics							#
Pseudo R squared	0.408	0.408	0.408	0.409	0.403	0.386	0.400

TABLE A2. BANK ORIENTATION: DURATION OF RELATIONSHIP

The dependent variable is ln(Duration of Relationship). The definition of the variables can be found in Table 1. The table reports the partial derivatives at the means from Tobit models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships.

Model	I	II	III	IV	V	VI	VII
Sample	All	All	All	Distance	SPB & SP	Age	Augmented
Number of Observations	13,098	13,098	13,098	11,222	9,213	1,991	645
HHI	-0.0	-0.6***	-1.2***	-1.0***	-1.2***	-0.6	-1.6*
HHI^2		0.6***	1.1***	0.9***	1.1***	0.7	1.9**
Multi-Market Contact			0.4***	0.6***	0.7***	0.7**	1.6***
$(1+\text{Distance to Lender})^{-1}$				0.4***	0.4***	0.5***	0.9***
$1 - (1 + \text{Distance to Closest Competitors})^{-1}$				0.1***	1.7***	0.2*	0.2
Branch Size	-0.4***	-0.4***	-0.4***	-0.3***	-0.4***	-0.1	-0.1
Postal Zone Variables and Constant	#	#	#	#	#	#	#
Firm Size and Legal Form Dummies	#	#	#	#			
Industry Dummies	#	#	#	#	#		
Age						#	
Firm Characteristics							#
Adjusted R squared (of equivalent OLS)	0.101	0.102	0.103	0.105	0.041	0.051	0.050

TABLE A3. CONTROL VARIABLES

The dependent variable is Relationship Banking (RB) or Industry Specialization (IS). The definition of the variables can be found in Table 1. The table reports the partial derivatives at the means, in percent , from binary Probit models (RB), or the coefficients from ordinary least squares models (IS). *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships.

Model	IV	VI	VII	IV	VI	VII
Dependent Variable	RB	RB	RB	IS	IS	IS
Sample	Distance	Age	Augmented	Distance	Age	Augmented
Number of Observations	11,222	1,991	645	11,222	1,991	645
Competition Variables	#	#	#	#	#	#
Bank Branch Characteristic	#	#	#	#	#	#
Postal Area Dummies and Constant	#	#	#	#	#	#
Industry Dummies	#			#		
Number of Firms	1.1	-0.0	5.7**	0.1	-0.3	-0.8
Industry Concentration	-32.7	80.6**	-12.3	-6.1	31.6***	58.1***
Assets of Firms	-3.0	-8.2	6.0	-0.0	1.2	2.0
Urban	1.1	10.0**	26.6	2.0***	3.7***	7.8***
Small Firm	-8.0			0.2		
Medium and Large Firm	-7.0			0.2		
Limited Partnership	16.1***			-0.2		
Limited Partnership w/ ES	23.0***			-1.2		
Corporation	17.2***			-0.6		
Temporary Arrangement	12.5*			-0.1		
Age		-0.0	-0.1*		-0.2*	-0.0
Assets			-27.8			-7.5
Earnings / Assets			31.2**			-2.0
Short-Term Debt / Assets			-12.9			1.2

TABLE A4. BANK INDUSTRY SPECIALIZATION: RELATIONSHIP LOANS

The dependent variable is Industry Specialization (in the set of Relationship Loans only). The definition of the variables can be found in Table 1. The table reports the coefficients from ordinary least squares models. *, **, and *** = significant at 10%, 5% and 1% level, two-tailed. SPB & SP: Single-Person Businesses and Sole Proprietorships.

Model	I	II	III	IV	V	VI	VII
Sample	All	All	All	Distance	SPB & SP	Age	Augmented
Number of Observations	6,874	6,874	6,874	5,953	4,738	1,206	424
HHI	1.7	-0.4	17.8	7.4	13.1	2.4	2.8
HHI^2		1.1	-16.6	-5.2	-11.3	6.4	0.5
Multi-Market Contact			-13.8**	-7.4	-10.6**	-1.3	5.7
$(1+\text{Distance to Lender})^{-1}$				-4.8***	-3.8**	-9.9**	-7.5
$1 - (1 + \text{Distance to Closest Competitors})^{-1}$				1.8	1.6	3.8	2.2
Branch Size	-17.8***	-17.8***	-18.1***	-22.4***	-20.0***	-24.7***	-18.2***
Postal Zone Variables and Constant	#	#	#	#	#	#	#
Firm Size and Legal Form Dummies	#	#	#	#			
Industry Dummies	#	#	#	#	#		
Age						#	
Firm Characteristics							#
Adjusted R squared	0.616	0.616	0.617	0.303	0.285	0.040	0.030

