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Research article

The effects of different modes of foreign bank entry in the Turkish banking sector during the 2007–2009 Global financial crisis

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Abstract: This paper provides insights on how foreign bank entry modes (acquisition vs. greenfield investment) in an emerging market (Turkey) influenced bank strategies during the 2007–2009 global financial crisis. Using a comprehensive dataset comprising twenty-nine accounting variables from Turkish banks' financial statements during 2005–2010, we find important differences between foreign-acquired banks and foreign bank branches in lending and sourcing funds. We find that foreign bank branches continued to support international trade by issuing import loans during 2007–2009 global financial crisis, whereas foreign-acquired banks focused on issuing consumer and credit card loans. In terms of bank sourcing funds, we find that foreign-acquired banks were able to continue to use foreign currency deposits of Turkish residents and local interbank funding including participation (Islamic) banks. Foreign bank branches, on the other hand, relied on sourcing funds from international interbank funding and foreign currency deposits of residents abroad, which led to the necessity for them to change their strategies because of funding shortage in international markets. Our results show that the presence of foreign banks in Turkish banking sector enabled the continuity of bank lending activities in host market during the turmoil of 2007–2009 global financial crisis. Our findings on foreign bank entry mode provide new evidence and have important implications for both policy makers and practitioners in emerging markets.

Keywords: financial crisis; bank; foreign ownership; strategic plan; performance measurement

JEL Codes: F65, G21, G32, L21, L25

1. Introduction

With the internationalization of banking industry, the transmission of financial shocks through foreign bank presence in host financial markets has been a long-standing debate in developed and emerging economies. The global financial crisis of 2007–2009 intensified this debate, as many empirical studies reported a decline in foreign banks' lending activities (De Haas and Van Leveled, 2010; Dietrich and Wanzenreid, 2011; Cetorelli and Goldberg, 2011; Popov and Udell, 2012; Wagner and Winkler, 2013; Xu and La, 2015; Dekle and Lee, 2015; Frey and Kerl, 2015; Bonin and Louie, 2017). The main reason for this decrease in lending has been attributed to the reduction in funding from parent banks to their affiliates in host markets (Dietrich and Wanzenreid, 2011; Dekle and Lee, 2015; Iwanicz-Drozowska and Witkoski, 2016). Empirical studies further document that many parent banks turned instead to their foreign subsidiaries for funds, i.e., capital flowed outwards, as they faced shortage of funds in their home markets (Jeon et al., 2013; De Haas and Van Leveled, 2010).

In addition to the financial condition of the parent bank (Moreno et al., 2010), the type of foreign bank entering in the host market has also received attention from researchers. Jeon et al. (2013) argue that the transmission of external shocks to the host market via greenfield investment is greater than foreign subsidiaries created via acquisition of local domestic banks. This effect is greater for Central and Eastern Europe host markets following by Asia and Latin America. Chen et al. (2017), on the other hand, investigated 32 emerging economies found the opposite effect. Wu et al. (2017) report that the foreign banks entering the host markets by M&A transactions to be more influential in their effect on the host market than foreign banks entering the market via greenfield investment.

De Haas et al. (2014) focused solely on emerging countries in Europe and concluded that foreign subsidiaries curtail more their lending than domestic banks and did not find any difference in behaviour between foreign banks that entered via greenfield or acquisition of domestic banks. In contrast, Cull and Martinez Peria (2013) noted differences in the effect of foreign banks affecting in different regions; foreign banks in Eastern Europe contract more their lending than local domestic banks, but this was not the case for Latin America. Furthermore, Bonin and Louie (2017) even identify differences during the crisis between the six large multinational banks on one hand and other foreign banks for emerging countries in Europe.

The mixed evidence from the above studies suggests that any contagion during the crisis was heterogenous (Dungey and Gajurel, 2015). As a result, several studies call for further research to understand these differences (Cull and Martinez Peria, 2013; Claessens and Van Horen, 2015). We aim to contribute to this debate by examining the behaviour of the two foreign bank entry forms: 1) opening a foreign bank branch via greenfield investment, and (2) acquiring the ownership of an existing local bank during 2007–2009 for specifically Turkish banking sector. We compare our findings on lending behavior of the two modes of entry with the lending behavior of domestically owned Turkish banks (including state-owned banks) to provide a more thorough understanding of the dynamics and strategies of the different types of banks and organizational forms operating in the Turkish banking sector. Given the sensitivity identified in previous research of the effects of foreign banks on the particular circumstances in the host markets, our study focuses on one particular market and digs much deeper than is possible in a cross-country study.

The Turkish banking sector presents a unique environment to investigate in detail the impact of foreign banks. Having been subject to major reforms after its own earlier 2000–2001 economic crisis (Akyuz and Boratav, 2003; Onder and Ozyildirim, 2008), the Turkish banking sector was in a relatively strong position in 2007, with most of its banks having high asset quality, high capital adequacy ratios, and high asset profitability (Akinci et al., 2013; Fukuyama and Mataousek, 2011; Atici and Gursoy, 2011; Aras, 2010; Egert, 2007). These characteristics attracted many foreign banks, which entered the Turkish market either through opening their own branches as greenfield investments or purchasing ownership of an existing local bank. We refer to these two entry forms as foreign bank branch and foreign-acquired bank, respectively. The entrance of foreign banks into the Turkish market was so extensive in 2007 (2008) that only 30% (28%) of all operating banks in Turkey remained wholly domestically owned. This marked presence of foreign banks in the Turkish banking sector increased the likelihood of foreign shock transmissions from foreign parent banks to their Turkish banking operations.

Our dataset includes all banks operating in Turkey between 2005 and 2010. We stopped our dataset collection after 2010, due to the Arab Spring political turmoil which started in 2011 and influenced the volume of foreign investment in the region (Arayssi et al., 2019; Ghosh, 2016). We start the analysis by applying a hierarchical clustering technique to identify strategic bank groups in 2005 and 2006, before the start of 2007–2009 global financial crisis. The clustering technique generates six strategic groups based on bank assets and nine strategic groups based on bank sources of funds. Each strategic group has a unique pattern of lending and sourcing of funds. Using the MOBIUS method of Sudharshan et al. (1991), we examine yearly bank membership stability to detect if any bank moves from one strategic group to another, moves which would indicate a change in bank strategy. For robustness to the clustering technique, we also undertook regression analysis. Both techniques reported consistent results.

Contrary to previous studies (e.g., Cetorelli and Goldberg, 2011; De Haas et al. 2014; Cull and Martinez Peria 2013), our findings show that both foreign-acquired banks and foreign bank branches supported the Turkish banking sector by issuing loans to Turkish customers during the financial crisis, in particular customer and credit card loans, while domestic banks moved away from this strategy. Our findings regarding bank sourcing of funds are broadly in line with previous research (Claeys and Heniz; Degryse et al., 2012; Jeon et al., 2013). However, unlike prior research (which did not consider the matter), we find that foreign-acquired banks relied on foreign currency deposits of Turkish residents and local interbank funding which made them less exposed compared to foreign bank branches that relied on sourcing funds from foreign interbank funding and foreign currency deposits of residents abroad.

The remainder of the paper is structured as follows. Section 2 presents the theoretical background and develops the hypotheses. Section 3 outlines the methodology used to explore banks' strategies. Section 4 describes bank data. Section 5 reports and discusses the empirical results, including robustness check analysis. Section 7 concludes the study.

2. Literature and hypotheses

The literature on foreign bank strategies in host markets suggests that foreign banks need to apply different banking strategies from domestic banks, to overcome the liability of “foreignness” associated with doing business in a different environment (Beck and Brown, 2015; Dell’Ariccia and Marquez, 2004; Miller and Parkhe, 2002; Berger et al., 2001). Several empirical studies report that foreign banks are

more likely to focus on lending to transparent firms whereas domestic banks will lend also to opaque firms, exploiting their advantages in local knowledge and familiarity with local firm practices (Beck and Brown, 2015; Dell' Ariccia and Marquez, 2004; Berger et al., 2001).

To our knowledge, there are only two studies, Gunes and Yildirim (2016) and Assaf et al. (2013), that analyse what happened in the Turkish banking sector during the 2007–2009 global financial turmoil. Both studies focus primarily on the effect of bank ownership: using a stochastic frontier approach to analyse the efficiency of banks operating in the Turkish market, these studies both find foreign banks to be more efficient than domestic banks. Assaf et al. (2013) argue that foreign banks have better performance than domestic banks because they focus on servicing top-performing clients who are perceived less risky. While Assaf et al. (2013) reports performance differences between the two foreign entry modes, foreign banks and foreign-bank branches, it does not analyse the effect on those domestic banks that have minority foreign ownership. In contrast, we separate out domestic banks that have sold any proportion (minor and major) of their ownership to foreign banks to see if their lending and access to funding sources differs in any significant way to banks that are wholly domestic in ownership terms.

The foreign bank entry literature suggests that the organizational entry form chosen by foreign banks affects their banking strategies in the host countries (Curi et al., 2015; Claeys and Hainz, 2014; Degryse et al., 2012; Cerutti et al., 2007). Entering the foreign market by acquiring an existing domestic bank provides the foreign bank with a ready-made customer network (Claeys and Hainz, 2014; Degryse et al., 2012), which enables the acquirer immediately to utilise existing relationship lending knowhow and to grant long-term loans to potentially opaque customers. On the other hand, entering the foreign market via greenfield investment take time both to create a local customer network and to develop trust in relationships lending. This in turn pushes the newly established foreign bank branches to focus on issuing short-term loans until they develop a reliable customer network (Claeys and Hainz, 2014, Degryse et al., 2012). Hence, we expect foreign bank branches to focus more on short term lending and other liquid assets as opposed to foreign-acquired banks which can rely on the acquired local customer network, enabling the latter to follow a similar lending and funding pattern to domestic banks.

A further difference between foreign bank branches and foreign-acquired banks is that the former is more heavily focused on their international operations and internal funding from their foreign parent banks (Degryse et al., 2012), creating more reliance on foreign currency funding and foreign currency lending when compared with foreign-acquired banks. Due to the acquired clientele network in the host country, foreign-acquired banks are more similar in bank lending and funding strategies to domestic banks, than foreign bank branches, which rely more heavily on international funding and internal parent funding. Based on these arguments, we can hypothesize the following:

Hypothesis 1.1: *The lending and funding strategies of foreign-acquired banks were more like those of domestic banks than were those of foreign bank branches.*

Hypothesis 1.2: *The lending and funding strategies of foreign-acquired banks rely more on their host markets than do foreign bank branches.*

Several studies examining the 2007–2009 global financial turmoil report an increase in the sensitivity of the credit supply of foreign banks to the balance sheet conditions of parent banks (Chen et al., 2017; Dekle and Lee, 2015; Frey and Kerl, 2015; Popov and Udell, 2012), with parent banks importing more funds from their foreign subsidiaries than before the crisis (Jeon et al., 2013; De Haas and Van Leuven, 2010). Such outflows to their parent banks should have forced foreign-owned banks either to cut their Turkish lending or to look for alternative sources of funding in the Turkish market.

However, this might have been expected to vary according to the form that their entry into Turkey had taken. Havrylchyk and Jurzyk (2011) argue that foreign bank branches in host countries are supported by parent banks when home conditions are good, whereas banks entering the market via acquisition are more likely to be supported by their parent banks when home conditions deteriorate. Cetorelli and Goldberg (2011) argue that there is a borrowing and lending internal market between parent organizations and their overseas affiliates, and that in the crisis period in their home market the parent firm will reduce funding to its affiliates. Furthermore, there may if necessary be an active transferal of funds from the parent's overseas affiliates to the parent bank. Foreign bank branches created via greenfield investment typically will be more integrated with their parent banks (Jeon et al., 2013) as opposed to foreign-acquired banks which are more independent (Havrylchyk and Jurzyk, 2011). If the parent banks of foreign branches face difficulties in their home countries, we conjecture that these foreign branches will be more likely to look for alternative sources of finance in their host markets. Given the difficulties in getting funding from their parent and the time it takes to develop new funding sources in the host market, we hypothesize that subsequently foreign branches will have had to change their loan supply strategies in Turkish market during 2007–2009 global financial crisis.

