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WORKING PAPER

Bank Competition and Outreach: Evidence from Turkey

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Abstract

In light of the importance of banking sector outreach and given concerns that competition may adversely affect it, this study explores the empirical linkage between banking structure and outreach in Turkey for the period 1988–2010. Bank-, province-, and bank-province-level estimation results indicate that competition is in general conducive to the outreach of banks. We do not find evidence for collusive behavior between banks when they have multimarket contact. On the province-level, the presence of foreign owned banks is associated with higher outreach, while at the bank-province level we observe that outreach of domestic banks exceeds that of foreign banks. Together, these results suggest that there are pro-competitive spillover effects from foreign banks to their domestic counterparts.

JEL: E44, F43, G21

Keywords: bank competition, multimarket contact, bank outreach

1 Introduction

The liberalization and privatization policies in many countries have triggered a sharp debate in the banking literature about the virtues and vices of competition in the banking industry. Conventional theory states that perfect competition maximizes economic welfare by supplying the greatest amount of credit at the lowest price and, in turn, reaching financial services to a greater share of population (see, amongst others, Pagano 1993; Guzman 2000). A competitive environment is, because of improved efficiency and cost reductions, benefiting banking sector customers. Additionally, in order to gain a competitive edge, increased competition may elevate the value of relationship banking, hence inducing banks to invest more in private information production (e.g., Boot and Thakor 2000, Yafeh and Yosha 2001).[1] On the other hand, the pioneering work of Stiglitz and Weiss (1981) emphasizes the role of informational frictions between borrowers and lenders, and shows that credit rationing can be an equilibrium outcome in competitive debt markets. Consequently, it has been claimed that some market power is needed to establish valuable relationships with clients. From this point of view, in a competitive environment, banks' investment in long-term relationships may not yield the intended economic benefits, as customers will be more tempted to engage in price comparisons and bank shopping. Increased competitive pressure may therefore destabilize (traditional) durable relationships. In this context, competitive banking markets may be associated with less credit availability especially to small and opaque firms (Petersen and Rajan 1995).[2]

In accordance with these ambiguous theoretical predictions, the empirical evidence is also not unequivocal on the issue. For example, based on cross-country data, Beck et al. (2004) favor the competition view as they find that less concentrated banking markets are associated with a reduction in financing obstacles, especially for smaller firms. Using data on US banking markets, Cetorelli and

[1] Berger et al. (2001) and Elsas (2005) empirically support the argument that competition may actually strengthen relationship banking.

[2] Another debate that is not resolved yet, is the question whether bank competition is good or bad for financial stability. The 'Competition-Fragility'-Hypothesis suggests that a competitive banking market will increase financial fragility. Higher banking profits and the existence of monopoly rents, associated with market power, will armor the bank against negative shocks, thereby increasing the franchise value of the bank. Furthermore, bank managers will not have adverse incentives to take excessive risk in a concentrated market (see, e.g., Allen and Gale 2004; Besanko and Thakor 1993). An opposing view, the 'Competition-Stability'-Hypothesis puts forward that concentration will increase the intermediation margin of banks. An increase in the interest rate charged to firms will amplify adverse selection and moral hazard considerations, which will lead to a deterioration of credit quality and an increase in banking system vulnerability (e.g., Boyd and De Nicoló 2005; Caminal and Matitutes 2002).

Strahan (2006) find that increased competition among banks in local markets is associated with the creation of new establishments due to enhanced access to finance. Corvoisier and Gropp (2002) find a positive relationship between concentration and price-cost margins for European banks, which is detrimental for business creation. On the other hand, Petersen and Rajan (1995) find for US that younger firms receive more credit at better conditions in local markets where bank concentration is higher. In particular, attention has been given to the accommodating role of relationship banking in the inter-temporal smoothing of loan terms, i.e., subsidizing borrowers in earlier periods in return for a share of the rents in the future, which benefits young, informationally opaque firms. For Italy, Bonaccorsi di Patti and Dell'Ariccia (2004) find that bank competition is less favorable to the creation of new firms in sectors where informational asymmetries are particularly severe. Other studies in favor of and/or against more competition include, inter alia: Cetorelli (2003) shows that competition is positively associated with firm entry; Zarutski (2006) finds that concentrated banking markets smooth loan rates, and hence provide more financing to borrowers; Maurer and Haber (2007), using 19th century data from Mexico, provide evidence that bank concentration is in favor of related lending to connected borrowers; Saeed and Vincent (2012) show that bank concentration elevates financial constraints for a sample of Indian firms.

While the importance of well-functioning financial intermediaries in general, and banks in particular, in raising productivity and promoting economic growth have been well documented, we still have very little knowledge concerning the outreach of financial systems, and its determinants.[3] Without broad access to financial services, credit constraints reduce the efficiency of resource allocation because opaque businesses will have difficulties to finance (profitable) investment projects (Galor and Zeira 1993). An inclusive financial system, with extensive geographical coverage reaching out to more people, can also help reduce poverty and income disparities (Beck et al. 2007, Honohan 2004). According to Rajan and Zingales (2003), access to finance for large numbers of people expands opportunities beyond the rich, fosters efficient resource allocation and, hence, economic growth.

[3] The discussion, in fact, relates also to the general finance-growth literature, and more specifically to the literature concerning the welfare impacts of inclusive financial systems. A vast body of research emphasizes the benefits of well-developed and inclusive financial systems for poverty alleviation and economic development (e.g., King and Levine 1993, Levine 1997, Demirgüç-Kunt and Maksimovic 1998, Rajan and Zingales 1998, Cetorelli and Gambera 2001). Financial institutions contribute to economic growth by mitigating frictions between lenders and borrowers, and thus improve the efficiency of capital and resource allocation decisions.

Although the benefits of increased access to finance are intuitively well understood, we have a less clear understanding of the impact of competition on banking sector outreach. The effect of competition on outreach could go both ways and, therefore, deserves an empirical investigation. In light of the importance of banking sector outreach and given concerns that competition can adversely affect it, this study explores the empirical linkage between banking structure and outreach in Turkey employing a long sample period from 1988 to 2010. In particular, we proceed on three levels. First, using bank level regressions, we analyze the impact of competition on diverse proxy measures of outreach, i.e., number of provinces served, volume of deposits, volume of credits, and different types of deposit accounts. Second, on the province level, we examine whether competition affects the growth rate in branch location or geographic penetration, per capita volume of credits generated, per capita volume of deposits placed at banks, and different types of deposit volumes. Finally, bank-province-level regressions enable us to verify whether competition influences the probability of opening new bank branches, per capita volume of credits granted by banks, and per capita volume of deposits placed in a specific bank in a particular province.

