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Abstract

Chapter 1: Within the liberalization of the financial markets, foreign direct investment activities have overgrown very quickly, especially in the banking sector. Acquisition by foreigners has been linked to the introduction of new technology and expansions in products and service range. This suggests that the inflow of foreign capital can alter the competitive structure of an industry. I plan to investigate the quantitative importance of this phenomenon using the data from the Turkish banking industry. To measure the how the competition index reacts to the foreign ownership diversity, I will use the Panzar and Rosse (1987) model that allows testing for market structure relying solely on information from the financial statements of the banks.

Chapter 2: After the devaluation of the Turkish Lira against Euro and US Dollar, automobile prices in Turkey rose substantially. Despite this context, car sales also increased. In this paper, I explore the role of credit supply of the Turkish banks. Throughout this period, consumer credit increased due to the modernization of the Turkish banking sector. The purpose of this study is to examine the role of credit supply in growing demand for a durable good by Bayesian vector autoregression. The results indicate that domestic car credits have a significant positive effect on car sales, while foreign banks remain insignificant.

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Chapter 1

THE EFFECT OF FOREIGN OWNERSHIP ON COMPETITION: EVIDENCE FROM THE TURKISH BANKING INDUSTRY

Introduction

Within the globalization and emerging technology after the 1980s, many countries were drawn into a rapid change in their financial systems. The willing of spreading the risk, rent-seeking behaviour, and liquidity saturation in their home country, countries began to canalize their investments to foreign markets. Cull et al. (2017) report that, in all states, 43% of the banking system assets belong to international holders, while 18% of it is being held by the government. They also indicated that there exists a significant increase in foreign holders in developing countries, even in high-income countries. In response to this, bank assets held by the government shows a downward trend in all regions.

The consequences of the foreign acquisition for the overall banking industry are ambiguous since acquired and the remaining banks can follow different strategies. That is why there is still not a straightforward answer. When a foreign purchase agreement takes place in a domestic bank, this might force other local banks to work more aggressively to keep their customers attracted. They can innovate new financial services and products inspired by their traditions and using their legal systems. On the contrary, banks which have foreign-held assets are less dependent on political tensions, and they are better in monitoring customers with advanced technology (Havrylchyk, 2006). Outsourced by their mother companies or investors, foreign-owned banks are better access to different sources of financing, have higher technological software and more sophisticated banking products

and labours than the remaining banks (Hermes et al., 2004). It has also been claimed that foreign banks might adopt cream-skimming behaviour, selecting low default risk borrowers due to having a lack of information about the existing firms and let the domestic banks work with more opaque customers. But since the local firms have more data about risky customers, they can monitor better and turn out the risk into their favour (Detragiache et al., 2008; Poghosyan, 2009). Contrarily, it has also been found that international banks can take over another strategy instead of cherry-picking behaviour and lean on small-medium size enterprises (Torre et al., 2010).

The possible effects of the ascent of foreign inhesion in developing as well as developed markets are studied in the academic literature intensively. Understanding competitive conditions in the banking industry are crucial since it instructs the country about the quality and production of financial services and products. It gives information about how the households and firms enjoy and use the financial services and, it is a matter for the economic growth for macroeconomic level (Claessens et al., 2004; Northcott, 2004; Goddard et al., 2009). Many pieces of evidence can be found in the research papers that forecast the effect of foreign bank ownership on bank competition through analysing efficiency from interest rate margins, profit-cost measurement, cost functions or direct assessment of competition, but differ from their methodologies and data selections such as country level, regional and large samples of countries. It has been mostly indicated that foreign ownership boosts competition in developing countries by providing resources and funding, and lowering costs for the domestic banks to operate more efficiently and enhancing economic growth (Demirgüç-Kunt et al., 1999; Denizer, 2000; Weill, 2003; Wang et al., 2004; Kraft et al., 2006; Gupta et al., 2006; Yañez et al., 2007; Schnitzer et al., 2008), while in high-income countries the

opposite case is accurate (Claessens et al., 2001). There also exist studies stating that foreign presence effect on bank performances are indefinable (Sensarma, 2006; Berger et al., 2009). Despite all, Lensink et al. (2008) indicate that international bank existence negatively penetrates the efficiencies of the bank.

Interest rate spreads can be affected from countries' macro-economic performance and environment, and moreover, liabilities of being a financial intermediary specific to the country and particular to banks factors such as preferences of risk and scales (Peria et al., 2010). Hence, in this paper, a direct measurement of the competition will be conducted.