NOTES

[1] See also Aoki (1994). Sabani (1993) and Schnitzer (1999) offer early critical discussions of Mayer's hypothesis. In Chan, Greenbaum and Thakor (1986) bank competition undermines the reusability of screening information, bank rents, and the quality of bank assets, but does not reduce the availability of credit. In Caminal and Matutes (2002) bank market power has an ambiguous impact on bank failure rates. See also the application in Park, Brandt and Giles (2003).
[2] Similar aggregate effects of the externalities in information production are present in Lang and Nakamura (1989).
[3] As already pointed out, market power is exogenous in Petersen and Rajan (1995) and the crucial information asymmetry is between borrowing firms and banks. Firms initially know their own quality, but banks do not. Banks learn the borrowers' type over time. In contrast Fischer (1990), Rajan (1992), Sharpe (1990), and von Thadden (2004) highlight the information asymmetry between banks to model endogenous informational monopoly power. By lending repeatedly "inside" banks gather proprietary repayment information. The resulting informational advantage vis-à-vis "outside" competing banks leads to some degree of monopoly power over the borrowing firms. Two points are worth noting. First, bank relationships arise endogenously in these models, even in perfectly competitive banking markets (as a fraction of the firms decides to stay with the current bank). Second, "learning by lending" does not require relationship specific investments, as in Anand and Galetovic (2001) a model we discuss shortly.
In Dell'Ariccia (2001) banks combine market power from product differentiation (exogenous) with informational monopoly power (endogenous). The contours of the informational asymmetry *per se* determine both the choice of banking type and the resulting market structure. Abatement in the informational problem in his model may lead to more banks operating in the market and more transactional banking, resulting in a similar correspondence (though not causality) between market structure and banking choice as in Petersen and Rajan (1995). More product differentiation on the other hand leads, for a given number of banks, to more price discrimination in the second period and higher loan rates in the first period.
[4] Fiercer interbank competition also results in more relationship lending in Banerjee (2002), Schmeits (2002), Dell'Ariccia and Marquez (2003), and Hauswald and Marquez (2003a). Similarly, more competition fosters renegotiation of contracts in Berlin and Butler (2002).
[5] See also Anand and Galetovic (2000) and Anand and Galetovic (2002).
[6] Hauswald and Marquez (2003b), Schargrodsky and Sturzenegger (2000), and Stomper (2003) investigate how changes in technology and banking regulation may affect bank industry specialization and interbank competition.
[7] Recent work by Zarutskie (2003), 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 (2003). 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.
[8] Cetorelli (2001), Cetorelli and Strahan (2003), 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.
[9] 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.

[10] H<0 indicates a monopoly, while H=1 indicates perfect competition.

[11] 549 bank branches lend to firms located in 921 out of 1,168 postal zones. The concentration index of the number of loans (sum of shares squared) is 22 (equal shares would yield an index equal to 9).

[12] NACE is the European industrial classification system subdividing industries. The industry concentration index across the 50 industries is around 1,200 (equal shares would result in an index equal to 200).

[13] The *intensity* of the relationship, reflected in for example the frequency of loan rollovers, could be a relationship dimension usefully separable from *scope* (Bodenhorn (2003)). *Trust* or *quality*, build on personal contacts between the loan officer and the entrepreneur, could also be relevant (Harhoff and Körting (1998); Lehmann and Neuberger (2001)).

[14] Banks may obtain an important informational advantage from observing turnover on checking accounts (Nakamura (1993), Vale (1993), Mester, Nakamura and Renault (2002)).

[15] We use Belgian Francs (BEF) throughout the paper but indicate equivalent amounts in Euros. Belgium switched to the Euro on January 1st, 1999.

[16] Hence the measure is also partially endogenous. Given that most loan portfolios contain more than a few dozen loans, we conjecture this econometric problem is relatively small.

[17] The Annual Report of the *Belgian Bankers Association* reports 7,668 branches. We consolidate multiple branches of the same bank at the same address.

[18] Belgium covers 30,230 sq km in land surface (source: *CIA Factbook 1995*).

[19] See for example Hannan (1991) for the U.S. and Sapienza (2002) for Italy.

[20] An incorrect *a priori* choice of the relevant geographical market cuts against finding significant results for the simple reason that with inappropriate market delineation we expect the resulting "markets" not to be relevant in determining competitive conditions.