In general, we find that competition improves the outreach of financial intermediaries. This finding is robust over bank-, province-, and bank-province-level regressions. Specifically, we find that competition increases the volume of loans and deposits, implying that banks are forced to work with reduced intermediation margins. We also find that multimarket competition does not trigger collusive behavior between banks, as it is not associated with lower outreach figures. Concerning the impact of foreign bank presence on outreach, we find that their presence boosts competition and stimulates domestic banks to offer more credits and attract more deposits.

We organize this article as follows. In Section 2, we enumerate previous studies related with our work and describe the main contributions of this paper. In Section 3, we describe the empirical methodology, the data, and the variables. In Section 4, we present the results and provide a discussion. The last section provides conclusions and implications.

2 Contributions and relation to prior work

In exploring the impact of bank competition on outreach, this study contributes to the literature in a number of ways. First, as far as we know, no prior research has specifically addressed the question

how competition may affect banking sector outreach. Previous studies have mainly focused on the relation between banking market concentration and credit availability (e.g., Petersen and Rajan 1995; DeYoung et al. 1999; Beck et al. 2004; Berger et al. 2007), while neglecting the importance of savings as a means for empowerment and social inclusion. Although, through microfinance programs, much attention has been paid in addressing the credit needs of income households, increasingly, attention has shifted to the need to provide a wider range of banking services, with a particular focus on savings. In many instances, it is also proved that the demand for savings facilities is stronger than for credit (Peachey and Roe 2006). Having access to bank accounts is considered to be the entry point for individuals to enhance their participation in the formal economy and society. The use of deposit accounts is valued both for facilitating transactions and for consumption smoothing. Furthermore, deposit accounts make accountholders better positioned for loan approvals as savings can not only serve as collateral, but also as a demonstration of financial discipline (Udell 2004). According to Mester et al. (2007), transaction accounts foster relationship banking as it provides banks privileged information about firms' different revenue sources over time.

Second, our dataset does not only make the distinction between bank access (branches and branch orientation) and use (volume of credits, volume/number of deposits), but also between different use alternatives (types of deposits). For a given bank, it would make sense to invest in an additional outlet whenever the projected gains from reductions in transactions costs and information asymmetries are at least as high as the additional investment costs. A climate of increased competition and increased pressure upon margins and profitability may affect the financial results of the branches negatively, forcing some banks to reorient themselves and adopt more cost-efficient bank practices, or even leading to the outright closure of branches. This may, in turn, impair the provision of financial services to less profitable segments and regions.[4] However, banks may also react to increased competitive pressure by resorting to non-price competition strategies and try to capture a larger share of the banking market by investing more in brick and mortar to establish valuable relationships.[5] Whether the net effects of competition on outreach (in terms of bank orientation and use) are positive or negative is, ultimately, an empirical question.

[4] Focus on the most profitable customers and regions, known as cherry picking, will lead to less outreach because of increased segmentation.

[5] Maintaining proximity to customers is considered to be a very favorable characteristic for providing relationship banking. Moreover, proximity banks are found to be better positioned in extracting location rents from their clients (Degryse and Ongena 2005).

Third, recognizing that banks may pursue both competitive and cooperative strategies simultaneously, this paper relates to the literature on multimarket contact and collusive behavior. Innovation and deregulation have made the financial landscape increasingly turbulent, inducing banks turning into strategic alliances to minimize costs and optimize benefits. In such an environment, it is argued that strategic alliances can be one powerful means in enhancing the competitive position of firms (Hill 1990). Furthermore, it has been suggested that the best partner in an alliance is a strong competitor (Deming 1993). In this vein, banks that meet each other in multiple points may be involved in different levels of competition than banks with more limited contact (Heggestad and Roades 1978, Bernheim and Whinston 1990). While some papers point to pro-competitive effects of multimarket contact (e.g., Mester 1987, 1992), the prevailing thought is that multimarket contacts allow competitive responses across markets, discouraging banks to compete aggressively as they fear rivals' retaliation in other markets. To the best of our knowledge, this is the first paper to empirically investigate the potential impact of collusive behavior on bank outreach.

Finally, the richness of our data set allows us to explore some important additional issues, which have been hitherto largely neglected. In Turkey, as well as in most emerging economies, state-owned banks have vast and extensive branch networks and are at the core of the payment system. Rather than pursuing exclusively profit maximization, the existence of state-owned banks has been motivated based on their balancing function between social and economic objectives (see, e.g., Megginson 2005a, 2005b). They make financial services available to many geographical remote regions and to poor people. Their privatization as a policy recommendation, therefore, presents a political dilemma as commercial missions may outweigh social objectives and this may lead to less banking in rural or non-profitable regions. The implied empirical question is therefore whether state-owned banks indeed exhibit better outreach outcomes.

In addition, we also explore whether foreign bank presence affect outreach outcomes. Proponents of foreign bank participation argue that these banks bring capital as well as technical skills, leading to a more competitive and efficient banking sector. There is also the argument that foreign banks decrease financing obstacles (Clarke et al. 2001) and introduce superior risk management techniques enabling them to reach a broader customer base (Berger and Udell 2006).On the other hand, foreign banks are often blamed for 'skimming the cream' of the market by focusing mainly on large and transparent borrowers, thus leaving domestic banks with a pool of opaque businesses which are on average more risky (Mian 2006, Detragiache et al. 2008, Beck and Martinez Peria 2010).