Regarding foreign banks entering host countries through purchasing ownership of local banks, this foreign bank entry strategy makes them less dependent on parent bank internal funding as they can tap into local funding sources of the acquired local bank (De Haas and Van Horen, 2013). Foreign banks with access to local deposits in host markets have been shown to be more stable suppliers of loans (Frey and Kerl, 2015). As a result, we would expect that foreign-acquired banks will be less likely to change banking activities than the bank branches of foreign-owned banks, the latter being more dependent on intra-bank parent funding than on local sources of funds in the host market during the financial crisis. Hence, we hypothesize the following:

Hypothesis 2: *Foreign bank branches changed their lending and funding strategies more than foreign-acquired banks did during the 2007–2009 global financial crisis.*

Yet, when foreign-acquired banks are compared with domestic banks with no foreign ownership, we hypothesize that the latter would have been less likely to change their banking strategies during the 2007–2009 global financial crisis. Sharing ownership with foreign banks will expose foreign acquired banks to the decision-making processes of their foreign owners who experience difficulties in their home countries. Ongena et al. (2015) shows that internationally borrowing by foreign-owned banks contracted their lending during the crisis more than locally funded domestic banks did. Given that several foreign-owned banks in Turkey shared ownership with foreign banks from developed countries (e.g., Akbank TAS—20% owned by Citigroup Inc), it exposed them to the difficulties faced by their co-owners in their home countries. As the international borrowing contracted, this type of bank would be more inclined to look to the host market for funding to finance their lending, which would have resulted in changes in their funding and lending strategies. On the other side, domestic banks with 100% local ownership will have been fully exposed to the local owner's policy lending and funding characteristics. Furthermore, account needs to be taken of the characteristics of the Turkish banking sector where 60% of domestic banks in 2007–2009 had strong Turkish political ties. These consisted of three state-owned banks (Turkiye Cumhuriyeti Ziraat Bankasi AS, Turkiye Halk Bankasi AS and Turkiye Vakiflar Bankasi TAO), a private domestic bank owned by opposition political forces (Turkiye Is Bankasi AS) and two other banks (Adabank AS and Birlesik Fon Bankasi AS) managed by a government agency, the Saving Deposit and Insurance fund. The lending and funding behavior of these seven banks would have faced pressures to follow the political policies of clients regardless of the market conditions. This conjecture is supported by the findings of Cull and

Martinez Peria (2013) and Mihaljek (2011) that show that in times of crisis government-owned banks are more likely to continue lending to support the economy than are foreign-owned banks. As for other domestic banks, if they relied on local funding rather than borrowing in the international markets, they would have been less likely to change their strategies because the roots of the 2007–2009 crisis originated in the advanced economies, not in the emerging markets. Furthermore, the Turkish banking sector was relatively strong with high bank capital adequacy ratios and bank profitability at the onset of 2007 global financial crisis due to its major reforms after its domestic 2000–2001 economics crisis (Akinçi et al., 2013, Fukuyama and Mataousek, 2011; Atici and Gursoy, 2011). Taking into account these distinctive characteristics of Turkish banking sectors—i.e., the influence of the government-owned and politically-connected banks and the strong capital adequacy ratios of the other domestic banks—we hypothesize that domestic banks would have been less likely to change their lending and funding sources as opposed to foreign-exposed banks which would have been more exposed to international borrowing markets. As a result, we predict the following:

Hypothesis 3: *Domestic-owned banks in Turkey changed their lending and funding strategies less than did foreign-acquired banks during the 2007–2009 crisis.*

3. Methodology

3.1. Identification of strategic groups in the Turkish banking sector

Our dataset includes all banks operating in Turkey between 2005–2010. We use the clustering technique of Hair et al. (1995) to identify strategic groups among banks to test *Hypothesis 1*. This technique enables us to identify strategic groups by separating banks with similar lending and funding characteristics into different distinctive clusters, so that the banks are homogenous within each cluster but heterogeneous between clusters.

We use two sets of selection criteria to identify the clusters. The first set consists of fifteen accounting variables to account for the different types of bank assets: liquid assets, non-specialized loans, discount notes, export loans, import loans, loans given to financial sector, international loans, consumer loans, credit cards, precious metal loans, other loans, specialized lending loans, other receivables loans, domestic loans, foreign loans. The second set consists of fourteen accounting variables to account for different types of bank funding sources: foreign currency deposits by residents in Turkey, foreign currency deposits by residents abroad, interbank deposits in Central Bank of Turkey, interbank deposits with domestic banks, interbank deposits with foreign banks, interbank deposits with participation banks, other interbank deposits, funds borrowed from domestic banks, funds borrowed from foreign banks, saving deposits, public sector deposits, commercial deposits, other institution deposits, precious metals deposits.

All variables are measured as a proportion of assets and they are standardized across banks over the range [0, 1] as in Antzoulatos et al. (2008), i.e., for each accounting variable we deduct the mean value from each observation and divide by the variable's standard deviation. This standardization procedure ensures that no variable has an outsize influence on the clustering process simply as a function of scale or variability. As bank assets and bank funding sources tend to be highly correlated; we examine the assets and funding sources separately. We apply the clustering technique on an annual basis in our dataset period between 2005–2010, so that we can determine if there is any change of a bank's strategy in a specific year. Banks can change strategies, subject to their specific conditions, and by analyzing them annually, we can obtain a more finely calibrated analysis of their

strategies and, in particular, we are able to identify if there was a change in strategies during the global financial crisis years.

Two commonly used clustering techniques are: k-clustering and hierarchical clustering. K-clustering (partition clustering) allocates cases based on a pre-determined number of clusters, whereas hierarchical clustering does not impose such a restriction, thereby allowing for outliers to be easily identified (Halaj and Zochowski, 2009). As the aim of our study is to provide detailed insights into the behavior of individual banks, including that of outliers, we apply hierarchical clustering.

Hierarchical clustering starts with each bank being treated as being in a cluster of its own (i.e., if there are N banks there will be N initial clusters). In the next step, the closest clusters are combined to form a new cluster. The number of clusters decreases as similar banks agglomerate in each subsequent step. We apply the Ward's method (Ward, 1963) to the agglomeration of banks in each cluster as in Antzoulatos et al. (2008). The Ward's method ($Wd_{A,B}$) calculates the distance between two clusters A and B as the difference between within-cluster sum of squares resulting from merging the two clusters and the total within-cluster sum of squares for the two clusters separately (Hand et al., 2001).

$$\begin{aligned} Wd_{A,B} &= \sum_{i \in A \cup B} \|x_i - \bar{x}_{A \cup B}\|^2 - \sum_{i \in A} \|x_i - \bar{x}_A\|^2 - \sum_{i \in B} \|x_i - \bar{x}_B\|^2 \\ &= \frac{n_A n_B}{n_A + n_B} \|\bar{x}_A - \bar{x}_B\|^2 \end{aligned} \quad (1)$$

where x_i is defined as bank i with a vector in k —dimensional space in which each dimension represents a particular balance sheet variable:

$$x_i = (x_{i1}, x_{i2}, x_{i3}, \dots, x_{ik}) \quad (2)$$

where \bar{x}_A is defined as the mean of cluster A and is a vector in k -dimensional space in which each dimension represents a particular balance sheet variable:

$$\bar{x}_A = (\bar{x}_{A1}, \bar{x}_{A2}, \bar{x}_{A3}, \dots, \bar{x}_{Ak}) \quad (3)$$

where \bar{x}_{Ak} is defined as the mean of banks in cluster A in the balance sheet variable k and is calculated as:

$$\bar{x}_{Ak} = \frac{1}{n_A} \sum_{i \in A} x_{ik} \quad (4)$$

where x_{ik} is defined as the value of balance sheet variable k for bank i . n_A is defined as the number of banks in cluster A.

Based on Ward's method (Ward, 1963), the total within-cluster sum of squares is the Error Sum of Squares (ESS) of the cluster. It measures the deviation from the mean and is calculated as the sum of squared Euclidean distance between all banks in the cluster and its mean. The ESS can be interpreted as a measure of the 'tightness of cluster' (Antzoulatos et al., 2008, p. 983).

$$ESSA = \sum_{i \in A} \|x_i - \bar{x}_A\|^2 \quad (5)$$

The ESS increases as clusters are created in each step. The aim of Ward's method (Ward, 1963) is to keep the ESS growth as small as possible by selecting the points/clusters with the minimum Ward's distance in the new set of bank observations. One should note that in each subsequent step the Ward's distance is calculated by re-computing means and the sum of squares of the new created groups

and the remaining banks. The clustering procedure continues until all of banks are grouped into one cluster. To avoid having all banks agglomerated in one single cluster, we stop the hierarchical clustering method using the 70% cut off level (Halaj and Zochowski, 2009). The choice of where to pitch the cut-off level has to involve a trade-off: a higher cut-off than 70% will yield a smaller number of clusters, but at a price of grouping together banks that have very different characteristics, particularly given the heterogeneity structure of the Turkish banking market, which comprises not only of foreign banks of two different forms but also government and politically connected banks, as well as conventional domestic banks. Furthermore, the 70% cut off for bank assets which is dependent on 15 accounting variables gives us six clusters, while the same 70% cut off for bank sources of funds at a smaller number of 14 accounting variables gives us nine clusters suggesting that there is a higher heterogeneity on fundings sources, which we need to account for. We therefore follow convention and use the 70% cut off employed in earlier research.

3.2. Strategic groups membership dynamics in Turkish banking sector

To identify if any bank changes its funding and lending strategy as predicted in *Hypotheses 2* and *3*, we examine the dynamics of strategic groups during the years 2005–2010. Any bank moving from one strategic group (cluster) to another indicates a change in its strategy and affects the membership composition of the two affected clusters.

To assess the membership stability of banks within clusters, we apply Sudharshan et al. (1991)'s MOBIUS method. This method is common in empirical studies (Fiegenbaum and Thomas, 1993; Koller, 2001; Zuniga-Vicente et al., 2004) for detecting any change in bank cluster composition. The MOBIUS method creates a matrix of banks with bank strategic groups in two time periods. We focus on the main diagonal of this matrix, which captures any structural change of the same group in two time periods. We use the “Match Ratio” (MR) index when analysing the main diagonal of the matrix. The MR is a variable taking the value between 0 and 1 and is measured as the following:

$$MR = \sum_{i=1}^{\min(m,n)} C_{i,i} / \frac{1}{2} \left(\sum_{i=1}^m N_{1i} + \sum_{i=1}^m N_{2i} \right), m \geq n \quad (6)$$

where $C_{i,i}$ = number of banks that move together from strategic group i in year 1 to the same strategic group i in the year 2, m = The number of strategic groups in year 1, n = The number of strategic groups in year 2, $N_{1,i}$ = Total number of banks belonging to strategic group i in year 1, $N_{2,i}$ = Total number of banks belonging to strategic group i in the year 2.

When the diagonal MR for group i is 1 (MR=1), it indicates that all the bank members of group i in year 1 are the same as the bank members of the group i in year 2, implying that those banks in year 1 have maintained the same banking strategy in year 2. Any value of MR between 0 and 1 indicates that at least one bank member has changed its banking strategy the following year. The lower the match ratio, the higher bank mobility and the higher the change in banking strategies between the two time periods. When MR for group i is 0 (MR=0), it indicates that all bank members of group i in year 1 are different from the bank members of the group i in year 2, indicating that those banks in year 1 have changed their banking strategies in year 2. The MR ratio is calculated for all the strategic groups created using bank types of assets and bank sources of funds to identify changes in membership composition of strategic groups during 2005–2010.

3.3. Regression model on bank sources of funds for bank lending

As a robustness check to our clustering technique, we also regress bank lending on the various sources of funds available to finance lending. We run the model separately for foreign-acquired banks, foreign bank branches and domestically owned banks, and do it for both the 2007–2009 crisis years and for the three years outside the crisis years, i.e., for 2005, 2006 and 2010. This is the approach used in Cull and Martinez Peria (2013), which investigated the change in bank strategies in Eastern Europe and Latin America during the global credit crunch crisis. In order to aid interpretation and deal with various econometric issues we standardize both the dependent variable and the explanatory variables to take the form of a Z score with zero means and standard deviations equal to one. Based on our panel dataset and the Hausman test results, we include firm fixed effects in the model to control for time-invariant unobservable bank variables.

Each of the six regressions takes the following form, which counts for the three types of banks (domestic, foreign-acquired banks and foreign branches) and the two time periods (outside crisis and inside crisis years):

$$\begin{aligned} \text{Loans}_{it} = & \beta_0 + \beta_1 \text{Equity}_{it} + \beta_2 \text{Liquidity}_{it} + \beta_3 \text{Deposit funding}_{i,t} \\ & + \beta_4 \text{Funds borrowed}_{it} + \beta_5 \text{Profitability}_{it} + \varepsilon_i \end{aligned} \quad (7)$$

where Loans_{it} is the natural logarithm of loans of bank i at times t ; Equity_{it} is the ratio of Equity/Total Assets of bank i at time t ; Liquidity_{it} is the ratio of Liquid Assets/Total Deposits of bank i at time t ; $\text{Deposit funding}_{it}$ is the natural logarithm of deposits of bank i at times t ; $\text{Funds borrowed}_{it}$ is the ratio of Funds borrowed/Total Assets of bank i at times t ; and $\text{Profitability}_{it}$ is the ratio of Net Operating Income before Tax/ Total Assets of bank i at time t .

Equity_{it} , $\text{Deposit funding}_{it}$ and $\text{Funds borrowed}_{it}$ are key sources of bank funding that can be used to support lending. We predict that Loans_{it} would be a positive function of these funding sources. We include Liquidity_{it} as an alternative asset a bank can hold, and therefore we predict a negative association between it and Loans_{it} . The last variable, $\text{Profitability}_{it}$, is expected to be positively associated with loans. The question of interest is whether these relationships vary between types of banks and period. As the variables are all standardized, we can interpret a one unit (i.e., one standard deviation) change in, say, Equity_{it} as being associated with a β_1 standard deviation changes in Loans_{it} .

4. Data description

The dataset in our study includes all domestic banks, foreign-acquired banks and foreign branches operating in the years 2005–2010 in the Turkish market. We use the Banks Association of Turkey (2012) database to collect bank variables and information on ownership and foreign bank entry form. Our sample starts with 34 banks in 2005 and decreases to 32 banks in 2008 and remains the same number of 32 banks in 2009 and 2010.

Table 1 provides descriptive statistics for the variables used in the hierarchical clustering for the two selection criteria analysed separately for bank assets and bank funding sources and by year.