This chapter provides the consequences of controlling the bank foreign ownership scale by using a different technique in the dissection of the Panzar-Rosse, 1987 (PR) competition test model. The competition analysis will be done by adding foreign ownership variable specific to each bank. In other words, competitive conditions without foreign ownership will be discussed; then the same model will be examined with foreign ownership control variable and interaction variables to see how the competition index reacts to the change in variables. Instead of using a dummy variable, which is commonly preferred in the literature, foreign ownership percentages specific to each bank will be considered. Since dummy variables take only values 0 or 1, it will not reflect the bank-specific foreign ownership character to the analysis.

One possible problem that might arise here is a potential endogeneity. Both parameters may be affected by the macroeconomic indices or a reverse causality between bank revenues and foreign acquisition can lead to an estimation bias since foreign banks are more attracted to invest in better-performed banks. To resolve this possible

endogeneity problem, the system Generalized Method of Moments (GMM) will be used in the second step.

The paper is coordinated as follows: Several examples relevant to the research question from the literature are given in Section 2. In section 3, the evolution of foreign existence in the Turkish banking industry is described for the years $1994 - 2017$. Data and methodology are described in Section 4 and Section 5, respectively. Section 6 presents the empirical results and lastly, the discussion takes part in the final.

Literature Review

The relationship between competition and foreign bank participation analysis is debated in many ways by using different models and data types. Some studies focused on this issue by analysing concentration ratio, Lerner Index, Herfindahl-Hirschman Index, etc. and Panzar and Rosse (1987) methodology. Most of the studies used a bank-level panel database and Panzar-Rosse (1987) model. Shaffer (1982) used the PR method first in academia to examine the competitive atmosphere by using U.S. bank data.

The first study in the literature concerning foreign penetration in the banking industry is Claessens et al. (2004), which used 50 countries' banking data for the period $1994 - 2001$. First, they examined the competitive conditions for each country by using PR method then indicated a positive relationship between competition and country-specific foreign participation by using cross-country regressions. Another study, Gelos et al. (2004) also used PR methodology to assess the competition level in several Central European and Latin American countries. Their results suggest a positive relationship between the competition indexes gathered through *H*-Statistics and foreign bank association by evaluating the correlation between them. Yıldırım et al.

(2009) indicate an increasing competition in Latin America when bank assets are opened to foreign investment. For the period 1998 – 2008, Jeon et al. (2011) used 17 Asian and Latin American developing states in total to explore the effect of foreign ownership status on the competition by taking into account the endogeneity issue. By implementing an instrumental variable regression, their results show a positive measure.

Despite all positive findings so far, Yeyati et al. (2008) focused on 8 Latin American countries' bank-level data by using the PR method and instrumental variable. They used the remaining seven countries' average foreign share as an instrumental variable and calculated the time-varying H-Statistics for each Latin American country in their sample. Consequently, their results suggest a less competitive environment when there is a foreign presence in the banking industry. Another study from Anzoátegui et al. (2012) also suggests lower competitiveness for foreign banks in Russia.

Hsieh et al. (2016) adopted a group of bank competition variables such as Herfindahl-Hirshman Index and concentration ratios instead of considering the PR method by dividing the sample into areas. By using dynamic panel GMM method, they present various outcomes depending on the regions. For Sub-Saharan Africa region, they found that an increase in foreign presence raises competition while the results for Latin America yields oppositely. For Middle East-North African and Asian areas, they find no significant evidence of an influence on competition through foreign ownership. Delis et al. (2016) used Lerner Index to address the same concern by using 131 countries' pooled bank-level data over the period 1997 – 2009, but they found an insignificant relationship between market power and foreign bank ownership.

As it is understood in the literature, the alliance between competitive structures and foreign bank ownership is still ambiguous,

and the number of studies which addressed this topic is few. In this paper, the competition will be analysed by following a new manner in the PR method. The literature presented above alongside other works in the literature studied competition assessment mainly used the same variables. This study will try to criticize the competitive conditions for the Turkish banking industry by changing the right-hand-side of the PR methodology.

A Short History of Turkish Banking Industry

The inference of the economic crisis happened abroad in the late 90s, and the systemic banking and liquidity crisis occurred in 2000 – 2001 in Turkey, the banking industry experienced a rapid change. In 1999 – 2002, the Turkish Banking Regulation and Supervisory Agency implemented reconstruction program to banks and incorporated them into Saving and Deposit Insurance Fund (SDIF). With this program, some banks ran into liquidation process or some combined with others. Through these processes, it is aimed to encourage foreigners to invest in the Turkish banking industry, moreover, strengthening the capital side of the bank according to the Basel II criteria (Karacaoğlan, 2011). Aysan et al. (2007) provide the pull factors specific to Turkey for foreign bank investment such as high growth potential backed by an increasingly young population, being a part of IMF's reconstruction plan and European Union negotiations, political stability and geo-strategic advantage due to its position between two continents. Following the crises, insolvent Turkish banks were promising profitable investments and suitable area to implement new technologies with cheaper costs (Sönmez, 2014).