3 Empirical methodology and dataset

Our dataset allows us to analyze the impact of above discussed facets on outreach along on the level of banks, province level, and the bank-province level. Specifically, we conduct (i) bank panel regressions with data aggregated for each bank over all provinces and each year, (ii) province regressions with data aggregated for each province and each year, and (iii) bank-province panel regressions with data for each bank within each province and each year.[6]

3.1 Empirical methodology and variables

We investigate the bank-level outreach by running the following specification:

$$Y_{i,t} = \alpha_i + \alpha_t + \alpha_1 HHI_{i,t-1} + \alpha_2 MMC_{i,t-1} + Control_{i,t(-1)} + \varepsilon_{i,t}, \quad (1)$$

where Y is a vector of dependent outreach variables for bank *i*. As mentioned in the introduction, we make a distinction between bank access and use in our outreach measures. Access refers to the availability and affordability of financial services, whereas use refers to the actual consumption of financial services. In this study, access is defined as the availability of financial services in closer proximity to the users.[7] On the bank-level, we use two proxies for access, i.e., investment in branch outlets (measured as the growth rate in the number of branches) and penetration to new markets (in terms of serving new provinces). For the actual use of financial services, we rely on the log of the (i) the total volume of deposits at time *t*; (ii) the total number of deposit accounts at time *t;* (iii) the total volume of credits at time *t*. Only for the bank-level regressions, our data allows us to distinguish between the number of deposit accounts and volume of deposits. We furthermore can distinguish between several deposit accounts for the entire sample period: business deposit accounts, savings deposit accounts, and interbank deposit accounts. This enables us to verify whether competition has differential impacts on different types of deposit accounts.[8]

[6] We follow a similar empirical strategy to Beck and Martinez Peria (2010), who show that, between 1997 and 2005, the increasing presence of foreign banks in Mexico is detrimental for bank outreach.

[7] Other aspects of access such as data on cost and quality of services are much harder to obtain and are therefore not part of the analysis.

[8] Subcategory information for the volume of deposits is unfortunately not available for the bank-level estimations, but is available for the other two levels (province and bank-province) of regressions. Because the number of deposit accounts is

The primary explanatory variables are measures for competition and multimarket contact. To quantify the former, we use a structural measure of competition, i.e., *Herfindahl–Hirschman Index of banking market concentration* (HHI).[9] We define the HHI as the sum of the squares of banks' market shares in the total number of branches. The Index ranges between zero and one, where higher values represent higher levels of market concentration and, hence, lower levels of market competition. For the bank-level regressions, we introduce a proxy for the degree of competition faced by each bank in one specific year, which is the branch-weighted sum of the provincial HHI. More specifically, this bank-specific HHI is calculated as: $HHI_{i,t} = \sum_j S_{i,j,t} * HHI_{j,t}$, where $S_{i,j,t} = B_{i,j,t} / \sum_{j=1}^{m} B_{i,j,t}$, $HHI_{j,t}$ is the HHI for the local market *j* at time *t,* and $B_{i,j,t}$ is the number of branches of bank *i* in the local market *j* at time *t.* We interpret a positive (negative) association between market concentration and outreach as an indication that concentrated banking markets are more (less) favorable for outreach.[10]

However, traditional concentration measures such as HHI can be biased when firms meet each other in multiple local markets. The theory of multimarket contact suggests that mutual forbearance will show up when the correlation between two firms is high in terms of geographical coverage. For example, a bank branch that pursues an aggressive growth strategy in a particular region may trigger retaliatory actions by rivals not only in that region but also in other regions. Consequently, fears of multimarket retaliation tempers aggressive behavior and may result in reduced competitive intensity. The theory of multimarket contact is very suitable for the banking industry as banks usually meet each other in several geographical markets via subsidiaries or branches. On the bank-level, we measure multimarket contact (MMC) by considering the number of geographical contacts between banks (De Bonis and Ferrando 2000; Coccorese and Pellechia 2009). Let D_{ij} be equal to 1 if bank *i* operates in province *j*, and 0 otherwise, for *i* = 1,…, n, and *j* = 1,…, m. We construct a symmetric $(n \times n)$ matrix $A = (a_{ik})$, where its generic element $a_{ik} = \sum_{j=1}^{m} D_{ij} D_{kj}$ represents the number of

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regionally not available, for the other two-levels of regressions, we proceed with the volume of deposits. Information about the number of loan contracts is also not available.

[9] We prefer to use HHI since it is the most widely used measure of banking structure and indicator for competition in both theoretical (e.g., Petersen and Rajan 1995; Boot and Thakor 2000) and empirical analyses (e.g., Black and Strahan 2002; Cetorelli and Strahan 2006; Degryse and Ongena 2007).

[10] Banking concentration studies in the US often use the deposit market shares in the calculation of HHI. However, we follow Elsas (2005) and Degryse and Ongena (2007) and use branch market shares as the branch serves as a more neutral benchmark for both the assets (i.e., credits) as well as the liabilities side (i.e., deposits). In addition, it is shown by Fisher (2001) that branch HHI and deposits HHI are highly correlated for US Metropolitan Statistical Areas.

markets in which bank *i* meets bank *k*, while the diagonal element a_{ii} measures the number of markets serviced by bank *i.* However, as in some markets the interactions between banks is heavier, we introduce a quadratic weighting structure by using the market shares in the calculation of multimarket contact. Therefore, we first produce an $(n \times m)$ matrix, with its generic element representing the share of the number of branches of bank *i* in market *j*, calculated as $S_{ij} = B_{ij}/\sum_{i=1}^{n} B_{ij}$. We proceed with the calculation of a symmetric $(n \times n)$ matrix $R = (r_{ik})$, where $r_{ik} = \sum_{j=1}^{m} S_{ij}S_{kj}$ is a weighted measure that captures the relative importance of bank *i* and bank *k* in the respective markets. In one specific year t, our indicator of *multimarket contact* for bank *i* is calculated as $MMC_i = \frac{\sum_{k \neq i} r_{ik}\delta_{ik}}{\sum_{k \neq i} \delta_{ik}}$, where $\delta_{ik} = \begin{cases} 1 \; if \; a_{ik} > 0 \\ 0 \; if \; a_{ik} = 0 \end{cases}$. We repeat this calculation for every period t, so to arrive at $MMC_{i,t}$.