Table 1. Descriptive statistics of accounting variables of banks operating in Turkish banking sector during 2005–2010.

| Accounting variables for bank assets | 2005 | | | | 2006 | | | | 2007 | | | | 2008 | | | | 2009 | | | | 2010 | | | |
|---|------|--------|--------|--------|------|--------|--------|--------|------|--------|--------|--------|------|--------|--------|--------|------|--------|--------|--------|------|--------|--------|--------|
| | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. |
| Liquid Asset/TA | 34 | 0.4324 | 0.0627 | 0.9271 | 33 | 0.5009 | 0.1357 | 0.9872 | 33 | 0.4707 | 0.0979 | 0.9858 | 32 | 0.4274 | 0.1315 | 0.9722 | 32 | 0.4456 | 0.0859 | 0.9485 | 32 | 0.4350 | 0.1080 | 0.9964 |
| Non-specialized loans/TA | 34 | 0.3572 | 0.0000 | 0.6490 | 33 | 0.3879 | 0.0000 | 0.7289 | 33 | 0.4103 | 0.0000 | 0.7137 | 32 | 0.4164 | 0.0000 | 0.7248 | 32 | 0.4206 | 0.0000 | 0.7313 | 32 | 0.4572 | 0.0000 | 0.7410 |
| Discount notes/TA | 34 | 0.0103 | 0.0000 | 0.1516 | 33 | 0.0108 | 0.0000 | 0.2305 | 33 | 0.0040 | 0.0000 | 0.0392 | 32 | 0.0035 | 0.0000 | 0.0352 | 32 | 0.0050 | 0.0000 | 0.0251 | 32 | 0.0133 | 0.0000 | 0.2054 |
| Export loans/TA | 34 | 0.0598 | 0.0000 | 0.1988 | 33 | 0.0557 | 0.0000 | 0.2065 | 33 | 0.0437 | 0.0000 | 0.1327 | 32 | 0.0454 | 0.0000 | 0.1551 | 32 | 0.0407 | 0.0000 | 0.1750 | 32 | 0.0422 | 0.0000 | 0.1503 |
| Import loans/TA | 34 | 0.0009 | 0.0000 | 0.0154 | 33 | 0.0003 | 0.0000 | 0.0042 | 33 | 0.0001 | 0.0000 | 0.0014 | 32 | 0.0001 | 0.0000 | 0.0029 | 32 | 0.0000 | 0.0000 | 0.0001 | 32 | 0.0000 | 0.0000 | 0.0002 |
| Loans given to financial sector/TA | 34 | 0.0212 | 0.0000 | 0.2885 | 33 | 0.0227 | 0.0000 | 0.2080 | 33 | 0.0218 | 0.0000 | 0.1767 | 32 | 0.0180 | 0.0000 | 0.2123 | 32 | 0.0226 | 0.0000 | 0.1668 | 32 | 0.0407 | 0.0000 | 0.3905 |
| International loans/TA | 34 | 0.0156 | 0.0000 | 0.3449 | 33 | 0.0154 | 0.0000 | 0.2912 | 33 | 0.0196 | 0.0000 | 0.4770 | 32 | 0.0203 | 0.0000 | 0.5423 | 32 | 0.0225 | 0.0000 | 0.5517 | 32 | 0.0065 | 0.0000 | 0.0583 |
| Consumer loans/TA | 34 | 0.0528 | 0.0000 | 0.3497 | 33 | 0.0707 | 0.0000 | 0.4345 | 33 | 0.0807 | 0.0000 | 0.4397 | 32 | 0.0871 | 0.0000 | 0.4728 | 32 | 0.0910 | 0.0000 | 0.3862 | 32 | 0.1014 | 0.0000 | 0.4181 |
| Credit cards/TA | 34 | 0.0263 | 0.0000 | 0.1654 | 33 | 0.0226 | 0.0000 | 0.1399 | 33 | 0.0278 | 0.0000 | 0.1483 | 32 | 0.0300 | 0.0000 | 0.1626 | 32 | 0.0301 | 0.0000 | 0.1625 | 32 | 0.0283 | 0.0000 | 0.1678 |
| Precious metals loans/TA | 34 | 0.0006 | 0.0000 | 0.0080 | 33 | 0.0005 | 0.0000 | 0.0102 | 33 | 0.0007 | 0.0000 | 0.0128 | 32 | 0.0008 | 0.0000 | 0.0169 | 32 | 0.0009 | 0.0000 | 0.0173 | 32 | 0.0009 | 0.0000 | 0.0192 |
| Other loans/TA | 34 | 0.1696 | 0.0000 | 0.4136 | 33 | 0.1890 | 0.0000 | 0.5191 | 33 | 0.2119 | 0.0000 | 0.5764 | 32 | 0.2111 | 0.0000 | 0.4913 | 32 | 0.2078 | 0.0000 | 0.5423 | 32 | 0.2238 | 0.0000 | 0.5260 |
| Specialized lending/TA | 34 | 0.0067 | 0.0000 | 0.1215 | 33 | 0.0083 | 0.0000 | 0.1426 | 33 | 0.0093 | 0.0000 | 0.1457 | 32 | 0.0096 | 0.0000 | 0.1350 | 32 | 0.0092 | 0.0000 | 0.1320 | 32 | 0.0096 | 0.0000 | 0.1202 |
| Other receivables/TA | 34 | 0.0137 | 0.0000 | 0.2934 | 33 | 0.0043 | 0.0000 | 0.1299 | 33 | 0.0004 | 0.0000 | 0.0118 | 32 | 0.0049 | 0.0000 | 0.1547 | 32 | 0.0000 | 0.0000 | 0.0000 | 32 | 0.0000 | 0.0000 | 0.0000 |
| Domestic loans/TA | 34 | 0.3420 | 0.0000 | 0.6437 | 33 | 0.3741 | 0.0000 | 0.7246 | 33 | 0.3945 | 0.0000 | 0.7122 | 32 | 0.4097 | 0.0000 | 0.7248 | 32 | 0.4056 | 0.0000 | 0.7313 | 32 | 0.4470 | 0.0000 | 0.7357 |
| Foreign loans/TA | 34 | 0.0219 | 0.0000 | 0.4965 | 33 | 0.0233 | 0.0000 | 0.5179 | 33 | 0.0259 | 0.0000 | 0.4770 | 32 | 0.0219 | 0.0000 | 0.5423 | 32 | 0.0245 | 0.0000 | 0.5517 | 32 | 0.0200 | 0.0000 | 0.3998 |
| Accounting variables for bank sources of funds | 2005 | | | | 2006 | | | | 2007 | | | | 2008 | | | | 2009 | | | | 2010 | | | |
| | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. | N | Mean | Min. | Max. |
| Foreign Currency_Residents in Turkey/TA | 34 | 0.1900 | 0.0006 | 0.5189 | 33 | 0.2016 | 0.0012 | 0.7237 | 33 | 0.1847 | 0.0000 | 0.5875 | 32 | 0.2185 | 0.0043 | 0.7287 | 32 | 0.1838 | 0.0038 | 0.4526 | 32 | 0.1507 | 0.0018 | 0.4007 |
| Foreign Currency_Residents abroad/TA | 34 | 0.0148 | 0.0000 | 0.0801 | 33 | 0.0134 | 0.0000 | 0.0652 | 33 | 0.0114 | 0.0000 | 0.0569 | 32 | 0.0111 | 0.0000 | 0.0510 | 32 | 0.0149 | 0.0000 | 0.0655 | 32 | 0.0113 | 0.0000 | 0.0449 |
| Interbank Deposits in Central Bank of Turkey/TA | 34 | 0.0000 | 0.0000 | 0.0004 | 33 | 0.0000 | 0.0000 | 0.0003 | 33 | 0.0000 | 0.0000 | 0.0003 | 32 | 0.0001 | 0.0000 | 0.0013 | 32 | 0.0000 | 0.0000 | 0.0006 | 32 | 0.0000 | 0.0000 | 0.0006 |
| Interbank Deposits_Domestic banks/TA | 34 | 0.0757 | 0.0000 | 0.7107 | 33 | 0.0611 | 0.0000 | 0.8396 | 33 | 0.0265 | 0.0000 | 0.5072 | 32 | 0.0127 | 0.0000 | 0.2281 | 32 | 0.0187 | 0.0000 | 0.2529 | 32 | 0.0253 | 0.0000 | 0.2852 |
| Interbank Deposits_Foreign banks/TA | 34 | 0.0311 | 0.0000 | 0.6218 | 33 | 0.0364 | 0.0000 | 0.4006 | 33 | 0.0255 | 0.0000 | 0.1944 | 32 | 0.0249 | 0.0000 | 0.2010 | 32 | 0.0270 | 0.0000 | 0.2158 | 32 | 0.0562 | 0.0000 | 0.7069 |
| Interbank Deposits_Participation banks/TA | 34 | 0.0009 | 0.0000 | 0.0129 | 33 | 0.0003 | 0.0000 | 0.0042 | 33 | 0.0014 | 0.0000 | 0.0264 | 32 | 0.0010 | 0.0000 | 0.0102 | 32 | 0.0005 | 0.0000 | 0.0034 | 32 | 0.0005 | 0.0000 | 0.0042 |
| Interbank Deposits_Other/TA | 34 | 0.0000 | 0.0000 | 0.0000 | 33 | 0.0000 | 0.0000 | 0.0000 | 33 | 0.0000 | 0.0000 | 0.0000 | 32 | 0.0000 | 0.0000 | 0.0000 | 32 | 0.0000 | 0.0000 | 0.0000 | 32 | 0.0000 | 0.0000 | 0.0000 |
| Funds Borrowed from Domestic banks/TA | 34 | 0.0178 | 0.0000 | 0.2986 | 33 | 0.0156 | 0.0000 | 0.1363 | 33 | 0.0248 | 0.0000 | 0.4101 | 32 | 0.0228 | 0.0000 | 0.3232 | 32 | 0.0207 | 0.0000 | 0.2339 | 32 | 0.0061 | 0.0000 | 0.0519 |
| Funds Borrowed from Foreign banks/TA | 34 | 0.1315 | 0.0000 | 0.5933 | 33 | 0.1581 | 0.0000 | 0.6938 | 33 | 0.1330 | 0.0000 | 0.4644 | 32 | 0.1201 | 0.0000 | 0.4412 | 32 | 0.1102 | 0.0000 | 0.5837 | 32 | 0.1512 | 0.0000 | 0.7987 |
| Savings Deposits/TA | 34 | 0.1399 | 0.0000 | 0.3967 | 33 | 0.1453 | 0.0000 | 0.4184 | 33 | 0.1519 | 0.0000 | 0.4561 | 32 | 0.1710 | 0.0000 | 0.4366 | 32 | 0.1701 | 0.0000 | 0.4030 | 32 | 0.1645 | 0.0000 | 0.3878 |
| Public Sector Deposits/TA | 34 | 0.0074 | 0.0000 | 0.0999 | 33 | 0.0061 | 0.0000 | 0.0860 | 33 | 0.0095 | 0.0000 | 0.0910 | 32 | 0.0089 | 0.0000 | 0.0821 | 32 | 0.0091 | 0.0000 | 0.0882 | 32 | 0.0095 | 0.0000 | 0.0933 |
| Commercial Deposits/TA | 34 | 0.0703 | 0.0008 | 0.1547 | 33 | 0.0591 | 0.0001 | 0.1329 | 33 | 0.0659 | 0.0000 | 0.1403 | 32 | 0.0741 | 0.0008 | 0.2198 | 32 | 0.0927 | 0.0000 | 0.2397 | 32 | 0.0967 | 0.0002 | 0.2223 |
| Other Institution Deposits/TA | 34 | 0.0156 | 0.0000 | 0.1387 | 33 | 0.0156 | 0.0000 | 0.1268 | 33 | 0.0146 | 0.0000 | 0.1652 | 32 | 0.0126 | 0.0000 | 0.1068 | 32 | 0.0106 | 0.0000 | 0.0801 | 32 | 0.0134 | 0.0000 | 0.0698 |
| Precious Metals Deposits/TA | 34 | 0.0004 | 0.0000 | 0.0116 | 33 | 0.0003 | 0.0000 | 0.0052 | 33 | 0.0001 | 0.0000 | 0.0016 | 32 | 0.0002 | 0.0000 | 0.0024 | 32 | 0.0005 | 0.0000 | 0.0044 | 32 | 0.0010 | 0.0000 | 0.0068 |

Table 1 reveals that the ratio of liquid assets to total assets declined by nearly 10% between 2007 (mean = 0.4707) and 2008 (mean = 0.4274). Similarly, during the same period, the discount notes ratio reduced by more than 12% (0.0040 v. 0.0035), financial sector loans by 17% (0.0218 v. 0.0180) and foreign loans by 15% (0.0259 v. 0.0219). On the other hand, the ratios for other types of lending, such as non-specialized loans, export loans, consumer loans, credit cards, precious metals loans, specialized lending, and domestic loans increased over the 2007–2008 years. As for bank funding sources, Table 1 reveals that foreign currency deposits held by residents in Turkey increased by 18% during the crisis (from 0.1847 to 0.2185), whereas foreign currency deposits held by residents abroad declined by 2%, from 0.0114 to 0.0111, consistent with foreign residents being more exposed to the crisis than domestic residents. Interbank deposits with domestic banks and foreign banks decreased over the two years of the crisis, suggesting there was a decline in interbank lending during the international financial turmoil. On the other hand, saving deposits ratio increased by 12%, from 0.1519 to 0.1710, consistent with precautionary saving by firms and individuals during those years.

In the next section, we present the empirical results from the clustering technique which was used to identify the strategic groups across banks operating in Turkish banking sector. Then we calculate the match ratio for membership stability within strategic groups across time. The purpose of these two methods is to investigate the membership dynamics of strategic groups between 2005–2010. We also present the findings from the regression model which was used as further robustness check analysis.

5. Empirical results

5.1. Strategic Groups in Turkish banking sector between 2005–2010

The results of applying Ward's hierarchical clustering technique (Ward, 1963) are presented in Appendix 1 (type of assets) and Appendix 2 (sources of funds). It can be seen that each of the strategic groups has its own unique characteristics. Most of the strategic groups are dominated by a unique type of ownership and foreign entry mode.