Figure 1.1 shows the graph of foreign ownership market percentage of the Turkish banking industry between the years 1994 – 2017. The left-hand-side of the chart illustrates the annual foreign

owners in portions. Since not all banks are the same sized, foreign ownership percentages are weighted to total assets. International penetration is around 5% in the first period. The reason is that there are already some foreign banks that existed before 1994 and afterward.

Figure 1.1: Yearly Foreign Ownership Percentage Weighted by Banks' Total Assets (1994 – 2017)
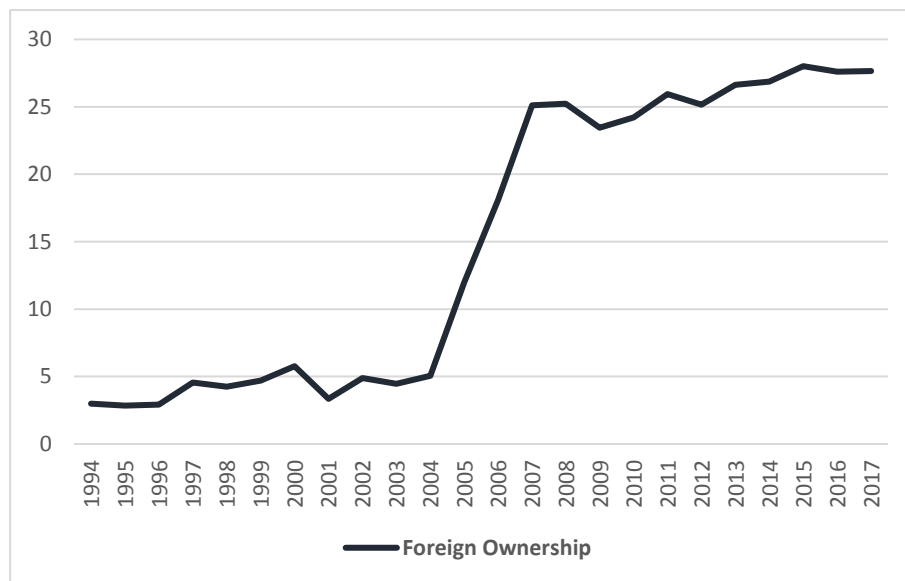
Especially in 2004 and later on, a dramatic increase can be seen due to corporate tax reduction and investment barriers relaxation (Süer et al., 2016). Besides, when there is foreign investment, it has been observed that the asset size of the bank balance sheet multiplies. The foreign penetration took place during this period, for instance, as acquisition and buying stocks of a bank, Greenfield investments and opening a branch. As it can be seen in Figure 1.1, between the years 2007 – 2017, there exists an upward trend in foreign participation as it is navigating at 25 – 28% levels. Its comparable structure over the periods of the Turkish banking industry makes the data useful to analyse the effect of foreign influence on the competition.

Table 1.1: Developments in Foreign Association in the Turkish Banking Industry (1994 – 2004)

1995	Bank Indosuez Generale Euro Türk A.Ş. became domestic and changed its name to Bank Kapital Türk A.Ş.
	Birleşik Türk Körfez Bankası A.Ş. became domestic and started operating in domestically owned banks.
1997	ING Bank N.V. began to operate.
	Chemical Bank A.Ş. became domestic and changed its name to Sitebank A.Ş.
1998	Rabobank Nederland started operating.
	Turkish Bank A.Ş. became domestic and started operating in domestically owned banks.
1999	Türk Sakura Bank A.Ş. became domestic and changed its name to Fiba Bank A.Ş.
2000	Kıbrıs Kredi Bankası Ltd. transferred to SDIF.
2001	Demirbank T.A.Ş. transferred to HSBC Bank A.Ş.
	Osmanlı Bankası A.Ş. transferred to Türkiye Garanti Bankası A.Ş.
	Ulusal Bank T.A.Ş. (Saudi American Bank) transferred to SDIF.
2002	UniCredito Italiano and Koçbank A.Ş. got into a strategic partnership alliance by 50% each.
	Rabobank Nederland stopped operating.
	Novabank S.A. invested in Sitebank A.Ş. by 100%.
2003	ING Bank N.V. stopped operating.
2004	Deutsche Bank A.Ş. started to accept deposits.

Source: Banks' annual operating reports and historical reports in the Bank Association of Turkey website.