The Control-vector includes ownership structure, number of branches, profitability, and bank age. The variable *State* refers to banks that are preliminary owned by the government. One of the strongest arguments in favor of state-ownership in banking has been its ability to correct market failures. Specifically, state banks can pursue social policies rather than just profit maximization and, therefore, they can penetrate in remote unserved areas.[11,12] The *Foreign* variable encompasses banks that are either branches of foreign banks or banks with at least 50 percent of their shares owned by non-residents. Studies have generally shown that foreign bank entry is beneficial to the banking efficiency in emerging economies. This increased efficiency is attributed to their superior know-how in the channeling of funds from depositors to creditors, their access to a greater variety of sources and smaller sensitivity to shocks in the host country (Berger et al. 2000; Bonin et al. 2005; Detragiache and Gupta 2006). However, despite the positive effects on bank efficiency, foreign banks are often criticized for cherry-picking the most creditworthy borrowers and depositors (Berger et al. 2005; Mian 2006). The limited empirical evidence generally suggests that foreign banks scale-down bank outreach (Detragiache et al. 2008; Beck and Martinez Peria 2010).[13] *Private* domestic banks serve as

[11] In this vein, authorities face a serious a political dilemma because privatizations can be at the detriment of bank access when privatized banks decide to close outlets in small and remote regions. Furthermore, Denis et al. (2002) and Kim and Mathur (2008) show that geographic diversifications are associated with firm value decrease, suggesting that corporate diversification costs (due to more complex coordination problems) are outweighing the benefits of diversification (trough economies of scale and scope). In such a situation, privatized banks can choose to operate in fewer markets.

[12] Apart from this social view, it has also been suggested that state-owned banks are rather used as instruments for maximizing politicians' personal objectives (La Porta et al. 2002; Sapienza 2004; Dinç 2005).

[13] In the regression equation with the log of volume of credits as a dependent variable, we additionally include a dummy variable representing investment banks. The *Investment* variable equals to 1 for non-deposit taking financial intermediaries,

the reference group. To control for the existing business orientation of the bank and its size, we include the natural logarithm of the number of branches (i.e., the *Branches*-variable). Furthermore, we verify whether profitability (in terms of return on assets, i.e., the variable *ROA*) and bank age (in terms of the natural logarithm of the number of years the bank is operating, i.e., the variable *Age*) are influencing outreach. We reduce concerns about potential endogeneity (i.e., reverse causality) problems through lagging all explanatory variables but ownership dummies with one period (i.e., variables are predetermined) and by exploiting the panel dimension of our dataset. Bank dummy variables α_i are included to control for unobserved time-invariant bank-specific effects. Year dummy variables α_t control for macroeconomic fluctuations and other year-specific effects that may influence outreach.

In order to assess the outreach impacts of competition on provincial markets, we estimate the following province-level equation:

$$Y_{j,t} = \alpha_j + \alpha_t + \alpha_1 HHI_{j,t-1} + \alpha_2 MMC_{j,t-1} + Control_{j,t(-1)} + \varepsilon_{j,t}. \quad (2)$$

As proxies for outreach at regional level, we use the following indicators: net branch entry (i.e., change in the total number of branches in a particular province *j*), per capita volume of credits, per capita volume of deposits, and we also differentiate between different deposit products. With these measures, we verify how the market equilibrium and competitive conditions in that market affect entry/outreach decisions.

For the measurement of competition and multimarket contact at the local level, we follow Degryse and Ongena (2007). Local market competition is calculated using the HHI of existing bank branches. Specifically, for a local market *j* in year *t* we define the HHI as: $HHI_j = \sum_{i=1}^{n}\left(B_{ij}/\sum_{i=1}^{n} B_{ij}\right)^2$, where n is the number of banks that operate in market *j*, and B_{ij} is, as before, the number of branches of bank *i* in market *j*. The disaggregation at the province-level enables us to take advantage of the

and 0 otherwise. The intuition is that commercial banks could also compete with investment banks in providing finance for borrowers. In this equation, the *HHI* and *MMC* are computed accordingly by including the branches of investment banks in the calculations.

heterogeneous nature of the banking structure within a single institutional framework.[14] The regional multimarket contact variable is measured as the sum of all bank pairs in a particular region weighted by the bilateral contacts in other regions. As a starting point, we define a $(n \times m)$ matrix $C = (c_{ij})$, with *i* representing banks (*i = 1,…,n)* and *j* representing the provinces (*j* = 1,…, m), where its generic element c_{ij} represent the number of branches of bank *i* in province *j*. Let D_{ij} be equal to 1 if bank *i* operates in province *j* (i.e., if $c_{ij} > 0$) , and 0 otherwise, for *i* = 1,…,n, and *j* = 1,…, m. Let f_j be equal to the number of different banks operating in region *j*, and let $a_{ik} = \sum_{j=1}^{m} D_{ij} D_{kj}$ represent the number of markets in which bank *i* meets bank *k*, while the diagonal element a_{ii} measures the number of markets serviced by bank *i.* However, as in some markets the interactions between banks is heavier, we introduce a quadratic weighting structure by using the market shares in the calculation of multimarket contact. Therefore, we first produce an $(n \times m)$ matrix, with its generic element equal to the share of the number of branches of bank *i* in market *j*, calculated as $S_{ij} = B_{ij} / \sum_{i=1}^{n} B_{ij}$. We proceed with the calculation of a symmetric $(n \times n)$ matrix $R = (r_{ik})$, where $r_{ik} = \sum_{j=1}^{m} S_{ij} S_{kj}$ is a weighted measure that captures the relative importance of bank *i* and bank *k* in the respective markets. The multimarket contact in region *j* (i.e., MMC_j) is calculated (as proposed by Evans and Kessides 1994) as $\frac{2}{f_j(f_j-1)} \sum_{i=1}^{n} \sum_{k=i+1}^{n} r_{ik} D_{ij} D_{kj}$. The variable is bounded between 0 (banks in the province has no contact elsewhere) and 1 (all banks in the province have contact with all other banks across all provinces). We repeat this calculation for every period t, so to arrive at $MMC_{j,t}$.

The Control-vector includes the bank ownership structure and the (natural logarithm of the) total number of bank branches in the provinces. The *State* variable is calculated as the proportion of the number of government-owned bank branches to the total number branches in province *j*; and the variable *Foreign* is the ratio of the number of foreign bank branches to the total number of branches in province *j*.[15] The *Branches* variable controls for both the relative size of the banking market and branch density in a particular province. Province dummy variables α_j are added to control for

[14] Moreover, the measurement of banking structure at the disaggregated level provides the advantage of taking into account the locality of relevant geographical markets for banking services, especially for opaque firms and retail customers (e.g., Berger et al. 1999; Cetorelli and Strahan 2006).