According to Appendix 1, foreign-acquired banks dominate Group 3. Group 3 specializes in credit card loans and consumer loans. Domestic-owned banks dominate Groups 2 and 4. Noticeably, in Group 2 state banks are the persistent domestic banks across all the five years, 2005–2010. Group 2's main characteristic is issuing specialized loans. Specialized loans largely appertain to state banks' programs that aim to support the Turkish state programme on supporting and developing the Turkish economy (El-Gamal and Inanoglu, 2005). *Turkiye Cumhuriyet Ziraat Bankasi A.S.* focuses on agricultural loans, whereas *Turkiye Halk Bankasi A.S.* focuses on small and medium sized enterprise loans (El-Gamal and Inanoglu, 2005).

Group 4 is also dominated by domestic banks, ones which are not state-owned banks but privately-owned domestic banks. Banks in Group 4 largely focus on export loans, precious metals loans and non-specialized loans. Foreign-acquired banks compete with domestic banks in issuing export loans and precious metals loans. Export loans are important for Turkish producers engaged in international trade. Precious metals, particularly gold, are commodities largely held by Turkish customers for cultural reasons. As such, foreign-acquired banks compete with domestic banks to provide banking products that service the needs of Turkish customers. This is not surprising, given that banks in the foreign-acquired banks group were originally domestic banks whose ownership has been acquired by foreign banks, probably with the intention of accessing quickly the existing Turkish customer network.

Foreign bank branches created through greenfield investments dominate three strategic groups: Group 1 which holds substantial liquid assets; Group 6, except for year 2005, focuses on loans given to the financial sector; and Group 5, a one-member strategic group, Bank Mellat, specializes in issuing foreign loans. The specific features of Groups 1 and 6 are consistent with foreign bank branches following a less risky strategy. By focusing on holding liquid assets, foreign branches are less exposed to risks in the host country (Degryse et al., 2012) and by issuing loans to the financial sector, they are more focused on inter-banking markets (wholesale banking) as opposed to standard credit operations (retail banking). The one-member Group 5, specializing in foreign loans indicates foreign bank branch easy access to international exchange markets which enables foreign currency banking products for its clients. Interestingly, foreign bank branches are also present in Group 3 which was dominated by foreign-acquired banks and focused on credit card and consumer loans.

Overall, the results in Appendix 1 shows a mixed picture and do not completely support Hypothesis 1 that each type of bank has different strategies. While each strategic group is dominated by a single type of bank, we can see the presence of other type of banks within the same strategic group. This picture is consistent with different types of banks competing to deliver the same type of banking services and products to Turkish customers.

Appendix 2 reports group clustering results for bank sources of funds. Foreign-acquired banks dominate Groups 1, 2 and 3. Banks in these groups specialize in collecting foreign currency deposits from residents in Turkey, funds borrowed from domestic banks and interbank deposits from participatory banks. Foreign-owned banks have a comparative advantage in collecting foreign currency deposits from Turkish residents (Groups 1 and 3) as they can direct such funds around their international operations. Moreover, foreign-owned banks have an advantage over foreign bank branches as they can tap into the existing local networks of the domestic bank, they invested in. Because of that we can also see in Group 1's member composition that it is foreign-acquired banks that mostly compete with domestic banks, rather than foreign bank branches. As for Group 2, foreign-acquired banks specialize in generating funds from interbank activities with participation banks, which are commonly active in Turkish Islamic society (Cokgezen and Kuran, 2015; Aysan et al., 2018). This feature of Group 2, composed predominantly of foreign-acquired banks, supports our prediction that the mode of foreign bank entry determines the sources of funds that foreign banks will be able to access in the host market.

Domestic banks are the sole members of Groups 6 and 7. Domestic banks in Group 6 are all state banks. These state banks focus primarily on generating funds from public sector deposits and customer saving deposits, indicating their strong advantage state banks have in tapping into the savings of public institutions and the general public. Group 7, composed of banks sourcing funds from interbank deposits from the Central Bank of Turkey, is dominantly influenced by one-single bank, *Turkiye Is Bankasi A.S*—a bank owned by one of the major Turkish political parties. This bank is persistent in this group except for year 2008, when *Yapi ve Kredi Bank AS*, a foreign-acquired bank, replaced it. Such membership change at the peak of the financial crisis further indicates how this particular bank became integrated into the Turkish banking sector such that it received funding support from Turkish Central Bank.

Foreign bank branches dominate Groups 4, 5, 8 and 9. The first three generate funds from interbank deposits in foreign and domestic banks, indicating that foreign bank branches rely heavily on international and host interbank funding. Group 9 consists solely of foreign bank branches that specialize mainly in generating funds from foreign currency deposits from residents abroad, providing further evidence on how foreign branches rely on their international networks' clientele. This contrasts

with foreign-acquired banks which source funds from foreign currency deposits of residents in Turkey. Such difference in behavior between foreign-acquired banks and foreign bank branches supports the prediction that the mode of entry in a host market determines the type of sources of funds that a foreign bank can access.

Overall, the results from Appendix 2 on bank sources of funds support our first hypothesis for foreign bank branches and state-owned banks. Foreign bank branches use their international networks as an advantage in sourcing funds from foreign customers deposits whereas state-owned banks have strategic advantage in attracting saving deposits and public institutions deposits. Foreign bank branches also are more dependent than foreign acquired banks on interbank funding. Entry by a foreign bank via acquiring partial ownership in a local bank enables the foreign bank to take advantage of acquired domestic client network and compete with local domestic banks in a range of domestic sources of funds such as foreign currency deposits of Turkish customers, participation (Islamic) banks and other domestic banks.

5.2. Foreign bank entry form and strategic group membership dynamics during 2005–2010

Tables 2 and 3 provide insights on strategic group dynamics by analysing bank membership within the same strategic group across two time periods using the match ratio based on Sudharshan et al. (1991)'s MOBIUS method. As explained earlier, the match ratio measures the proportion of banks in a group in a year that were the same banks in the given group in the previous year, with 0.00 (1.00) representing the situation where all the banks in the group i in year t are different (the same) from bank members in group i the previous year $t-1$. Table 2 presents match ratios for strategic Groups 1–6 from Appendix 1 on bank assets, whereas Table 3 presents match ratios for strategic Groups 1–9 from Appendix 2 on bank sources of funds. Figures 1 and 2 present the trends through time of the overall patterns for the three types of banks based on bank assets and bank sources of funds.

Table 2. Match ratios of strategic groups based on bank assets.

| Panel A | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| Overall Sample | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.80 | 0.77 | 0.91 | 0.53 | 0.77 |
| Group 2 | 0.53 | 0.57 | 0.44 | 0.25 | 0.25 |
| Group 3 | 0.83 | 0.60 | 0.44 | 1.00 | 0.62 |
| Group 4 | 0.67 | 0.53 | 0.44 | 0.44 | 0.53 |
| Group 5 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Group 6 | 0.18 | 0.00 | 0.29 | 0.29 | 0.00 |
| Total | 0.73 | 0.61 | 0.52 | 0.50 | 0.53 |
| Panel B | | | | | |
| Foreign-acquired banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 3 | 0.89 | 0.71 | 0.36 | 1.00 | 0.50 |
| Group 4 | 0.80 | 0.44 | 0.36 | 0.20 | 0.29 |
| Group 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Continued on next page

| Panel B | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| Foreign-acquired banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Total | 0.92 | 0.74 | 0.32 | 0.23 | 0.24 |
| Panel C | | | | | |
| Domestic Banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.80 | 1.00 | 1.00 | 1.00 | 1.00 |
| Group 2 | 0.60 | 0.86 | 0.80 | 0.67 | 0.67 |
| Group 3 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 4 | 0.67 | 0.50 | 0.57 | 0.75 | 0.86 |
| Group 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 0.69 | 0.64 | 0.63 | 0.78 | 0.84 |
| Panel D | | | | | |
| Foreign Branches | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.80 | 0.67 | 0.86 | 0.50 | 0.75 |
| Group 2 | 0.40 | 0.33 | 0.00 | 0.00 | 0.00 |
| Group 3 | 1.00 | 0.67 | 1.00 | 1.00 | 1.00 |
| Group 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 5 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Group 6 | 1.00 | 0.00 | 0.40 | 0.40 | 0.50 |
| Total | 0.73 | 0.55 | 0.67 | 0.60 | 0.71 |

Note: Match ratios measure bank membership stabilities between two periods using Sudharsan et al. (1991) Mobius method within strategic groups. Panel A shows match ratios for all the six strategic groups based on bank assets. Panels B, C and D reports match ratios of foreign-acquired banks, domestic banks and foreign bank branches respectively. The numbers in bold on panels B, C and D display the dominances of foreign-acquired banks, domestic banks, and foreign bank branches on strategic groups respectively.

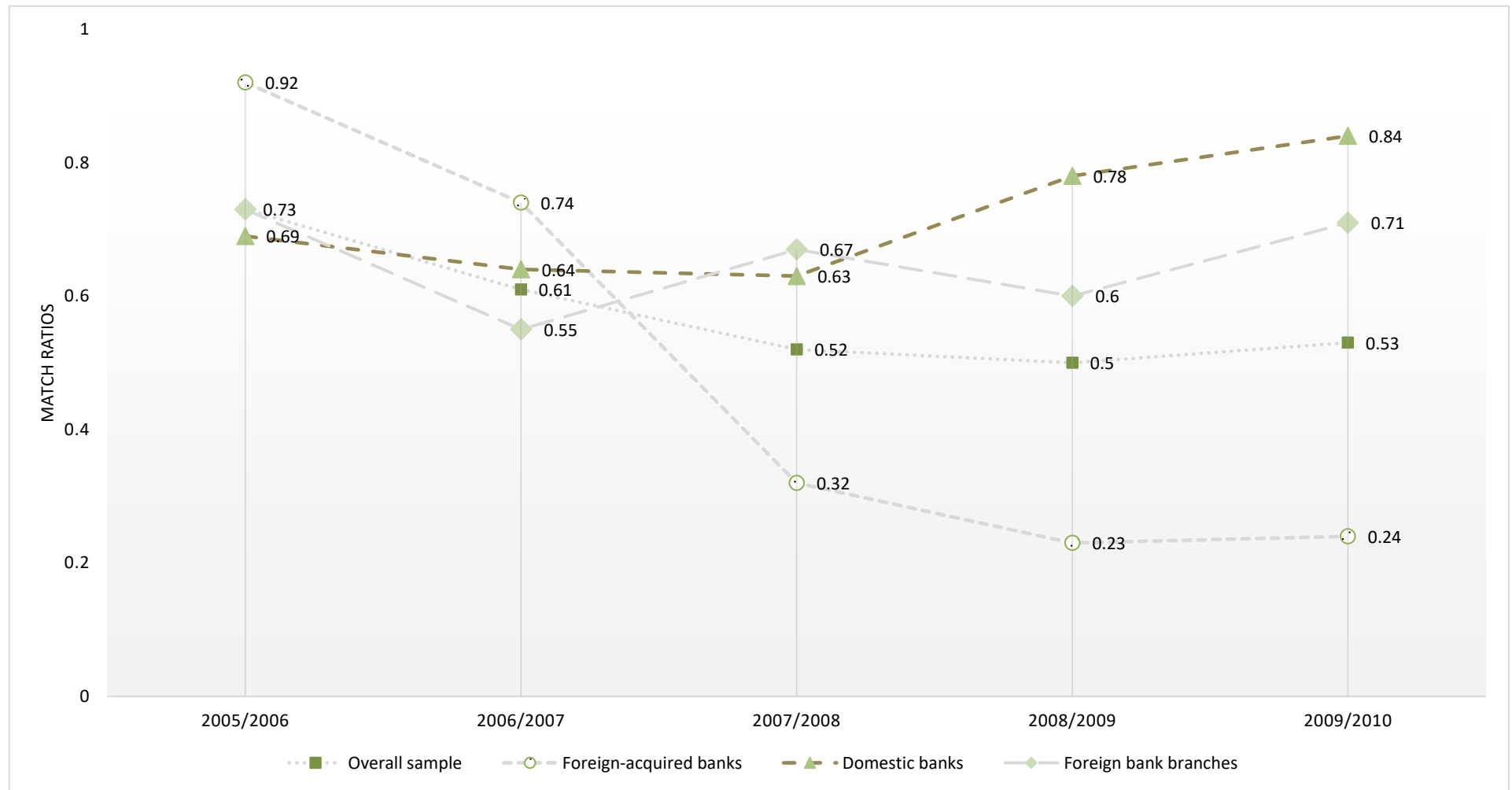


Figure 1. Match ratios on strategic groups based on bank assets for three types of banks and overall sample.

Panel A in Table 2 and Figure 1 reveal that overall, the six strategic groups' match ratios started to decrease in 2007/2008 (0.52) and declined further. In the next two years (0.50). Panels B, C and D report match ratios for the three types of banks: (1) foreign-acquired banks, (2) domestic banks and (3) foreign branches. The numbers highlighted in bold within each of these three panels corresponds to groups of banks dominated by one of the three bank types: (1) foreign-acquired banks, (2) domestic banks, and (3) foreign bank branches.