Note: The Chase Manhattan Bank N.A. has been excluded from the data set after 2002. Portigon AG (WestLB AG) has been added to the dataset in 1995. Banca di Roma S.p.A. was added to the dataset in 1996. The banks which include foreign assets are Abn Amro Bank N.V., Arap Türk Bankası A.Ş., Bank Mellat, Bnp-Ak Dresdner Bank A.Ş., Citibank A.Ş. (Citibank N.V.), Habib Bank Limited and Société Générale (SA) were operating in the overall 1994-2004 period.

Table 1.2: Developments in Foreign Association in the Turkish Banking Industry (2005 – 2017)

2005	Fortis Bank A.Ş. invested in Türk Dış Ticaret Bankası A.Ş. by 94,11%.
	BNP Paribas invested in Türkiye Ekonomi Bankası A.Ş. by 42,12%.
	General Electric invested in Türkiye Garanti Bankası A.Ş. by 25,5%.
	UniCredito became a partner of Yapı ve Kredi Bankası A.Ş. indirectly by 28,7%.
	Ak Uluslararası Bankası A.Ş., foreign-owned by 60%, merged with Akbank T.A.Ş.
	Koçbank A.Ş., 50% owned by UniCredito Italiano, merged with Yapı ve Kredi Bankası A.Ş.
	National Bank of Kuwait invested in Turkish Bank A.Ş. by 39,19%.
2006	The foreign share increased to 65% from 54,09% in Arap Türk Bankası A.Ş.
	Dexia Participation Belgique S.A. invested in Denizbank A.Ş. by 99,74%.
	UniCredito increased its indirect investment in Yapı ve Kredi Bankası A.Ş. to 40,09%.
	National Bank of Greece S.A. invested in Finans Bank A.Ş. by 46%.
2007	Citibank Overseas Investment Corporation invested in Akbank T.A.Ş. by 20%.
	ING Bank invested in Oyakbank A.Ş. by 100%.
	Banca di Roma S.p.A. stopped operating.
	Eurobank EFG S.A. invested in Tekfenbank A.Ş. by 70%.
	BTA Securities JSC invested in Şekerbank T.A.Ş. by 33,98%.
	Arab Bank and BankMed invested in MNG Bank A.Ş. by 50% and 41% respectively.
2008	The foreign share increased to 94,79% in Finansbank A.Ş.
2010	The foreign share increased to 100% in MNG Bank A.Ş.
2011	The foreign share increased to 99,81% in Finans Bank A.Ş.
	The foreign share increased to around 68% in Türkiye Ekonomi Bankası A.Ş.
	Fortis Bank A.Ş. merged with Türkiye Ekonomi Bankası A.Ş.
2012	Burgan Bank S.A.K. invested in Tekfenbank A.Ş. by 99,26%.
	Odea Bank A.Ş. started operating.
2013	Commercial Bank of Qatar invested in Alternatif Bank A.Ş. by 74,24%.
	Portigon AG stopped operating.
	Bank of Tokyo-Mitsubishi UFJ Turkey started operating.
2014	Intesa Sanpaolo S.p.A. began to operate.

Rabobank A.Ş. started operating.

2015 The foreign share increased to 19,9% in Fibabanka A.Ş.

Industrial and Commercial Bank of China limited invested in Tekstil Bankası A.Ş. by 92,82%.

The foreign share increased to 75% in Alternatif Bank A.Ş.

COIC sold back its holdings in Akbank T.A.Ş.

The foreign share increased to around 72,48% in Türkiye Ekonomi Bankası A.Ş.

BBVA SA invested in Türkiye Garanti Bankası A.Ş. by 39,90%.

2016 The foreign share increased to 100% in Alternatif Bank A.Ş.

The foreign share increased to 27,87% in Fibabanka A.Ş.

2017 The foreign share increased to 49,85% in Türkiye Garanti Bankası A.Ş.

Source: Banks' annual operating reports, historical reports in the Bank Association of Turkey website and Sönmez, (2014), Süer et al. (2016).

Note: Foreign ownership in Şekerbank T.A.Ş decreased from 33,7% to 19,37% from 2013 to 2017.

Table 1.1 and Table 1.2 provides brief information about the changes and developments in foreign penetration in the Turkish banking system. The yearly based historical data in the tables below represent the ownership structure of the banks for the years 1994 – 2004 and 2005 – 2017 separately. In the tables, the domestic banks which are transferred to SDIF and merges that are happened in local bank category are not provided. Even though the data for 2004, 2005 and 2006 are not included in the analysis, the information for these years is also given in the tables.