[15] In the regression equation with the volume of credits per capita as a dependent variable, we also control for the presence of investment banks. The *Investment* variable is the proportion of the number of investment bank branches to the total number of branches in a particular province. The intuition is that commercial banks could also compete with investment banks in providing finance for borrowers in a particular province. In this equation, the provincial *HHI* and *MMC* are also computed accordingly by including the branches of investment banks in the calculations.

heterogeneous cultural environments, uneven economic development and differences in living standards between provinces. All the correlates, except the ownership dummy variables, are lagged with one period.

At the bank-province-level, we estimate the following regression equation:

$$Y_{i,j,t} = \alpha_i + \alpha_j + \alpha_t + \alpha_1 HHI_{i,t-1} + \alpha_2 HHI_{j,t-1} + \alpha_3 MMC_{i,t-1} + \alpha_4 MMC_{j,t-1} + Control_{i,j,t(-1)} + \varepsilon_{i,j,t}, \quad (3)$$

where the indicators *i*, *j* and *t* represent bank, province, and time, respectively.

For each province *j*, in a particular year *t*, we have information about the number of branches a bank *i* has and, in addition, we know the type of bank *i* (i.e., state-owned, privately-owned, foreign-owned, and investment banks[16]). At the level of provinces, we have access to information to the volume of credits granted and the volume of deposits (total and subcategories) generated by bank type. These figures enable us to calculate an accurate estimate of the volumes of credits and deposits (and different categories of deposits) that bank *i* produces in province *j*. As proxies for outreach at the bank-province-level, we use the following indicators: branch expansion (i.e., a dummy variable equal to 1 if the number of branches is higher than the previous year, and otherwise 0), per capita volume of credits, per capita volume of deposits, and we differentiate between different deposit products. As independent variables, we include simultaneously both of the HHI and MMC parameters used in the previous two regressions levels, in order to verify whether the bank and province indicators have differential impacts on outreach. The Control-vector includes the ownership structure and the number of branches the bank *i* has in province *j*.[17] Again, all the correlates, except the ownership dummy variables, are lagged with one period.

[16] Only in the regression equation with the volume of credits per capita as the dependent variable, we additionally control for investment banks by including a dummy variable that equals to 1 if a non-deposit taking financial intermediary exists in province j, and 0 otherwise.

[17] At the bank-province level, the number of branches is used directly instead of the natural logarithm of branches in order to avoid losing observations.

3.2 Data-sources

Our primary data is retrieved from the various issues of *Banks in Turkey* published by the Banks Association of Turkey (www.tbb.org.tr/en/) for the period 1988-2010, an era of a liberalized financial system. These issues include annual information about the number of branches, the number/volume of deposit accounts, and the volume of credits for all conventional banks operating in Turkey. The number of (different types of) deposit accounts and total volumes of deposits/credits are available at the bank-level. The volume of deposits (and different types of deposits) and credits per ownership-type are available on province-level. Information about the number of branches is available on three levels (bank, province, and bank-province). Irrespective of this disaggregation, we also have information on the ownership type (state, private, and foreign) of all operating banks. Hence, combining the bank-branch information on the bank-province-level and volume of deposits and credits at the level of provinces, we can calculate a fair proxy for the volume of deposits and credits at bank-province level. At the beginning of the sample period, there were 67 provinces in Turkey. During the sample period, 14 new provinces were established from existing provinces. In order to tackle the artificial decline in the levels of deposits and credits in the existing provinces, we classify the split provinces as newly formed and assign them unique province identifiers.[18] All the volume variables are expressed in constant prices. Definitions and descriptive statistics of all the variables are exhibited in Table 1.

< Put Table 1 around here>

4 Estimation results

We start with regression results at the bank-level. Next, we turn to province-level regressions. Finally, we report the results using the bank-province panel estimations. In all levels, we use annual data for the period 1988-2010.

[18] We refer, inter alia, to Alper and Önis (2003), Tanyeri (2010), Kilinç et al. (2012) and Laeven and Valencia (2012) for an excellent discussion about the historical developments in the Turkish economy and, in particular, its financial sector. We refer also to a series of papers written by Önder and Özyildirim (2008, 2010, 2011) for an overview of the intermediating role of banks in Turkish regions.

4.1 Evidence from bank-level regressions

We start by testing for the presence of unit roots using the ADF panel unit root test of Maddala and Wu (1999), which does not require a balanced-panel as most tests do. The results reject the null of non-stationarity for all variables at the 5% level.[19] We let the Hausman test determine the choice between fixed and random effects. The robust-Hausman test for all specifications of model (1) indicates that the difference between FE and RE is systemic, providing evidence in favor of the FE model.[20,21]

In Table 2, we report the estimates of the determinants of model 1. An analysis of Panel A of this table reveals that competition is driving banks to seek new markets. Higher levels of competition (lower HHI) lead to an increase in the penetration of new provinces (i.e., forming branches in unexplored provinces). This result indicates that competition is fostering broader physical outreach. Next to the positive effect of competition on exploring new markets, we find that profitable and younger banks induce banks to penetrate into new provinces. In addition, we find that a higher level of competition encourages banks to extend more credit, and attract higher volumes of deposits and numbers of deposit accounts. Competition makes the financial system more inclusive. These findings are in line with the conventional competition interpretation that a high concentration of market power in banking gives a lower equilibrium amount of deposits and credits. The multimarket hypothesis states that more contacts between firms in the same markets may lead to more collusion. In our empirical framework, the collusive behavior triggered by multimarket competition between banks will be expressed as an increase in bank margins (lower cost of funding will lead to lower deposit quantities; and a higher charge on loans will lead to a decrease in credit quantities). We do not find support for this hypothesis. Our results indicate that multiple contacts between banks lead to higher volumes and numbers of deposits and do not have any effect on the credit market. We interpret this finding as evidence that collusive behavior between banks is less likely when barriers to

[19] Maddala and Wu (1999) suggest to combine the p-values of the test-statistic for a unit-root in each bank. For the sake of brevity, the test results are not shown, but they will be made available upon request. Note, however, that individual intercepts are included as exogenous variables in the test equations. Except for the variable "Growth in the provinces served", the reported statistics and conclusions are obtained using one lagged first difference terms.

[20] This test is similar to the classical Hausman test, but has the edge that is also applicable in the event of clustered errors, which are used to correct for within-bank serial correlation (Schaffer and Stillman 2006).