According to Group 3 in Panel B, the positions of foreign-acquired firms shifted in 2007/2008 (match ratio decreased from 0.71 to 0.36). Appendix 1 reveals that 7 out of 9 foreign-acquired banks moved away from lending consumer and credit card loans in 2008. The only two foreign-acquired banks (Finans Bank and Yapi ve Kredi Bankasi) that remained in Group 3 (match ratio of 1.00) during the peak of the crisis 2008/2009 continued to provide this type of loan finance to Turkish customers. During the crisis years 2007–2009, we also see the maximum match ratio (1.00) for foreign branches in group 3 panel D. From Appendix 1 in group 3, we can see that these are the foreign bank branches of HSBC and Citibank AS, suggesting that these foreign bank branches continued to issue consumer and credit card loans. This is consistent with the theoretical argument of Althammer and Haselmann (2011) that foreign banks have a technological advantage over domestic banks when it comes to screening projects, enabling foreign banks to continue and expand their lending activities during distressed market conditions. Interestingly, we can see from Appendix 1 that no state-owned banks or private domestic banks with 100% domestic ownership were members of group 3 as during the peak of crisis years, 2008 and 2009. This is consistent with Turkish customers being highly reliant on banks with foreign ownership for accessing consumer and credit card loans. In fact, the rise in consumer and credit card loans during the peak of financial crisis revealed in Table 1's descriptive statistics, coupled with the presence of foreign-acquired banks and foreign bank branches in Group 3, suggests that it was these two types of banks that supported the Turkish market by continuing to issue consumer and credit card loans during 2007–2009. We can see that foreign ownership presence in the emerging markets was not always associated with a negative transmission effect in the host markets. We can also see how domestic banks with foreign ownership and foreign bank branches continued to provide lending support to Turkish customers.

Foreign-acquired banks are also present in Group 4, which largely specializes in lending on export loans, precious metals loans and non-specialized loans. Foreign-acquired banks in Group 4 reaches the lowest match ratio in 2008/2009 (0.20) suggesting that banks with foreign ownership changed their banking strategies by providing less (in money value) of these types of loans. Looking at membership stability of domestic banks in Group 4 in Panel C, we can see an increase in its membership stability with match ratios increases from 0.50 in 2006/2007 to 0.57 in 2007/2008 and 0.75 in 2008/2009 during the financial crisis (Panel C). This difference in behavior between domestic banks and foreign-acquired banks reveals high bank dynamics within the Turkish banking sector. During 2007–2009 global financial crisis, domestic banks continued to issue export loans and precious metals loans to support the international trade of Turkish producers, whereas foreign-acquired banks continued to issue consumer and credit card loans to support Turkish consumers in the domestic trade within Turkish market.

As shown in Appendix 1, group 2 is another group dominated by domestic banks. Group 2 focuses on specialized loans such as agriculture or SME loans and has high match ratios for 2006/2007 (0.86) and 2007/2008 (0.80). A possible explanation for the large bank membership stability in this group is the presence of state-owned banks as in Appendix 1, which have been shown to be less pro-cyclical during the financial crisis (Cull and Martinez Peria, 2013, Mihaljek, 2011). Interestingly, Group 2 had

also foreign bank branches between 2005–2007. However, foreign bank branches are not present during the peak of global financial turmoil, leaving this group solely the preserve of state banks.

As for Group 1, which concentrates on liquid assets, domestic banks have the maximum match ratios of 1.00. This high membership stability for domestic banks in Group 1 is due to two domestic banks, Adabank A.S. and Birlesik Fon Bankasi A.S., which are present in the group throughout the whole period 2005–2010. This high stability of the two domestic banks is in contrast with the low membership stability (0.50 in 2008/2009) for foreign bank branches. Such difference in behavior is consistent with foreign bank branches having to sell their liquid assets to create funds for parent banks struggling in their home countries during the peak of the financial crisis.

Panel D reports match ratios for foreign bank branches. Groups 1, 5 and 6, shown in bold, are the groups dominated by foreign bank branches. Group 1 specializes in liquid assets and has very high instability of foreign bank branches membership at the peak of the global financial crisis, with the match ratio decreasing to 0.5. This change in strategy for foreign bank branches is different to the behavior of domestic banks which stayed in this group (match ratio 1.00) as shown in Panel C. Again, such difference in behavior is consistent with foreign bank branches changing their strategies by selling their liquid assets to create funds for parent banks struggling in their home countries, whereas this was not the case for Turkish domestic banks. Group 5, a one-member group (Bank Mellat) specializing in issuing foreign loans, is very stable during financial crisis. On the other hand, Group 6, which specializes on loans given to the financial sector, is very unstable. This instability was to be expected, given the turmoil in credit shortage across financial markets and suggests that foreign bank branches were more exposed than foreign-acquired banks or domestic banks.

Table 3 displays match ratios for the nine strategic groups on bank sources of funds. According to Panel A and Figure 2, the lowest match ratio for the overall dataset for bank sources of funds is during 2007/2008 (0.52), a period earlier than the lowest match ratio reported in 2008/2009 for bank assets. This suggests that there was a time lag between changing strategies on bank sources of funds.

Table 3. Match ratios of strategic groups created based on bank sources of funds.

| Panel A | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| Overall Sample | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.81 | 0.83 | 0.87 | 0.79 | 0.85 |
| Group 2 | 0.00 | 0.50 | 0.00 | 0.86 | 0.67 |
| Group 3 | 0.00 | 0.40 | 0.29 | 0.00 | 0.33 |
| Group 4 | 0.00 | 0.25 | 0.25 | 0.00 | 1.00 |
| Group 5 | 0.50 | 0.50 | 0.00 | 0.00 | 0.33 |
| Group 6 | 0.67 | 0.50 | 0.80 | 1.00 | 1.00 |
| Group 7 | 0.50 | 0.50 | 0.00 | 0.00 | 1.00 |
| Group 8 | 1.00 | 0.50 | 0.00 | 0.67 | 0.00 |
| Group 9 | 1.00 | 1.00 | 1.00 | 0.67 | 0.50 |
| Total | 0.66 | 0.61 | 0.52 | 0.56 | 0.69 |
| Panel B | | | | | |
| Foreign-acquired banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.60 | 0.50 | 0.88 | 0.89 | 0.86 |
| Group 2 | 0.00 | 0.00 | 0.00 | 1.00 | 0.80 |
| Group 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| Group 4 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |

Continued on next page

| Panel B | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| Foreign-acquired banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 0.46 | 0.32 | 0.64 | 0.77 | 0.72 |
| Panel C | | | | | |
| Domestic Banks | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.95 | 1.00 | 0.86 | 0.86 | 0.86 |
| Group 2 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 |
| Group 3 | 0.00 | 0.67 | 0.50 | 0.00 | 0.00 |
| Group 4 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| Group 5 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 6 | 0.67 | 0.50 | 0.80 | 1.00 | 1.00 |
| Group 7 | 0.50 | 0.50 | 0.00 | 0.00 | 1.00 |
| Group 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 0.75 | 0.88 | 0.63 | 0.67 | 0.84 |
| Panel D | | | | | |
| Foreign Branches | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 |
| Group 1 | 0.67 | 0.00 | 0.00 | 0.00 | 0.80 |
| Group 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 3 | 0.00 | 0.50 | 0.29 | 0.00 | 0.00 |
| Group 4 | 0.00 | 0.33 | 0.00 | 0.00 | 1.00 |
| Group 5 | 0.33 | 0.67 | 0.00 | 0.00 | 0.40 |
| Group 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Group 8 | 1.00 | 0.50 | 0.00 | 1.00 | 0.00 |
| Group 9 | 1.00 | 1.00 | 1.00 | 0.67 | 0.50 |
| Total | 0.64 | 0.55 | 0.29 | 0.20 | 0.50 |

Note: Match ratios measure bank membership stabilities between two time periods within strategic groups using Sudharsan et al. (1991) Mobius method. Panel A shows match ratios for all the nine strategic groups based on bank sources of funds. Panels B, C and D reports match ratios for foreign-acquired banks, domestic banks, and foreign bank branches respectively. The numbers in bold on panels B, C and D display the dominances of foreign-acquired banks, domestic banks, and foreign bank branches on strategic groups respectively.

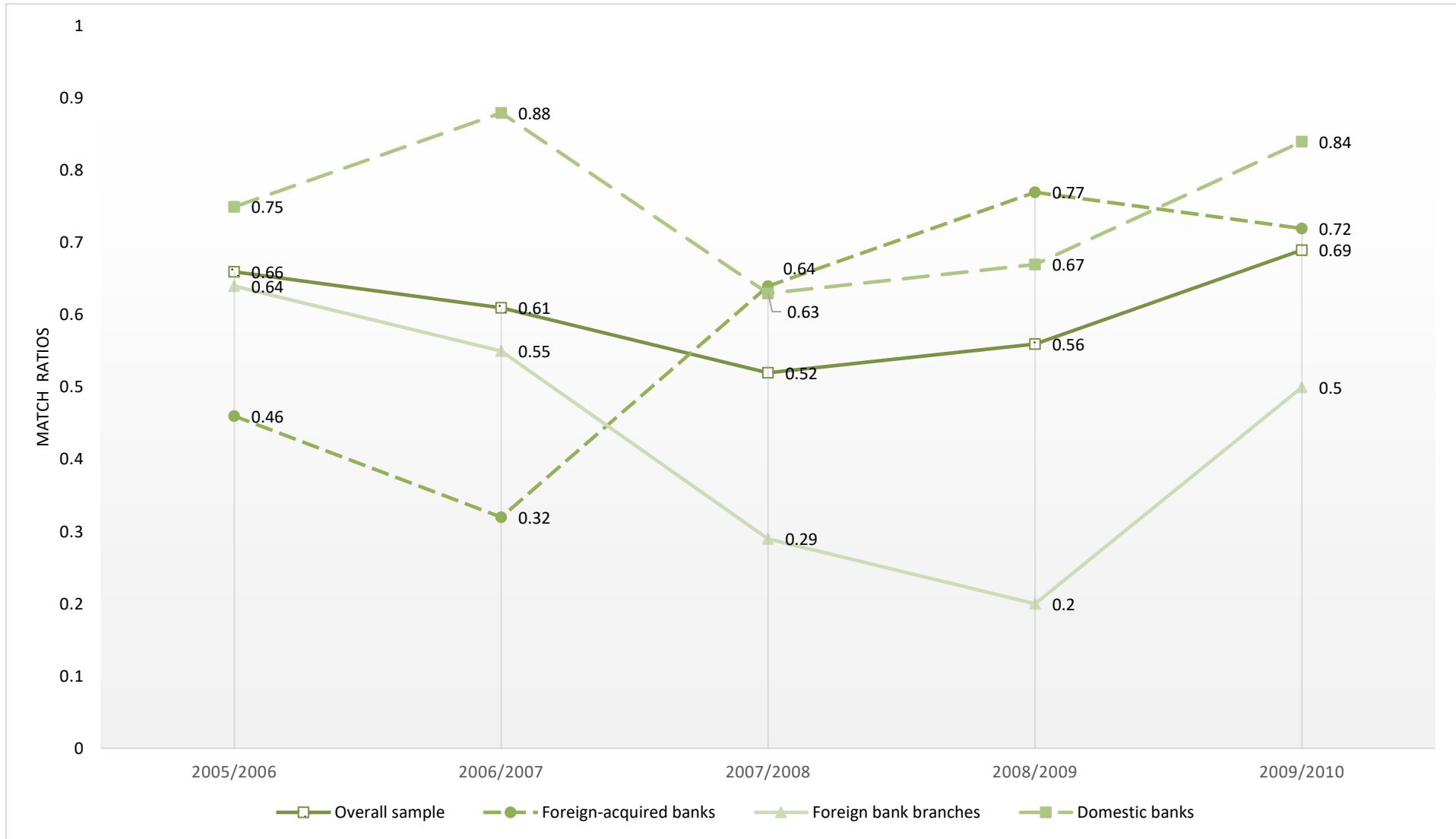


Figure 2. Match ratios on strategic groups based on bank sources of funds for three types of banks and overall sample.

Panel B reports match ratios for foreign-acquired banks. The highlighted Groups 1, 2 and 3 are composed of foreign-acquired banks. As seen in Appendix 2, Groups 1 and 2 focus on generating funds from domestic banks, foreign currency deposits of residents in Turkey and interbank deposits of participation (Islamic) banks. Interestingly, in both these two groups there is higher stability (match ratios of 0.89 and 1.00) during the financial crisis period 2008–2009—a finding again consistent with foreign banks choosing to enter the Turkish market by purchasing ownership of existing local banks, enabling them to rely on the host countries local sources of funds making them less exposed to global funding shortage. Panel C in Table 5 displays the match ratios of domestic banks. Overall domestic banks face the highest member instability during 2007/2008 and 2008/2009 (match ratios 0.63 and 0.67) as also visually seen in Figure 2. However, there is a large variation in membership stability between groups composed solely of state-owned banks and groups of private owned domestic banks.

Group 6, composed solely of state banks and uses primarily public and customer savings deposits as their main sources of funds, reaches its highest membership stability during the global financial crisis period. While public institutions are expected to place their savings in state-owned banks, it is interesting to conjecture that Turkish customer perceived state-owned banks as being safer than banks with foreign ownership and private-owned domestic during the 2007–2009 global turmoil. Whatever the reason, this led to stability in sources of funds for state-owned banks.

Group 7, which specializes mainly in sourcing funds from interbank deposits of the Central Bank of Turkey, reaches its highest member instability (match ratios of 0.00) during 2007–2009 global financial crisis. As seen in Appendix 2, *Turkiye Is Bankasi*, the private domestic-owned bank where a political party has a substantial stake, is the common member in the Group between 2005–2007. However, at the peak of the crisis 2008, this bank changes its strategy by moving to Group 1, a group consisting mainly of foreign-acquired banks. The replacement of *Turkiye Is Bankasi (Domestic)* with *Yapi ve Kredi Bankasi (Acquired)* during 2008 in Group 7, suggests that Central Bank of Turkey provided funds also for domestic banks sharing ownership with foreign owners.