Methodology

Panzar-Rosse (1987) model is preferred to examine the competition levels for each case: first, without the foreign ownership control variable, the second with foreign ownership control variable and lastly, foreign ownership interaction variables. Its easily appropriate structure and data requirements make it a popular competition

assessment methodology in the literature. This model first measures the elasticities of the firm's revenue concerning the input prices. These input prices are derived mostly from the main costs of firms' like capital, labour and operating costs. The summation of these elasticities (coefficients of input prices) generates *H*-Statistics, a degree that ranges between -∞ and 1. Depending on the value that *H* will take, we will be able to compare the *H*-Statistics in each case. When the *H*-Statistics is equal to 1, the industry is under perfect competition. This means that the revenues and the marginal cost increase in the same proportion with an increase in input prices. When *H*-Statistics is smaller than 1 but positive, this condition regards to monopolistic competition. This tells us that, an increase in the input prices both scales up the revenues and the marginal cost but not as the same amount of that increase in input prices. When *H*-Statistics is negative and equal to 0; a rise in the input prices decreases the revenues, this points out that the market operates under a monopoly.

Most of the studies in literature examined the competitive environment of the banking industries based on the following model:

$$\ln TR_{i,t} = a + \beta_1 \ln DEP_{i,t} + \beta_2 \ln OP_{i,t} + \beta_3 \ln PER_{i,t}$$
$$+ \beta_4 \ln LO_{i,t} + \beta_5 \ln PER_{i,t} + \beta_6 \ln TA_{i,t} + \varepsilon_{i,t} \quad (0)$$

In this standard model, the dependent variable which is $TR_{i,t}$, is the ratio of Total Interest Revenues plus Commissions and Fees Received or Interest Revenues only over Total Assets, as a proxy for bank revenues. The ratio $DEP_{i,t}$ is the banks' Interest Expenses on Deposits over Total Deposits which is an input price stands for the deposits. Second, $OP_{i,t}$ is the ratio of Other Operating Expenses over Total Assets, is an input price for operating activities. The last input

price $PER_{i,t}$ that is a proxy for personnel, is the ratio of Personnel Expenses over Number of Employees. Because of the lack of data of Number of Employees, some studies used Total Assets as a denominator instead. The remaining independent variables are control variables to eliminate size effects, namely, $LO_{i,t}$ is the ratio of Total Loans and Receivables over Total Assets, $EQ_{i,t}$ is the ratio of Total Equity over Total Assets and $TA_{i,t}$ is for Total Assets.

However, Bikker et al. (2012) indicated that a scaled price equation as it is described above is not an accurate measurement of competition since the presence of Total Assets as a denominator in the dependent variable and control variable in the right-hand-side of the model, might mislead the results. Their theoretical and empirical frameworks show that the sign of *H*-Statistics will signal monopolistic competition even though the market is operating under monopoly or oligopoly. Therefore, in this study, the notations of Bikker et al. (2012) are considered.

In all models presented below, bank-level observations are used to investigate how the bank revenue responses to the input prices; i indicates the bank and t is for the time. α_i are bank fixed effects, δ_t are year fixed effects and $\varepsilon_{i,t}$ is the error term. Following the specifications proposed by Bikker et al. (2012), first, model (1) below without the foreign ownership control variable and interaction variables are used to measure the competition level of the Turkish banking industry:

$$\ln R_{i,t} = a_i + \delta_t + \beta_1 \ln DEP_{i,t} + \beta_2 \ln OP_{i,t} + \beta_3 \ln PER_{i,t}$$
$$+ \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} + \varepsilon_{i,t} \tag{1}$$

In this model, the dependent variable which is $R_{i,t}$, is the Total Interest Revenues plus Commissions and Fees Received. Instead of using Interest Revenues only, Commissions and Fees are also added to the model because banks' price charging for operating processes might differ. Within the similarities with the very first model presented above, the ratio $DEP_{i,t}$ is the banks' Interest Expenses on Deposits over Total Deposits which is an input price stands for the deposits. Second, $OP_{i,t}$ is the ratio of Other Operating Expenses over Total Assets, is an input price for fixed capital. The last input price $PER_{i,t}$ that is a proxy for personnel, is the ratio of Personnel Expenses over Number of Employees. The remaining independent variables are bank-specific control variables, namely, $LO_{i,t}$ is the ratio of Total Loans and Receivables over Total Assets, $EQ_{i,t}$ is the ratio of Total Equity over Total Assets. The coefficients for the first two control variables $LO_{i,t}$ and $EQ_{i,t}$ are expected to be positive since higher revenues will be generated through a higher allocation of loans and better capitalization levels (Turk-Ariss, 2009).