[21] Furthermore, the estimation results show that bank- and time-effects are present, since the relevant F-statistics for all specifications are significant at the 5% level.

entry and exit are absent. This finding is also consistent with De Bonis and Ferrando (2000) for the Italian banking market, reporting an increase in the loan market share (because of lower lending rates) for banks with greater multimarket linkages.

< Put Table 2 around here>

We furthermore find that state-and foreign-owned banks extend higher volumes of credits than their private counterparts do. However, everything else constant, state-owned banks are not successful in attracting deposits compared to their private peers. In line with Evanoff (1988), we find that banks with higher number of branches have an advantage in the acquisition and servicing of both deposits and credits.[22] Table 2 – Panel B shows that our previous results for the deposit market are primarily driven by the savings deposits. There is no impact of competition in attracting interbank deposit accounts, as was to be expected. Especially, state-owned banks, profitable and older banks are successful in attracting bank deposits. In sum, we observe that more competition, higher multimarket links, and economies of scale enable banks to have pro-outreach activities both in term of deposits-attraction and servicing credits.

4.2 Evidence from province-level regressions

While the bank-level regressions allow us to explore the impact of competition between banks on the country-level, the province-level regressions allow us to exploit the regional nature of banking market competition.[23] Conventional theory asserts that the less competitive conditions in the regional market will produce lower outreach by financial institutions. In Table 3, which shows the regression results for model 2, we test this hypothesis at the province-level by introducing province-specific outreach and competition measures. The results confirm our previous findings. Although we find that

[22] Larger Turkish banks do not only issue more loans or attract more deposits; they also manage their assets and liabilities in a more risk/return efficient manner (De Jonghe et al. 2012).

[23] As a pretest, we first check the stationarity of model (2) using the ADF panel unit root test of Maddala and Wu (199). Although we do not show the test results here owing to lack of space, the results reject the null-hypothesis of non-stationarity for all the variables. Note, however, that individual intercepts are included as exogenous variables in test equations. Except for the variable "Growth in the number of branches", the reported statistics and conclusions are obtained using one lagged first difference terms. A robust-Hausman test for all specifications of model (2) indicates a systemic difference between FE and RE, providing evidence in favor of the FE model. Since the relevant F-statics for all specifications are significant at the 5% level, we can conclude that province- and time-fixed effects are present. The results are available upon request from the authors.

provinces with competitive banking markets have a lower growth in the number of branches compared to concentrated banking market provinces, we also find that competition is conducive to attracting more deposits (mainly driven by the volume of savings deposits), or for granting more loans. We again confirm the earlier result that higher multi-market competition is not associated with collusive behavior. Indeed, in markets where the competing banks have extensive multimarket contacts, banks tend to attract more deposits and issue more loans. This finding is consistent with Rosen's (2003) analysis, showing that markets with multimarket banks have higher deposit rates (i.e., attracting more deposits).[24] At a disaggregated level, we find that provinces bank branches to the total number of branches) with a high presence of foreign banks (measured as the ratio of the number of foreign bank branches to the total number of branches) offer financial services to a broader base of clients in terms a higher growth of the number of bank branches and higher deposit and credit volumes. This result is consistent with those of some studies in favor of foreign bank entry (see, amongst others, Giannetti and Ongena 2005, Jeon et al. 2011).

< Put Table 3 around here>

4.3 Evidence from bank-province-level regressions

While the results using bank-panel regressions allow us to identify the impact of competition on outreach for each bank over all provinces and the province-level regressions show the association between regional outreach and competition, the bank-province level regressions in Table 4 (cf. regression results of model 3) enable us to identify the ability of banks to reach out to a broader customer base in response to the local competitive environment in which they are located. In doing so, to have a more complete assessment, we do not only control for the competitive environment in each province (HHI_j) but also for the competition that each bank faces (HHI_i) over all provinces. We find that banks facing competition (HHI_i) do open new branches but not in provinces with relatively more competitive banking markets (HHI_j). Banks with high levels of multimarket contact between banks (MMC_i) and that are present in provinces where banks have extensive interprovincial contacts (MMC_j) are likely to open less new branches, but attract more deposits and issue more loans,

[24] Park and Pennacchi (2009) find that the presence of multi-market banks in local markets results in both lower loan rates (i.e., pro-competitive effect) and lower deposit-rates (i.e., contra-competitive) due to their funding advantages in wholesale markets. However, according to Rosen (2007), multimarket becomes positively related with interest rates (pro-competitive) with the inclusion of fixed-effects in the estimations.

confirming at the bank-province level our earlier evidence that multimarket contact is not associated with collusive behavior. The volume of both deposits per capita and credits per capita is increasing with competition that banks face (HHI_i) and in provinces with a higher level of competition (HHI_j), again confirming that competition boosts bank outreach. Furthermore, the increase of the total volume of deposits is mainly driven by the volume of savings deposits, and less so by the volume of commercial deposits (see panel B of Table 4).

< Put Table 4 around here>

Ownership types at the bank-province level provide us additional insights. At the province-level, and to a lesser extent at the level of banks, we found that foreign bank presence is conducive to outreach. At the bank-province level, however, we find that foreign banks offer less per capita deposits and credit then domestic banks, clearly indicating that foreign banks do not boost outreach by offering themselves higher levels of deposits and issuing more loans, but by increasing competitive pressure and inducing domestic banks to do so. Jeon et al. (2011), who find that an increase in foreign bank penetration enhances competition in the host countries' banking sectors, offer a similar finding.

5 Concluding remarks

Although the benefits of increased access to finance are intuitively well understood, this understanding is still absent as regards the influence of competition on banking sector outreach. The effect of competition on outreach may go both ways and deserves an empirical investigation. Contrary to the conventional view that a competitive banking market leads to an increase in both the equilibrium amounts of credit (thanks to lower borrowing costs) and deposits (thanks higher savings rates), it has also been claimed that market power is needed to establish relationship banking for an optimal use of financial services. In line with the traditional assumptions, we find on the level of banks, that competition (i.e., decreasing margins) is driving banks to explore new markets, extend more credits, and attract more deposits. This finding is confirmed on the province-level and bank-province-level regressions. The results are in line with the market power hypothesis that suggests that less competitive banking markets lead to more credit rationing and less competitive deposit rates (i.e., eroding the consumer surplus). In addition, on the bank-province level, we find that banks facing competition do open new branches, but in less competitive markets. Across specifications, we do not

find that multimarket contact is causing collusive behavior among banks. On the contrary, we find that outreach strengthened through multimarket contact linkages, portraying the existence of a contestable market. Finally, our results indicate that the presence of foreign banks is associated with higher outreach, while at the bank-province level we observe that outreach of domestic banks exceeds that of foreign banks. Together these results suggest that there are pro-competitive spillover effects from foreign banks to their domestic counterparts that boost banking outreach.