[21] However firms are also influenced by other branch (convenience and hours of operation), bank (reputation, quality and reliability) and relationship (personal or long-term) characteristics when choosing a particular bank branch (Elliehausen and Wolken (1990); Binks and Ennew (1997)). For example, the lending bank is located closer than the closest competitor in 44% of the borrower contract cases in the sample, making distance the dominant bank (product) characteristic for only a sizeable minority of the borrowers in Belgium.

[22] Buch (2004) and Corvoisier and Gropp (2001) finds similar evidence for other European countries. This evidence contrasts with studies showing that U.S. bank branch – borrower distance has grown considerably (Cyrnak and Hannan (2001); Petersen and Rajan (2002)).

[23] Banking consolidation through a number of major within-market mergers took place at the end of the nineties.

[24] Berger, et al. (2004) succinctly reviews the literature on measuring competition in banking. See Dick (2002) and Dick (2003) for recent examples of structural approaches.

[25] U.S. bank concentration studies always use deposit market shares. However, Fischer (2001) also employs branch market shares for Germany and shows that for U.S. Metropolitan Statistical Areas the "branch HHI" is highly correlated with the "deposit HHI".

[26] Pilloff (1999) finds a positive but economically small effect of multi-market contact on U.S. bank profitability, except for a group of large banks for which the effect becomes somewhat meaningful.
[27] We consolidate the branches in 104 banks (sometimes banks comprise distinctly incorporated sets of branches in Brussels, Flanders, and Wallonia). There are 837 postal zones with bank branches. Let D_{ij} = 1 if bank i operates in postal zone j, and = 0 otherwise, for i = 1, …, 104; j = 1, …, 837. Let $a_{kl} = \sum_{j=1}^{837} D_{kj} D_{lj}$, and f_j: the number of different banks offering service in postal zone j.

The Multi-Market Contact measure is then defined as: $MMC_j = \frac{2}{837\, f_j(f_j - 1)} \sum_{k=1}^{104} \sum_{l=k+1}^{104} a_{kl} D_{kj} D_{lj}$.
[28] We actually employ the distance to the *quartile* closest competitor. The quartile closest competitor is the bank branch with the 25-percentile traveling time located in the same postal zone as the borrower. We select this measure *a-priori* to gauge competitor proximity for obvious measurement reasons. Omissions and recording or mapping errors are less likely to influence the 25-percentile statistic than the shortest distance statistic. In addition, bank branches may not be entirely homogeneous in their product offerings. In that case, we also conjecture that our 25% measure is more highly correlated with the distance to the closest, “truly” competing bank branch than the minimum distance metric. In Degryse and Ongena (2004) we show that the use of the quartile closest competitor measure rather than the actual measure does not affect results beyond reducing the standard errors.
[29] Berger, et al. (2002) provide suggestive evidence corroborating elements of Stein’s model. They find, for example, that large banks have less exclusive and shorter relationships and interact more impersonally with their borrowers. Liberti (2002) documents how delegation increases monitoring efforts by relationship managers.
[30] Antwerpen, Brussel – Schaarbeek, Charleroi, Gent, and Liege (source: *UN Demographic Yearbook 1995*). We assign postal zones on the basis of the current circumscription.
[31] It may be more profitable for banks to reserve relationship lending for loans of larger size (Stanton (2002)) and for large firms. We employ firm size dummies, as the full dataset does not contain any other measures of firm size.
[32] “On theoretical grounds it is difficult to justify this choice” (Greene (1997), p. 875) of a Probit model, hence we also rerun all exercises using a Logit model. Given that the mean of the dependent variable is close to 50%, not surprisingly results are almost unaffected.
[33] The U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines (April 1997) label markets with an HHI above 0.18 ‘highly concentrated’ and an HHI below 0.10 ‘unconcentrated’.
[34] The local markets in his paper are also substantially larger than in ours. The average postal zone in Belgium contains less than 10,000 inhabitants, while the mean *Landkreise* in Germany counts around 175,000 people.
[35] The average firm in Elsas (2004) has an annual turnover of approximately 4,000 million BEF, while the average firm in our Augmented sample reports 14 million BEF in total assets.
[36] German and Belgian corporations seem to maintain a similar number of bank relationships (Ongena and Smith (2000b)), but small firms in general are found to have fewer bank relationships (the empirical evidence is reviewed in Ongena and Smith (2000a)). The average small Belgian firm surveyed by de Bodt, Lobez and Statnik (2001) employs two banks. The firms in the latter sample are on average more than three times larger and 7 years older than the firms in our sample.
[37] A Hausman test cannot reject at a 1-% level that random effects should be favored.