Second, to understand how the competition index changes with respect to foreign ownership, an additional variable specific to each bank, namely $FO_{i,t}$ is added to the model (1), namely model (2):

$$\ln R_{i,t} = a_i + \delta_t + \beta_1 \ln DEP_{i,t} + \beta_2 \ln OP_{i,t} + \beta_3 \ln PER_{i,t}$$
$$+ \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} + \beta_6 FO_{i,t} + \varepsilon_{i,t} \qquad (2)$$

In the former two models, H-Statistics will be equal to $\beta_1 + \beta_2 + \beta_3$, the first three coefficients of the input prices. Third, interaction variables with foreign ownership will be added to the former model (3). In model (3), the H-Statistics for the domestic banks will be equal to $\beta_1 + \beta_2 + \beta_3$ while the H-Statistics for the foreign banks will be equal

to $\beta_6 + \beta_7 + \beta_8$. With this model (3), we will be able to divide the sample to compare the banks depending on the foreign presence.

$$
\begin{aligned}
\ln R_{i,t} = a_i + \delta_t + {} & \beta_1 (1 - FO) \ln DEP_{i,t} + \beta_2 (1 - FO) \ln OP_{i,t} \\
& + \beta_3 (1 - FO) \ln PER_{i,t} + \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} \\
& + \beta_6 \, FO_{i,t} \ln DEP_{i,t} + \beta_7 \, FO_{i,t} \ln OP_{i,t} \\
& + \beta_8 \, FO_{i,t} \ln PER_{i,t} + \beta_9 \, FO_{i,t} + \varepsilon_{i,t} \quad\quad (3)
\end{aligned}
$$

The dynamic GMM estimation method is becoming popular in the competition assessment literature. For "small T-large N" dynamic panel datasets which are unbalanced with gaps and suffering from the endogeneity and omitted variable biases, makes the GMM method a proper tool to analyse more efficiently. Also, for the presence of heteroscedasticity and serial autocorrelation, the GMM method is preferred (Roodman, 2009). Hansen, (1982) first introduced the Generalized Method of Moments and it has been developed by Arellano-Bond, 1991 by taking differences of the variables which is named difference-GMM. Then by, The Arellano–Bover, (1995) and Blundell–Bond, (1998) enhanced the methodology and designed the system-GMM. First, the lag values of the variables are instrumented into the difference equation, then the lags of differenced variables introduced as instruments into the level equation. Since it generates and estimates two equations at the same time, the estimation is called system-GMM. It is essential to state that one should test the validity of instruments for over-identification existence and check whether the error term is not autocorrelated after GMM estimation. To test those, Arellano–Bond (AR) and Sargan tests are implied. With the difference of what has been denoted for fixed effects estimations above, the system GMM method adds the lag of the dependent variable automatically as

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an independent variable to the estimation. For GMM estimations, the models (4), (5) and (6) respectively that are below, are going to be used for the assessment of competition index for the two periods. There can be found several studies who used GMM estimation for PR method such as Delis et al. (2008) and Vardar et al. (2014).

$$\ln R_{i,t} = a_i + \beta_0 \ln R_{i,t-1} + \beta_1 \ln DEP_{i,t} + \beta_2 \ln OP_{i,t}$$
$$+ \beta_3 \ln PER_{i,t} + \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$\ln R_{i,t} = a_i + \beta_0 \ln R_{i,t-1} + \beta_1 \ln DEP_{i,t} + \beta_2 \ln OP_{i,t}$$
$$+ \beta_3 \ln PER_{i,t} + \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} + \beta_6 FO_{i,t}$$
$$+ \varepsilon_{i,t} \quad (5)$$

$$\ln R_{i,t} = a_i + \beta_0 \ln R_{i,t-1} + \beta_1 (1 - FO) \ln DEP_{i,t}$$
$$+ \beta_2 (1 - FO) \ln OP_{i,t} + \beta_3 (1 - FO) \ln PER_{i,t}$$
$$+ \beta_4 \ln LO_{i,t} + \beta_5 \ln EQ_{i,t} + \beta_6 FO_{i,t} \ln DEP_{i,t}$$
$$+ \beta_7 FO_{i,t} \ln OP_{i,t} + \beta_8 FO_{i,t} \ln PER_{i,t} + \beta_9 FO_{i,t}$$
$$+ \varepsilon_{i,t} \quad (6)$$

It has been intensively denoted that the PR method should be held only when the market operates in equilibrium. The idea behind the equilibrium assessment is that return to assets should be identical across banks and for this, the rate of return to assets should be independent of the input prices. To be in equilibrium, the rate of return to assets (or equity) should not be correlated with the input prices (Shaffer, 1982; Nathan et al., 1989; Bikker et al., 2012). Following this idea, return to asset ratio (ROA) is replaced by the total revenues and other independent variables remain the same in many studies. However, it has been indicated that the state of equilibrium should have been observed

in an industry only when the market is perfectly competitive (Bikker et al., 2012). In this study, since the results signal monopolistic competition mostly for all periods, equilibrium conditions are not attended.