From a policy perspective, our results indicate that the government should promote banking competition in all parts of the country. Moreover, especially in regions with a strong banking concentration, regulatory authorities will need to take a view on how to stimulate regional competition (e.g., through encouraging bank entry) to further the goals of financial inclusion. As competition may have adverse interactions with financial stability, appropriate safeguards should be provided to ensure compliance and bank safety. Through regional diversification, banks can also mitigate adverse region-specific shocks, and therefore, can achieve superior risk/return tradeoffs (e.g., Acharya et al. 2006). Although individual foreign banks exhibit relatively modest levels of regional outreach, their presence stimulates regional competition and fosters outreach of domestic banks in the same region. However, more research will be needed to confirm and widen these findings, and to identify the channels through which foreign bank entry (e.g., de novo entry or acquisition of existing banks) is conducive for competition.

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Table 1: Summary statistics

Variable	Description	Mean	Std. Dev.
Panel A - Bank-level variables			
Growth in the provinces served	ln(provinces served by bank i in t) - ln(provinces served by bank i in t-1)	0.054	0.283
Log of volume of deposits	Natural logarithm of the volume of deposits for bank i	26.094	2.508
Log of number of deposit accounts	Natural logarithm of the total number of deposit accounts for bank i	10.471	3.600
Log of volume of credits	Natural logarithm of the volume of credits for bank i	24.711	2.165

Table 1 (Continued)

Log of number of savings deposit accounts	Natural logarithm of the total number of savings deposit accounts for bank i	9.963	3.996
Log of number of commercial deposit accounts	Natural logarithm of the total number of commercial deposit accounts for bank i	8.506	3.055
Log of number of interbank deposit accounts	Natural logarithm of the total number of interbank deposit accounts for bank i	4.116	2.248
HHIi	Bank-specific measure of competition, calculated as the branchweighted sum of the provincial HHIj	0.067	0.039
MMCi	Bank-specific measure of multimarket contact by considering the number of interprovincial weighted contacts between banks	0.032	0.072
State	Dummy variable equals to 1 when a bank is preliminary owned by the government, otherwise 0	0.077	0.267
Foreign	Dummy variable equals to 1 for banks that are either branches of foreign banks or banks with at least 50 percent of their shares owned by non-residents, otherwise 0	0.291	0.454
Investment	Dummy variable equals to 1 for non-deposit taking financial intermediaries, otherwise 0	0.214	0.410
Branches	Natural logarithm of the total number of branches	2.469	2.314
ROA	Return on Assets	0.013	0.149
Age	Natural logarithm of the number of years that the bank exists	2.962	1.161

Table 1 (Continued)

Variable	Description	Mean	Std. Dev.
Panel B - Province-level variables			
Growth in the number of branches	ln(total number of branches in province j in t) - ln(total number of branches in province j in t-1)	0.004	0.078
Volume of deposits per capita	Volume of total deposits divided by (1,000,000*population in province j)	0.523	0.456
Volume of credits per capita	Volume of credits divided by (1,000,000*population in province j)	0.325	0.385
Volume of savings deposits per capita	Volume of savings deposits divided by (1,000,000*population in province j)	0.229	0.219
Volume of commercial deposits per capita	Volume of commercial deposits divided by (1,000,000*population in province j)	0.046	0.059
Volume of interbank deposits per capita	Volume of interbank deposits divided by (1,000,000*population in province j)	0.004	0.020
HHIj	Summed squares of bank market shares by number of branches in province j	0.175	0.079
MMCj	Sum of the bank pairs in province j weighted by the relative frequency of their bilateral contacts in other provinces	0.509	0.425
State	Proportion of the number of government-owned bank branches to the total number branches in province j	0.547	0.155
Foreign	Proportion of the number of foreign-owned bank branches to the total number branches in province j	0.038	0.068
Investment	Proportion of the number of investment bank branches to the total number branches in province j	0.001	0.005
Branches	Natural logarithm of the total number of branches in province j	3.751	0.996
Panel C - Bank-province-level variables			
New branches	Variable equal 1 if the total number of branches of bank i in province j exceeds the total number of branches in the previous year	0.034	0.181
Volume of deposits per capita	Volume of total deposits of bank i in province j divided by (1,000,000*population in province j)	0.009	0.038

Table 1 (Continued)

Variable	Description	Mean	Std. Dev.
Volume of credits per capita	Volume of credits of bank i in province j divided by (1,000,000*population in province j)	0.006	0.043
Volume of savings deposits per capita	Volume of savings deposits of bank i in province j divided by (1,000,000*population in province j)	0.004	0.017
Volume of commercial deposits per capita	Volume of commercial deposits of bank i in province j divided by (1,000,000*population in province j)	0.001	0.005
Volume of interbank deposits per capita	Volume of interbank deposits of bank i in province j divided by (1,000,000*population in province j)	0.000	0.003
State	Dummy variable equals to 1 when a bank i in province j is preliminary owned by the government, otherwise 0	0.076	0.265
Foreign	Dummy variable equals to 1 for banks in province j that are either branches of foreign banks or banks with at least 50 percent of their shares owned by non-residents, otherwise 0	0.290	0.454
Investment	Dummy variable equals to 1 for non-deposit taking financial intermediaries in province j, otherwise 0	0.216	0.411
Branches	Total number of branches of bank i in province j	1.436	8.141

Table 2: Bank competition and outreach – Bank-level evidence.