Domestic banks were also present in Groups 1, 2 and 3. While membership of Group 1, which focuses on sourcing funds from domestic banks, is highly stable with the match ratio decreasing only slightly to 0.86, domestic banks in Groups 2 and 3 are highly unstable. Group 2, which specializes in using funds from participation banks (Islamic banks), is unstable in 2007/2008 with the match ratio reaching the lowest possible value of 0.00. However, in 2008/2009, the match ratio increases to its maximum value of 1.00 due to the stability of a private domestic bank (*Turkiye Halk Bankasi* as seen in Appendix 2). However, while this domestic bank stayed in this group in the peak of the crisis years, 2008 and 2009, it moved away in 2010. Domestic banks in Group 3, which focuses on sourcing funds from foreign currency deposits of Turkish residents, started to move away from this group in 2007/2008 (match ratio 0.50) and continued to do so in 2008/2009 and 2009/2010. This higher instability of domestic banks in Group 3 is consistent with a change in behavior of Turkish customers in using foreign currency deposits as a result of the funding turmoil experienced across foreign financial markets.

Panel D of Table 3 reports match ratios for foreign bank branches. Overall, foreign bank branches have lower membership stability during financial crisis 2007–2009 (match ratios 0.29 and 0.20) than other types of foreign-acquired banks in Panel B (match ratios 0.64 and 0.67) and domestic banks in Panel C (match ratios 0.63 and 0.64). Groups 8 and 9 are the only groups composed solely of foreign bank branches. Group 8, which specialize in raising funds from domestic banks and foreign banks, changes its single member from *Societe Generale SA* to *Habib Bank Ltd* during 2007/2008 as seen in Appendix 2. *Habib Bank Ltd* entered this strategic group at the peak of the crisis (2008), presumably to access funding from domestic banks and left the group in 2010. As for Group 9, which is composed

of two banks that specialize in generating funds from foreign currency deposits of residents abroad, the membership stability in this group decreases in 2009 with one of the two banks, Arap Turk Bankasi, moving to Group 5 as seen in Appendix 2. Group 5 which specializes in interbank funding from domestic banks is very unstable (match ratio 0.00) during the 2007–2009. A similar pattern of foreign bank branches can be seen for Group 4, which specializes in interbank funding from foreign banks. This instability of foreign bank branches that depended on interbank funding is consistent with there being a funding shortage in the interbank markets.

Overall, our results reveal that foreign bank entry mode plays a role in the bank strategy during 2007–2009 global financial crisis. Foreign-acquired banks relied on the local sources of funds. On the other hand, foreign bank branches relied on sourcing funds from international interbank funding market and funds from foreign currency deposits of residents abroad. This dependence on foreign funding markets left foreign bank branches more exposed to the turmoil of 2007–2009 global financial crisis, resulting in greater need to change their strategies on sourcing funds when compared with foreign-acquired banks. This behavior of foreign bank branches supports our second hypothesis that foreign bank branches changed their funding strategies more drastically than foreign-acquired banks during 2007–2009 global financial crisis as seen in Figure 2 (foreign bank branches match ratios 0.29 and 0.2 whereas foreign-acquired banks had match ratios of 0.64 and 0.77). However, in terms of our third hypothesis regarding domestic banks, our findings indicate that it is only state-owned banks that have funding stability during 2007–2009 global financial crisis. As for private-owned domestic banks they were less stable than both foreign type of banks. Hence our findings support the third hypothesis for state owned banks only.

As for bank lending strategies, our results reveal that it was foreign-acquired banks and foreign bank branches that continued to support Turkish customers by issuing consumer and credit card loans during the crisis, whereas neither private domestic banks nor state banks issued these types of loans. Private domestic banks on the other hand increased issuing export loans and precious metals loans to support Turkish international trade during the 2007–2009 global financial turmoil. As for state-owned banks, they continued to issue specialised loans such as agriculture loans and loans for SMEs. Our results also are consistent with foreign bank branches selling their liquid assets to create funds for parent banks struggling in their home countries. On the other hand, our results also reveal that foreign bank branches were important lenders in terms of supporting international trade as they continued issuing import loans during the 2007–2009 global financial crisis. As might be expected, foreign bank branches that focused on issuing loans to financial sectors had to change this strategy during the crisis due to the turmoil occurring across global financial institutions. Overall, our findings indicate very dynamic lending strategies for foreign acquired banks, foreign bank branches and private owned domestic banks.

In the next section, we present the results from the regression model discussed in section 4.3. The regression analysis is used as robustness check to our findings from the clustering technique. The results from this regression model are discussed in the next section (6.3).

5.3. Regression model results on bank sources of funds

Table 4 presents the results from the regression model shown in section 4.3, which examine the funding sources that were used to finance bank lending activities during 2005–2010. The model is fitted separately for the two types of foreign bank entry form—foreign-acquired banks (Panel A) and foreign bank branches (Panel C) and outside crisis and inside crisis period. We compare these results with those for domestic banks shown in Panel B.

Table 4. Bank sources of funds for bank lending for foreign acquired banks, domestic banks and foreign bank branches.

| Dependent Variable | Panel A Foreign acquired banks | | Panel B Domestic banks | | Panel C Foreign branches | |
|-------------------------------|--------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Outside crisis | Crisis | Outside crisis | Crisis | Outside crisis | Crisis |
| Loans _{it} | | | | | | |
| Equity _{it} | 0.076 <i>(0.581)</i> | 0.2 <i>(0.073)*</i> | -0.043 <i>(0.820)</i> | -0.144 <i>(0.152)</i> | 0.181 <i>(0.028)**</i> | -0.031 <i>(0.805)</i> |
| Liquidity _{it} | -0.15 <i>(0.005)***</i> | -0.079 <i>(0.018)**</i> | -0.043 <i>(0.520)</i> | -0.082 <i>(0.002)***</i> | -0.452 <i>(0.000)***</i> | -0.268 <i>(0.007)***</i> |
| Deposit funding _{it} | 1.184 <i>(0.000)***</i> | 0.847 <i>(0.000)***</i> | 1.686 <i>(0.000)***</i> | 0.983 <i>(0.000)***</i> | 1.275 <i>(0.000)***</i> | 0.072 <i>(0.604)</i> |
| Funds borrowed _{it} | 0.048 <i>(0.092)*</i> | 0.058 <i>(0.026)**</i> | 0.1 <i>(0.129)</i> | 0.002 <i>(0.965)</i> | 0.277 <i>(0.000)***</i> | 0.001 <i>(0.993)</i> |
| Profitability _{it} | 0.007 <i>(0.612)</i> | 0.013 <i>(0.823)</i> | 0.251 <i>(0.094)*</i> | 0.125 <i>(0.012)**</i> | -0.103 <i>(0.09)*</i> | 0.043 <i>(0.586)</i> |
| Constant _{it} | -0.147 <i>(0.052)*</i> | 0.113 <i>(0.162)*</i> | -0.548 <i>(0.001)***</i> | -0.167 <i>(0.047)</i> | 0.077 <i>(0.341)</i> | -0.567 <i>(0.000)***</i> |
| Observations | 38 | 37 | 22 | 21 | 26 | 26 |
| No. of banks | 14 | 13 | 8 | 7 | 10 | 9 |
| R-squared (within) | 0.974 | 0.859 | 0.968 | 0.964 | 0.951 | 0.555 |
| F value | 144.24 | 23.17 | 54.60 | 47.59 | 42.68 | 2.99 |
| p-value | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.056 |

Note: Both dependent and explanatory variables are standardized, and the regression is a fixed effect panel data regression model based on the Hausman test result. The dependent variable for the regression model is Loans_{it} and is measured as the natural logarithm of loans of bank *i* at times *t*. Equity_{it} is the ratio of Equity/Total Assets of bank *i* at time *t*. Liquidity_{it} is the ratio of Liquid Assets/Total Deposits of bank *i* at time *t*. Deposit funding_{it} is the natural logarithm of deposits of bank *i* at times *t*. Funds borrowed_{it} is the ratio of Funds borrowed/Total Assets of bank *i* at times *t*. Profitability_{it} is measured as the ratio of Net Operating Income before Tax/ Total Assets of bank *i* at time *t*. Foreign acquired banks are banks that have foreign ownership. Domestic banks are 100% domestic banks. Foreign branches are foreign bank's subsidiaries. Outside crisis includes the years 2005, 2006 and 2010. Crisis corresponds to global financial crisis years: 2007–2009. The p-values are in parenthesis and in italics, statistically significant coefficient with p-values $p < 0.1$, $p < 0.05$ and $p < 0.01$ are denoted as *, ** and *** respectively.

Looking at the outside crisis period first, as predicted, we observe a negative relationship between liquidity and lending for both foreign-acquired banks and foreign bank branches, but there appears to be no such association for domestic banks. Specifically, there is a coefficient of -0.15 for foreign-acquired banks indicating that one standard deviation increase in liquid assets is associated with about 15% standard deviations decrease in bank lending. Interestingly, the coefficient of -0.45 for foreign bank branches implies three-fold standard deviations decrease in bank lending compared to foreign-acquired banks. In contrast, there is a generally similar relationship between bank lending and usage of deposits as sources of funds for all the three types of banks, and as expected the relationship is positive and strong, implying elasticities of greater than one. The coefficient on other types of borrowing funds is both significantly positive (0.048 and 0.277) for foreign acquired banks and foreign bank branches respectively, the lending effect for the latter being almost six times that of the former. In contrast, there is no significant relationship for domestic banks. The relationship between profitability and bank lending varies according to the type of bank. Specifically, there is no significant relationship for foreign-acquired banks, whereas there is a positive association for domestic banks (0.251) and a negative association for foreign bank branches (-0.103).

Looking at the crisis years (2007–2009), the negative association between liquidity and lending persists for both types of foreign banks but effects are much reduced (-0.079 and -0.268), although the effect for foreign branches is still about three times that of foreign-acquired banks. What we observe here is consistent with the foreign banks being more conservative during the crisis period. While we observed no significant relationship between liquidity and lending for domestic banks in the non-crisis years, we observe a negative association during crisis years of -0.082 which is quite close in magnitude to that of foreign acquired banks (-0.079). This could be reasonably expected, given that the type of foreign entry the foreign bank chooses via acquisition of an existing domestic bank enables them to access the same clientele as domestic banks.

Turning to the influences of funding sources on lending during the crisis years, we observe a positive relationship for foreign acquired banks and domestic banks, though the associations are smaller (0.847 and 0.983) than was the case outside the crisis years. Interestingly, there is no association for foreign bank branches during crisis years, while we observed a positive relationship outside crisis years. This behavior of foreign bank branches is also observable regarding other sources of funds. Foreign acquired banks, as discussed in section 6.2, appear to continue to use other sources of funds during crisis years (0.058) as they did outside crisis years (0.048) to support their lending. This is in contrast to domestic banks where we observe no significant relationship in either period. These findings are consistent with foreign acquired banks having greater access to non-deposit fundings than other types of banks. Lastly, as was the case in non-crisis years, we observe no significant relationship between lending and profitability for foreign-acquired banks. This insignificant relationship also exists for foreign bank branches during crisis years, which is in contrast to the negative relationship outside crisis years. As for domestic banks, the positive relationship continues but at half the level (0.125 vs. 0.251).

The regression results confirm our earlier findings from the clustering technique. In all the three panels A, B and C, the three types of banks are adapting their strategies during the 2007–2009 global financial crisis period. Overall, the regression model results are consistent with the dynamic behavior of foreign acquired bank, foreign bank branches and domestic banks seen in the groups generated by the clustering technique discussed in section 6.2.

5.3.1 Robustness checks using additional regression models on bank sources of funds

As an alternative method to the regression model in section 6.2, we run two additional regression models with interaction variables for foreign banks and foreign-acquired banks. In the first regression, we use all the sample data and include an indicator variable for foreign banks to distinguish them from domestic banks. We interact the foreign banks variable with the five sources of funds (Equity, Liquidity, Deposits, Funds borrowed and Profits) to identify any differences between foreign banks and domestic banks¹. The results of this regression are reported in Table 5. In the second regression model, we exclude domestic banks, and focus solely on the two types of foreign banks: foreign-acquired banks and foreign bank branches. In this regression, we use an indicator variable for foreign-acquired banks to distinguish them from foreign bank branches. We interact the foreign banks variable with the five sources of funds (Equity, Liquidity, Deposits, Funds Borrowed and Profits) to identify any differences between foreign-acquired banks and foreign bank branches². The results of this regression are reported in Table 6.