Data

In this chapter, the data covers all deposit banks (public, private and foreign banks) operating in Turkey for the years between 1994 – 2004 and 2007 – 2017. The data consists of 83 deposit banks in total with an unbalanced (with gaps) panel of 469 observations for the period 1994 – 2003 and 321 observations for the period 2007 – 2017. The banks under SDIF, Islamic banks, development and investment banks are not included in the sample. Annually financial statements and the number of employees of the banks are obtained from the Bank Association of Turkey database. Balance sheet items are comprised of total assets, total deposits, total equity and loans and receivables. Income statement items are total interest revenue, commissions and fees received, interest expense on deposits, other operating and personnel expenses. The summation of total interest revenue and commissions and fees received will form total revenues, which is the dependent variable.

On the contrary of most of the literature, the data for commissions and fees received is decided to be added since foreign-owned banks are appeared to be further productive than the existing banks in the sense of non-interest income (Claessens et al., 2001). Foreign ownership percentages for each bank is obtained from banks' annual reports and the historical data in the Bank Association of Turkey website. Table 1.3 displays the descriptive statistics of the data of deposits banks' operating in Turkey for the years 1994 – 2003 and 2007 – 2017 separately.

Table 1.3: Descriptive Statistics of Turkish Banking Industry

	1994 – 2003					2007 – 2017				
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Total Deposits	469	1147072	3510635	13.742	33851826	321	30606968.4	48342459	115	266384189
Loans and Receivables	469	418209.5	1158388	0.548	8717455	321	30526547.37	50841546	2819	298032546
Total Equity	469	184125.2	660572.9	21.313	5833045	321	5561226	8964123	22624	47009828
Total Assets	469	1683371	5026433	81.293	46655144	321	50270041	80458025	48249	434274509
Total Interest Revenue	469	393753.2	1378329	10.427	16212479	321	4043544	6051067	4696	35463463
Interest Expense on Deposits	469	247000.4	924371.6	0.313	9559875	321	1680458	2484846	40	12249174
Fees and Commissions Income	469	25452.89	81999.55	0	620897	321	596993.4	931190	28	4876857
Other Operating Expenses	469	51710.38	180083.6	8.08	1532751	321	1138892	1547934	1746	7395787
Personnel Expenses	469	29520.12	83485.49	5.432	730325	321	487643.7	649261.9	885	3399059
Number of Employees	469	2860	5787	10	37705	321	6158	7466	15	25697
Foreign Ownership (%)	469	30.69102	44.65409	0	100	321	60.58403	42.58323	0	100

Except for the variable Foreign Ownership which is denoted in percentage, the other variables are in thousand Turkish Lira. As it is shown in Table 1.3, the mean of Foreign Ownership percentage comes to the forefront as approximately 61% for the second period, which signs higher foreign penetration for the industry; wherein the years 1994 – 2003 the foreign ownership percentage is at 31%.

Empirical Results

The very first model is commonly used in the literature, but in this study, it has been decided to consider the biased estimations, that is why model (0) has not been analysed. The *H*-Statistics and the coefficients are gathered from the models are represented in the tables below. The first and the second columns depict the results of the model (1) and model (2) respectively. The third column includes former variables together with the interaction variables, which is the model (3). The panel fixed effects estimation results for the period 1994 – 2003 are given in Table 1.4, where in Table 1.5 the results refer to the period 2007 – 2017. To control the possible time-varying effects and unobserved bank heterogeneity in the sample, year dummies are added and the first year is omitted and fixed-effects estimation is preferred. Table 1.6 and Table 1.7 presents the GMM results. Likewise, in fixed-effects regressions, the result of the last three models (4), (5) and (6) are given in the three columns, respectively. All the variables are used in natural logarithm except the Foreign Ownership, which is taken in decimals. The dependent variable is Total Revenues (Total Interest Income plus Commissions and Fees Received).

For each model, *H*-Statistics is calculated, besides, in the last column, *H*-Statistics for both foreign and domestic banks are calculated. Accordingly, the coefficients of the first three input prices will refer to competitive conditions of domestic banks, where the *H*-Statistics of the

banks which include international partnership is calculated by summing the coefficients of the interaction variables.