	Panel A				Panel B		
	(1)	(2)	(3)	(4)	(1)	(2)	(3)
	Growth in the provinces served	Log of volume of deposits	Log of number of deposit accounts	Log of volume of credits	Log of number of savings deposit accounts	Log of number of commercial deposit accounts	Log of number of bank deposit accounts
HHI_i^a	-7.4317***	-22.1548**	-20.7102**	-23.8224*	-28.3857**	-5.5411	-3.9067
	(-3.458)	(-2.337)	(-2.283)	(-1.768)	(-2.412)	(-0.552)	(-0.289)
MMC_i^a	-0.3255	4.2220**	7.9997***	-1.1523	9.4120***	6.6920***	2.0113
	(-1.306)	(2.531)	(3.507)	(-0.095)	(2.680)	(2.732)	(0.499)
State	0.0770	-0.3025*	0.0239	0.9444**	0.3013	-0.5519	3.1607**
	(1.336)	(-1.755)	(0.156)	(2.275)	(1.063)	(-1.204)	(2.133)
Foreign	-0.0540	-0.0176	-0.1367	0.9406**	-0.2109	0.0552	0.3590
	(-0.884)	(-0.122)	(-0.685)	(2.133)	(-0.773)	(0.352)	(1.584)
Investment				0.4532			
				(0.927)			
Branches[a]	0.0027	0.7438***	1.3307***	0.4195**	1.4975***	1.0108***	0.5184***
	(0.129)	(8.919)	(12.035)	(2.350)	(9.792)	(8.721)	(3.319)
ROA[a]	0.9962*	1.1921	0.5182	1.9875	0.4393	0.2551	1.8207***
	(1.784)	(1.471)	(0.889)	(1.547)	(0.713)	(0.300)	(2.707)
Age[a]	-0.1117**	0.0623	0.0632	0.0567	0.3349	0.0059	0.5782*
	(-2.605)	(0.279)	(0.329)	(0.218)	(1.123)	(0.037)	(1.884)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	971	962	962	1,136	895	956	897
R-squared	0.224	0.918	0.958	0.674	0.946	0.928	0.751

For a description of the variables, see Panel A of Table 1. Bank and year dummy variables are included in all regressions, but their coefficient estimates are not reported for space reasons. Coefficients' robust t-Statistics are in parentheses. Standard errors are clustered at the bank-level. *, **, *** denote statistically significance at 10, 5, and 1 percent levels, respectively.

a. The variable is lagged with one period.

Table 3: Bank competition and outreach – Province-level evidence.

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	Growth in the number of branches	Volume of deposits per capita	Volume of credits per capita	Volume of savings deposits per capita	Volume of commercial deposits per capita	Volume of bank deposits per capita
HHI_j[a]	0.4626***	-1.0489**	-0.8419**	-0.8866***	-0.0650	0.0025
	(4.328)	(-2.502)	(-2.132)	(-3.150)	(-1.384)	(0.530)
MMC_j[a]	-0.0084	0.1626***	0.1893***	0.1273***	0.0141***	0.0002
	(-0.544)	(3.515)	(4.631)	(4.384)	(3.824)	(0.126)
State	-0.5069***	-0.0320	-0.0220	0.0877	0.0411*	-0.0096
	(-8.643)	(-0.154)	(-0.115)	(0.699)	(1.938)	(-1.198)
Foreign	0.2338***	0.9541***	1.1947***	0.8255***	0.1008***	-0.0085
	(3.699)	(3.325)	(3.837)	(4.726)	(3.357)	(-1.225)
Investment			0.8405			
			(0.225)			
Branches[a]	-0.1416***	0.0114	0.0193	-0.0489	0.0177*	-0.0046
	(-6.866)	(0.076)	(0.149)	(-0.678)	(1.679)	(-0.910)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,711	1,711	1,711	1,711	1,711	1,711
R-squared	0.723	0.932	0.867	0.898	0.888	0.891

For a description of the variables, see Panel B of Table 1. Province and year dummy variables are included in all regressions, but their coefficient estimates are not reported for space reasons. Coefficients' robust t-Statistics are in parentheses. Standard errors are clustered at the province-level. *, **, *** denote statistically significance at 10, 5, and 1 percent levels, respectively.

a. The variable is lagged with one period.

Table 4: Bank competition and outreach – Bank-province-level evidence.

	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
	Probability of opening new branches	Volume of deposits per capita	Volume of credits per capita	Volume of savings deposits per capita	Volume of commercial deposits per capita	Volume of bank deposits per capita
HHI_i^a	-5.6655***	-0.3248***	-0.7846***	-0.2635***	-0.0584***	0.0025
	(-2.782)	(-10.304)	(-15.705)	(-15.973)	(-5.561)	(0.625)
HHI_j^a	2.1341**	-0.0475**	-0.0286***	-0.0306**	-0.0048**	-0.0002
	(2.528)	(-2.396)	(-3.247)	(-2.625)	(-2.029)	(-0.366)
MMC_i^a	-2.0848***	0.4447***	0.7453***	0.2817***	0.0455***	-0.0042
	(-3.302)	(14.536)	(15.857)	(15.202)	(5.620)	(-1.334)
MMC_j^a	-0.2748**	0.0076***	0.0053***	0.0057***	0.0008***	0.0001
	(-2.067)	(3.860)	(5.269)	(4.680)	(2.963)	(0.733)
State	-0.4154**	0.0007	0.0033***	0.0003	-0.0001	0.0001
	(-2.203)	(0.793)	(3.171)	(1.539)	(-0.588)	(0.620)
Foreign	-0.1346**	-0.0056***	-0.0103***	-0.0032***	-0.0007***	0.0000
	(-2.009)	(-6.995)	(-12.754)	(-10.431)	(-4.085)	(0.765)
Investment			-0.0116***			
			(-12.949)			
Branches[a]	-0.0041***	0.0024***	0.0011***	0.0007***	0.0003***	0.0001***
	(-8.679)	(3.815)	(2.784)	(5.657)	(2.871)	(3.528)
Bank dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	70,528	76,203	97,937	76,203	76,203	76,203
R-squared	0.378	0.685	0.462	0.670	0.429	0.186

For a description of the variables, see Table 1. Bank, province and year dummy variables are included in all regressions, but their coefficient estimates are not reported for space reasons. The estimation of the probability of opening new branches is conducted using a probit model. Coefficients' robust t or z-Statistics are in parentheses. Standard errors are clustered at the province-level. *, **, *** denote statistically significance at 10, 5, and 1 percent levels, respectively.
a. The variable is lagged with one period.