Table 5. Bank sources of funds for bank lending of foreign banks versus domestic banks.

| Dependent Variable | Outside crisis | Crisis |
|--|----------------------|---------------------|
| Loans _{it} | | |
| Equity _{it} | 0.23 (0.154) | 0.051 (0.906) |
| Foreign bank _{it} | 0.067 (0.540) | -0.051 (0.831) |
| Equity _{it} * Foreign bank _{it} | -0.067 (0.695) | -0.011 (0.981) |
| Liquidity _{it} | -0.211 (0.010)*** | -0.089 (0.332) |
| Liquidity _{it} * Foreign bank _{it} | -0.1 (0.259) | -0.210 (0.049) |
| Deposit funding _{it} | 1.207 (0.000)*** | 0.952 (0.000)*** |
| Deposit funding _{it} * Foreign bank _{it} | -0.155 (0.189) | -0.348 (0.147) |
| Funds borrowed _{it} | 0.206 (0.012)** | 0.076 (0.652) |
| Funds borrowed _{it} * Foreign bank _{it} | -0.007 | 0.0344 |

Continued on next page

¹ The regression model with foreign bank indicator variable is:

$$\text{Loans}_{it} = \beta_0 + \beta_1 \text{Equity}_{it} + \beta_2 \text{Foreign bank}_{it} + \beta_3 \text{Equity}_{it} * \text{Foreign bank}_{it} + \beta_4 \text{Liquidity}_{it} + \beta_5 \text{Liquidity}_{it} * \text{Foreign bank}_{it} + \beta_6 \text{Deposit funding}_{it} + \beta_7 \text{Deposit funding}_{it} * \text{Foreign bank}_{it} + \beta_8 \text{Funds borrowed}_{it} + \beta_9 \text{Funds borrowed}_{it} * \text{Foreign banks}_{it} + \beta_{10} \text{Profitability}_{it} + \beta_{11} \text{Profitability}_{it} * \text{Foreign bank}_{it} + \varepsilon_i$$

² The regression model with foreign-acquired bank indicator variable is:

$$\text{Loans}_{it} = \beta_0 + \beta_1 \text{Equity}_{it} + \beta_2 \text{Foreign-acquired bank}_{it} + \beta_3 \text{Equity}_{it} * \text{Foreign-acquired bank}_{it} + \beta_4 \text{Liquidity}_{it} + \beta_5 \text{Liquidity}_{it} * \text{Foreign-acquired bank}_{it} + \beta_6 \text{Deposit funding}_{it} + \beta_7 \text{Deposit funding}_{it} * \text{Foreign-acquired bank}_{it} + \beta_8 \text{Funds borrowed}_{it} + \beta_9 \text{Funds borrowed}_{it} * \text{Foreign-acquired banks}_{it} + \beta_{10} \text{Profitability}_{it} + \beta_{11} \text{Profitability}_{it} * \text{Foreign-acquired bank}_{it} + \varepsilon_i$$

| Dependent Variable | | |
|--|-----------------|----------------|
| Loans _{it} | Outside crisis | Crisis |
| | <i>(0.936)</i> | <i>(0.844)</i> |
| Profitability _{it} | -0.169 | 0.079 |
| | <i>(0.282)</i> | <i>(0.704)</i> |
| Profitability _{it} * Foreign bank _{it} | 0.157 | -0.079 |
| | <i>(0.323)</i> | <i>(0.715)</i> |
| Constant _{it} | -0.176 | -0.023 |
| | <i>(0.085)*</i> | <i>(0.921)</i> |
| Observations | 86 | 84 |
| No. of banks | 32 | 29 |
| R-squared | 0.9689 | 0.9347 |
| Wald chi-squared | 1296.71 | 246.24 |
| p-value | 0 | 0 |

Note: Both dependent and explanatory variables of the regression are standardized. The dependent variable for the regression model is Loans_{it} and is measured as the natural logarithm of loans of bank *i* at times *t*. Equity_{it} is the ratio of Equity/Total Assets of bank *i* at time *t*. Foreign bank_{it} is the indicator variable for foreign banks to differentiate from domestic banks. Liquidity_{it} is the ratio of Liquid Assets/Total Deposits of bank *i* at time *t*. Deposit funding_{it} is the natural logarithm of deposits of bank *i* at times *t*. Funds borrowed_{it} is the ratio of Funds borrowed/Total Assets of bank *i* at times *t*. Profitability_{it} is measured as the ratio of Net Operating Income before Tax/ Total Assets of bank *i* at time *t*. Outside crisis includes the years 2005,2006 and 2010. Crisis corresponds to global financial crisis years: 2007–2009. The p-values are in parenthesis and in italics, statistically significant coefficient with p-values $p < 0.1$, $p < 0.05$ and $p < 0.01$ are denoted as *, ** and *** respectively.

According to Table 5, there is no statistically significant difference in bank lending between the crisis years and outside crisis years between foreign banks as a whole and domestic banks. A possible explanation is that foreign banks also include foreign-acquired banks which are shown in the subsequent Table 6 to differ in behavior from foreign bank branches. These effects cancel out in Table 5 to the extent that foreign-acquired banks follow the same strategy as domestic banks. In terms of sources of funds, we can see that outside the crisis years, banks are more likely to rely on deposit funding (coef. 1.207) and other non-deposit funding sources (coef. 0.206) as sources of funds as opposed to using liquid assets (coef. -0.211). The reliance on using deposit funding continues during the crisis years (0.952). In terms of the foreign banks, we observe only one significantly different incremental effect for foreign banks over domestic banks, namely, a negative statistically significant relation (coef. -0.210) between liquidity assets and bank lending. A one unit decrease in liquid assets for foreign banks is associated with a 21% increase in bank lending when compared with domestic banks, suggesting that foreign banks are more likely to sell liquid assets to fund their bank lending. This result support the earlier findings in Table 4, where we observe a similar negative relation for foreign bank branches.

Turning to Table 6 on foreign acquired banks versus foreign bank branches, we observe differences between these two types of foreign entry modes, which we also documented in Table 4. First, the positive coefficient of 0.343 on foreign-acquired banks during the crisis years suggest that foreign-acquired banks increased bank lending by 34.3% standard deviations when compared with foreign bank branches. This result supports the argument that foreign bank branches became more constrained in their lending activities due to being more dependent on their parent internal funding

(Havrylchuk and Jurzyk, 2011) which contracted during the 2007–2009 global financial crisis as their parent banks experienced significant shortage of funds in their own markets.

Table 6. Bank sources of funds for bank lending of foreign-acquired banks versus foreign bank branches.

| Dependent Variable | Outside crisis | Crisis |
|---|-----------------------------|-----------------------------|
| Loans _{it} | | |
| Equity _{it} | 0.1911 <i>(0.001)***</i> | −0.086 <i>(0.328)</i> |
| Foreign-acquired bank _{it} | −0.064 <i>(0.606)</i> | 0.343 <i>(0.023)**</i> |
| Equity _{it} * Foreign-acquired bank _{it} | −0.116 <i>(0.570)</i> | 0.191 <i>(0.469)</i> |
| Liquidity _{it} | −0.396 <i>(0.000)***</i> | −0.356 <i>(0.000)***</i> |
| Liquidity _{it} * Foreign-acquired bank _{it} | 0.262 <i>(0.001)***</i> | 0.232 <i>(0.016)**</i> |
| Deposit funding _{it} | 1.119 <i>(0.000)***</i> | 0.283 <i>(0.003)***</i> |
| Deposit funding _{it} * Foreign-acquired bank _{it} | 0.0125 <i>(0.888)</i> | 0.769 <i>(0.000)***</i> |
| Funds borrowed _{it} | 0.231 <i>(0.000)***</i> | 0.043 <i>(0.394)</i> |
| Funds borrowed _{it} * Foreign-acquired bank _{it} | −0.182 <i>(0.000)***</i> | 0.01597 <i>(0.840)</i> |
| Profitability _{it} | −0.092 <i>(0.053)*</i> | 0.0052 <i>(0.923)</i> |
| Profitability _{it} * Foreign-acquired bank _{it} | 0.103 <i>(0.058)*</i> | 0.0664 <i>(0.637)</i> |
| Constant _{it} | −0.058 <i>(0.401)</i> | −0.385 <i>(0.000)***</i> |
| Observations | 64 | 63 |
| No. of banks | 24 | 22 |
| R-squared | 0.9637 | 0.9362 |
| Wald chi-squared | 1156.69 | 367.07 |
| p-value | 0 | 0 |

Note: Both dependent and explanatory variables of the regression are standardized. The dependent variable for the regression model is Loans_{it} and is measured as the natural logarithm of loans of bank *i* at times *t*. Equity_{it} is the ratio of Equity/Total Assets of bank *i* at time *t*. Foreign-acquired bank_{it} is the indicator variable for foreign acquired banks to differentiate from foreign bank branches. Liquidity_{it} is the ratio of Liquid Assets/Total Deposits of bank *i* at time *t*. Deposit funding_{it} is the natural logarithm of deposits of bank *i* at times *t*. Funds borrowed_{it} is the ratio of Funds borrowed/Total Assets of bank *i* at times *t*. Profitability_{it} is measured as the ratio of Net Operating Income before Tax/ Total Assets of bank *i* at time *t*. Outside crisis includes the years 2005,2006 and 2010. Crisis corresponds to global financial crisis years: 2007–2009. The p-values are in parenthesis and in italics, statistically significant coefficient with p-values $p < 0.1$, $p < 0.05$ and $p < 0.01$ are denoted as *, ** and *** respectively.

Moving on to the sources of funds, we can see that equity funding is used to finance foreign bank lending outside the crisis years (coef. 0.1911), when the funding from parent banks was available. However, during the crisis years, there is no difference between foreign-acquired banks and foreign bank branches, which shows that foreign bank branches did not receive any more internal funding from their parents and hence became less reliant on equity funding like foreign acquired banks. In terms of liquidity, we observe a significant difference between foreign-acquired banks and foreign bank branches as previously seen in Table 4. The positive interaction coefficient for foreign-acquired banks (0.262) continues to be significant during crisis years (0.232), suggesting that foreign-acquired banks faced less liquidity risk than did foreign bank branches. Foreign bank branches experienced higher liquidity risk, as they sold their liquid assets to help their parent banks, which were facing funding shortages in their own markets. In terms of deposit funding, we can see that foreign banks used deposits funds to finance bank lending during crisis years, though at a slower rate, almost a quarter of the rate (0.283) they used outside the crisis years (1.119). However, the positive significant interaction effect on deposit funding and foreign acquired banks (0.769) during the crisis shows that foreign-acquired banks relied more on deposit funding than foreign bank branches. This result is in line with the argument that foreign-acquired banks were in a better position during the crisis than foreign bank branches, due to the acquired local clientele funding. The decrease in reliance on deposits funding for foreign bank branches also suggests that it was foreign currency deposits of foreign customers from their parent banks that foreign bank branches relied on before the crisis, which dried up due to the instability in their parent home countries and international capital markets. The dependence of foreign bank branches on foreign currency deposits were also observed in the clustering results.

In terms of other sources of funds, we observe a positive relation between non-deposit funding and foreign bank lending outside crisis years (0.231), suggesting that both foreign-acquired banks and foreign bank branches banks made use of non-deposit funding to finance bank lending in normal times. A similar positive relation was observed in Table 4. However, the significant negative interaction coefficient of -0.182 for foreign-acquired banks outside crisis years shows that foreign-acquired banks normally relied less on non-deposit fundings than foreign bank branches. This is expected as foreign bank branches, being affiliates of large multinational banks are more involved in borrowing from international interbank markets (Havrylchuk and Jurzyk, 2011, Degryse et al., 2012). No such difference occurred during the crisis years.

In terms of profitability, we see a significant negative relation (-0.093) for foreign banks outside the crisis years and a significant incremental positive relation for foreign-acquired banks (0.103). Summing these two to get the total coefficient for foreign-acquired banks yields a figure (0.011) which is significantly different from zero; in other words, a one-unit standard deviation increase in profits is associated with about a 1% standard deviation overall increase in foreign-acquired bank lending. However, there is no such difference between foreign-acquired banks and bank branches during the crisis years, which we also observed in Table 4.

6. Conclusions and policy discussion

This paper examined how foreign bank entry form in the Turkish banking sector influenced the strategies in bank lending and funding sources during the 2007–2009 global financial crisis. Using an extensive bank dataset of twenty-nine accounting variables from bank financial statements between 2005–2010, to which we applied Ward's method (Ward, 1963) hierarchical clustering technique, Sudharshan et al. (1991) MOBIUS method and regression model, we were able to analyze in detail and

provide new insights on the effect that the chosen foreign bank entry form has on an emerging market's banking sector during 2007–2009 global financial crisis.

Our results indicate foreign banks that entered the Turkish banking sector by purchasing existing domestic banks and foreign banks that entered the Turkish market via greenfield investment to create foreign bank branches continued to support Turkish customers by issuing consumer and credit card loans during the peak of the 2007–2009 global financial crisis. This is not the case for private domestic banks, which moved away from this strategy and focused on other types of lending strategy, specifically export loans and precious metal loans with the focus of supporting international trade. Before 2007, foreign-acquired banks were also active lenders in issuing export loans and precious metals, sharing this market with private domestic banks. However, during 2007–2009 crisis, foreign acquired banks moved away from these types of international trade loans and focused more on local loans, i.e., consumer and credit card loans. Differently from foreign acquired banks, foreign bank branches continued to support international trade by issuing import loans during 2007–2009 crisis. Despite the differences in lending behavior between the two foreign bank entry modes, our results indicate that both type of foreign banks (foreign acquired banks and foreign bank branches) continued to support the Turkish market, contradicting the assumption that during 2007–2009 global financial crisis, foreign ownership presence in emerging markets had a negative effect on the host market bank lending activities. This an important finding contributing to the ongoing academic and policy debate on the impact of foreign bank presence in emerging markets.

In terms of foreign bank strategies on sources of funds during 2007–2009 Global financial crisis, our results show that the chosen foreign bank entry mode determines the types of sources of funds that a foreign bank can access in the host market. Specifically, for foreign banks that chose to enter the Turkish market by purchasing ownership of local banks were able to use the acquired local sources of funds, making them less exposed to the global funding shortage during the 2007–2009 global financial crisis. Concretely, foreign-acquired banks were able to utilize the acquired access to local interbank domestic funding including funding from participation (Islamic banks) as well as foreign currency deposits of Turkish customers. As for foreign bank branches created by greenfield investment, they were dependent on international funding market and foreign currency deposits of foreign customers. The dependence of foreign bank branches on foreign funding markets made them more exposed to the turmoil of 2007–2009 global financial crisis, resulting in greater need to change their strategies when compared with foreign acquired banks. These findings from the clustering technique were also observed in the regression analysis.

Overall, our findings suggest that foreign-acquired banks provided more support than did foreign bank branches to the Turkish banking sector during the 2007–2009 global financial crisis. The observed results support the theoretical argument by Claeys and Heinz (2014) and Degryse et al. (2012) that foreign-acquired banks are more independent than foreign bank branches as the former relies on the acquired customer network, whereas the latter is more dependent on the internal capital market it has with its parent bank and the international interbank market than it is on its Turkish clientele. Furthermore, the different observed results between foreign-acquired banks continuing to lend in host market versus foreign bank branches contraction, also supports the substitution and complementary theoretical arguments by Havrylchuk and Jurzyk (2011): foreign-acquired banks were more likely to engage in the host market when the parent banks economics conditions worse. By investigating a specific country's banking sector, Turkey, we contribute to the findings on country based empirical literature.

In terms of policy implications, our findings indicate that the entry of foreign banks into Turkey through the mechanism of buying into existing local banks did not worsen the exposure of Turkey to

the 2007–2009 financial crisis. On the contrary, our empirical findings on this type of foreign entry mode support the predicted positive welfare effect of foreign banks in emerging markets provided theoretically by Lehner and Schnitzer (2008). Having heterogeneous ownership in an emerging market banking sector adds, if Turkey is a guide, makes the country banking sector more robust.

References

- Akinci DA, Matousek R, Radic N, et al. (2013) Monetary policy and the banking sector in Turkey. *J Int Financ Mark Inst Money* 27: 269–285. <https://doi.org/10.1016/j.intfin.2013.08.001>
- Akyuz Y, Boratav K (2003) The Making of the Turkish Financial Crisis. *World Dev* 31: 1549–1566. [https://doi.org/10.1016/S0305-750X\(03\)00108-6](https://doi.org/10.1016/S0305-750X(03)00108-6)
- Althammer W, Haselmann R (2011) Explaining foreign bank entrance in emerging markets. *J Comp Econ* 39: 486–498. <https://doi.org/10.1016/j.jce.2011.03.002>
- Aras ON (2010) Effects of the global economic crisis on Turkish banking sector. *Int J Econ Financ Stud* 2: 113–120. <https://dergipark.org.tr/en/pub/ijefs/issue/26156/275506>
- Arayssi M, Fakih A, Haimoun N (2019) Did the Arab spring reduce MENA countries' growth? *Appl Econ Lett* 26: 1579–1585. <https://doi.org/10.1080/13504851.2019.1588938>
- Antzoulatos AA, Thanopoulos J, Tsoumas Ch (2008) Financial system structure and change—1986–2005 Evidence from the OECD countries. *J Econ Integr* 23: 977–1001.
- Assaf AG, Matousek R, Tsionas EG (2013) Turkish bank efficiency: Bayesian estimation with undesirable outputs. *J Bank Financ* 37: 506–517. <https://doi.org/10.1016/j.jbankfin.2012.09.009>
- Atici G, Gursoy G (2011) Financial crisis and capital buffer: evidence from the Turkish banking sector. *Bank Bank Syst* 6: 72–86.
- Aysan AF, Mustafa D, Duygun M, et al. (2018) Religiosity versus rationality: Depositor behavior in Islamic and conventional banks. *J Comp Econ* 46: 1–19. <https://doi.org/10.1016/j.jce.2017.03.001>
- Banks Association of Turkey (2012) Historical Data. Available from: <http://www.tbb.org.tr/en/banks-and-banking-sector-information/member-banks/historical-data/40>.
- Beck Th, Brown M (2015) Foreign bank ownership and household credit. *J Financ Intermed* 24: 466–486. <https://doi.org/10.1016/j.jfi.2013.10.002>
- Berger AN, Klapper LF, Udell GF (2001) The ability of banks to lend to informationally opaque small businesses. *J Bank Financ* 25: 2127–2167. [https://doi.org/10.1016/S0378-4266\(01\)00189-3](https://doi.org/10.1016/S0378-4266(01)00189-3)
- Bonin JP, Louie D (2017). Did foreign banks stay committed to emerging Europe during recent financial crises? *J Comp Econ* 45: 793–808. <https://doi.org/10.1016/j.jce.2016.08.003>
- Cerutti E, Dell'Araccia G, Martinez Peria MS (2007) How banks go abroad: Branches or subsidiaries? *J Bank Financ* 31: 1669–1692. <https://doi.org/10.1016/j.jbankfin.2006.11.005>
- Cetorelli N, Goldberg LS (2011) Global Banks and International Shock Transmission: Evidence from the Crisis. *IMF Econ Rev* 59: 41–76. <https://doi.org/10.1057/imfer.2010.9>
- Chen M, Wu J, Jeon BN, et al. (2017) Do foreign banks take more risk? Evidence from emerging economies. *J Bank Financ* 82: 20–39. <https://doi.org/10.1016/j.jbankfin.2017.05.004>
- Claeys S, Hainz Ch (2014) Modes of foreign bank entry and effects on lending rates: Theory and evidence. *J Comp Econ* 42: 160–177. <https://doi.org/10.1016/j.jce.2013.01.009>
- Cokgezen M, Kuran T (2015) Between consumer demand and Islamic law: The evolution of Islamic credit cards in Turkey. *J Comp Econ* 43: 862–882. <https://doi.org/10.1016/j.jce.2015.07.005>
- Claessens S, Van Horen N (2015) The Impact of the Global Financial Crisis on Banking Globalization. *IMF Econ Rev* 63:868–918.

- Cull R, Martinez Peria MS (2013) Bank ownership and lending patterns during the 2008–2009 financial crisis: Evidence from Latin America and Eastern Europe. *J Bank Financ* 37: pp. 4861–4878. <https://doi.org/10.1016/j.jbankfin.2013.08.017>
- Curi C, Lozano-Vivas A, Zelenyuk V (2015) Foreign bank diversification and efficiency prior to and during the financial crisis: Does one business model fit all? *J Bank Financ* 61: 522–535. <https://doi.org/10.1016/j.jbankfin.2015.04.019>
- De Haas R, Van Horen N (2013) Running for the exit? International bank lending during a financial crisis. *Rev Financ Stud* 26: 244–285. <https://doi.org/10.1093/rfs/hhs113>
- De Haas R, Korniyenko Y, Pivovarsky A, et al. (2014) Taming the herd? Foreign banks, the Vienna Initiative and crisis transmission. *J Financ Intermed* 24: 325–355. <https://doi.org/10.1016/j.jfi.2014.05.003>
- De Haas R, Van Leveled I (2010) Internal capital markets and lending by multinational bank subsidiaries. *J Financ Intermed* 19: 1–25. <https://doi.org/10.1016/j.jfi.2009.02.001>
- Degryse H, Havrylchuk O, Jurzyk E, et al. (2012) Foreign bank entry, credit allocation and lending rates in emerging markets: Empirical evidence from Poland. *J Bank Financ* 36: 2949–2959. <https://doi.org/10.1016/j.jbankfin.2011.12.006>
- Dekle R, Lee M (2015) Do foreign bank affiliates cut their lending more than the domestic banks in a financial crisis? *J Int Money Financ* 50: 16–32. <https://doi.org/10.1016/j.jimonfin.2014.08.005>
- Dell’Ariccia G, Marquez R (2004). Information and bank credit allocation. *J Financ Econ* 27: 185–214. [https://doi.org/10.1016/S0304-405X\(03\)00210-1](https://doi.org/10.1016/S0304-405X(03)00210-1)
- Dietrich A, Wanzenreid G (2011) Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *J Int Financ Mark Inst Money* 21: 307–327. <https://doi.org/10.1016/j.intfin.2010.11.002>
- Dungey M, Gajurel D (2015) Contagion and banking crisis—International evidence for 2007–2009. *J Bank Financ* 60: 271–283. <https://doi.org/10.1016/j.jbankfin.2015.08.007>
- Egert B (2007) Central bank interventions, communication and interest rate policy in emerging European economies. *J Comp Econ* 35: 387–413. <https://doi.org/10.1016/j.jce.2007.02.004>
- El-Gamal MA., Inanoglu H (2005) Inefficiency and heterogeneity in Turkish banking: 1990–2000. *J Appl Econ* 20: 641–664. <https://doi.org/10.1002/jae.835>
- Fiegenbaum A, Thomas H (1993) Industry and strategic group dynamics: Competitive strategy in the insurance industry, 1970–84. *J Manag Stud* 30: 69–105. <https://doi.org/10.1111/j.1467-6486.1993.tb00296.x>
- Frey R, Kerl C (2015) Multinational banks in crisis: Foreign affiliate lending as a mirror of funding pressure and competition on the internal capital market. *J Bank Financ* 50: 52–68. <https://doi.org/10.1016/j.jbankfin.2014.06.005>
- Fukuyama H, Matousek R (2011) Efficiency of Turkish banking: Two-stage network system. Variable returns to scale model. *J Int Financ Mark Inst Money* 21: 75–91. <https://doi.org/10.1016/j.intfin.2010.08.004>
- Ghosh S (2016) Political transition and bank performance: How important was the Arab Spring? *J Comp Econ* 44: 372–382. <https://doi.org/10.1016/j.jce.2015.02.001>
- Gunes H, Yildirim D (2016) Estimating cost efficiency of Turkish commercial banks under unobserved heterogeneity with stochastic frontier models. *Cent Bank Rev* 16: 127–136. <https://doi.org/10.1016/j.cbrev.2016.12.001>
- Hair JF Jr, Anderson RE, Tatham RL, et al. (1995) *Multivariate Data Analysis with Readings*. Prentice-Hall Inc, NJ, United States.
- Hand, DJ, Mannila H, Smyth P (2001) *Principles of Data Mining*. MIT Press, United States of America.

- Halaj G, Zochowski D (2009) Strategic Groups and Banks' Performance. *Financ Theory and Pract* 33: 153–186.
- Havrylchuk O, Jurzyk E (2011) Inherited or earned? Performance of foreign banks in Central and Eastern Europe. *J Bank Financ* 35: 1291–1302. <https://doi.org/10.1016/j.jbankfin.2010.10.007>
- Iwanicz-Drozdowska M, Witkowski B (2016) Determinants of the Credit Growth in CESEE Countries. *Coll Econ Anal Ann* 41: 161–174.
- Jeon BN, Olivero MP, Wu J (2013) Multinational banking and the international transmission of financial shocks: Evidence from foreign bank subsidiaries. *J Bank Financ* 37: 952–972. <https://doi.org/10.1016/j.jbankfin.2012.10.020>
- Koller W (2001) Strategic group in Austrian banking 1995–2000. Available from: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.201.1285&rep=rep1&type=pdf>.
- Lehner M, Schnitzer M (2008) Entry of foreign banks and their impact on host countries. *J Comp Econ* 36: 430–452. <https://doi.org/10.1016/j.jce.2008.02.002>
- Miller SR, Parkhe A (2002) Is there a liability of foreignness in global banking? An empirical test of banks x-efficiency. *Strateg Manag J* 23: 55–75.
- Mihaljek D (2011) Domestic bank intermediation in emerging market economies during the crisis: locally owned versus foreign-owned banks. In: Bank for International Settlements (ed.), *The global crisis and financial intermediation in emerging market economies* 54: 31–48.
- Moreno R, Mihaljek D, Villar A, et al. (2010) The Global Crisis and Financial Intermediation in Emerging Market Economies. BIS Paper 54. Available from: <https://ssrn.com/abstract=1959828>.
- Onder Z, Ozyldirim S (2008) Market Reaction to Risky Banks: Did Generous Deposit Guarantee Change It? *World Dev* 36: 1415–1435. <https://doi.org/10.1016/j.worlddev.2007.08.007>
- Ongena S, Peydro JL, Van Horen N (2015) Shocks Abroad, Pain at Home? Bank-Firm-Level Evidence on the International Transmission of Financial Shocks. *IMF Econ Rev* 63: 698–750. <https://doi.org/10.1057/imfer.2015.34>
- Popov A, Udell GF (2012) Cross-border banking, credit access, and the financial crisis. *J Int Econ* 87: 147–161. <https://doi.org/10.1016/j.jinteco.2012.01.008>
- Sudharshan D, Thomas H, Fiegenbaum A (1991) Assessing mobility barriers in dynamic strategic group analysis. *J Manag Stud* 28: 429–438. <https://doi.org/10.1111/j.1467-6486.1991.tb00762.x>
- Ward JHJr (1963) Hierarchical Grouping to Optimize an Objective Function. *J Am Stat Assoc* 58: 236–244. <https://doi.org/10.1080/01621459.1963.10500845>
- Wagner Ch, Winkler A (2013) The Vulnerability of Microfinance to Financial Turmoil—Evidence from the Global Financial Crisis. *World Dev* 51: 71–90 <https://doi.org/10.1016/j.worlddev.2013.05.008>
- Wu J, Chen M, Jeon BN, Wang R (2017) Does foreign bank penetration affect the risk of domestic banks? Evidence from emerging economies. *J Financ Stability* 31: 45–61 <https://doi.org/10.1016/j.jfs.2017.06.004>
- Xu Y, La HA (2015) Foreign banks and international shock transmission: Does bank ownership still matter? *J Int Financ Mark Inst Money* 38: 200–216. <https://doi.org/10.1016/j.intfin.2015.05.006>
- Zuniga-Vicente JA, De La Fuente-Sabate JM, Rodrigues-Puerta J (2004) A study of industry evolution in the face of major environmental disturbances; Group and firm strategic behavior of Spanish banks, 1983–1997. *Br J Manag* 15: 219–245. <https://doi.org/10.1111/j.1467-8551.2004.00416.x>