In all fixed-effect estimations of 1994 – 2003, the coefficients; except for the operating expenses, personnel expenses, personnel expense interacted with foreign ownership, and foreign ownership in the second column, are statistically significant in all three columns. Input price as a proxy for deposits appears to be positive and is statistically significant. This suggests that expenses made on funds collected, generate more revenues in the banking industry. The proxies for operating activities and staff are appeared to be statistically insignificant in fixed-effects estimations. The results suggest that a higher level of loans will generate higher revenues which is consistent with the findings in Molyneux et al. (1994). The remaining fundamental control variable $\ln EQ$ which is a proxy for total equity of the bank is statistically significant and has a negative impact on total revenues. This suggests that higher the ratio of capital, lower the banks will bear the risk, and so, this will result in declining bank revenues (Günalp et al., 2006).

Likewise, in proxy for personnel, its interacted variable with foreign ownership is also insignificant. When a bank is foreign owned totally, the total effect of deposits on revenue is positive with a value of 0.188. In conclusion, when a bank is independent of foreign acquisition, the effect of expenses from deposits on bank revenues is less than double. The same interpretation can be also made for the operating activities. This shows us that domestic banks generate more revenues per expense than foreign-owned banks. Foreign ownership appeared to have a significant negative impact on bank revenues only in the model (3). When foreign ownership control variable and interactions variables are added to the model, the signs and significances of the input prices do not change. The value of within R-squared is increasing by adding

new variables to the model and adding the foreign presence variables to the model increase the value of the coefficient of $\ln DEP$.

Table 1.4: Fixed Effects Estimation Results for the period 1994 – 2003

Dependent Variable: lnR	Model 1	Model 2	Model 3
lnDEP	0.292475	0.294466	0.385514
	(0.032056) *	(0.032090) *	(0.045494) *
lnOP	-0.049865	-0.041876	-0.041164
	(0.052069)	(0.052514)	(0.072493)
lnPER	0.012534	0.008674	0.055173
	(0.063904)	(0.063967)	(0.066427)
LnLO	0.107189	0.111908	0.094111
	(0.029369) *	(0.029645) *	(0.029459) *
lnEQ	-0.396311	-0.399194	-0.364379
	(0.044137) *	(0.044191) *	(0.044597) *
FO	-	-0.230510	-0.793080
	-	(0.201327)	(0.397497) **
LnDEP * FO	-	-	0.188233
	-	-	(0.044807) *
LnOP * FO	-	-	-0.097833
	-	-	(0.058621) ***
LnPER * FO	-	-	0.005045
	-	-	(0.064676)
Constant	7.252496	7.361357	7.614447
	(0.213491) *	(0.233628) *	(0.310882) *
H-Statistics	0.255144	0.261263	-
	(0.081134) *	(0.081278) *	-
Foreign H-Statistics	-	-	0.095445
	-	-	(0.091078)

Non-Foreign *H*-Statistics	-	-	0.399522
	-	-	(0.095536) *
F-Statistics (*H*=0)	9.89 *	10.33 *	-
F-Statistics (*H*=1)	84.28 *	82.61 *	-
Foreign F-Stat (*H*=0)	-	-	1.10
Non-Foreign F-Stat (*H*=0)	-	-	17.49 *
Foreign F-Stat (*H*=1)	-	-	98.64 *
Non-Foreign F-Stat (*H*=1)	-	-	39.51 *
F-Test ($H_F = H_{nF}$)	-	-	11.00 *
R-Squared (within)	0.9527	0.9529	0.9549
Observations	469	469	469

Note: Standard errors in parentheses. *, **, *** represent significant at 1%, 5% and 10%, respectively. Year dummies are from 1995 to 2003. DEP is the ratio of banks' Interest Expenses on Deposits over Total Deposits. OP is the ratio of Other Operating Expenses over Total Assets. PER is the ratio of Personnel Expenses over Number of Employees. LO is the ratio of Total Loans and Receivables over Total Assets. EQ is the ratio of Total Equity over Total Assets. FO is the Foreign Ownership Percentage in decimals.

In the first two columns, the calculated *H*-Statistics are positive, which tells us that the Turkish banking industry is under a monopolistic competition for the years 1994 – 2003. It has also been indicated monopolistic competition for the period 1990 – 2000 for the banking industry in Turkey with scaled revenue model as well (Günalp et al., 2006). The calculated *H*-Statistics were also tested, whether it is different from zero or unity. For all models, the estimated *H*-Statistics are all significantly different from unity at 1% significance level. This rejects the condition of the Turkish banking industry is operating under a perfectly competitive market in this period. For the first two models and the competitive nature of the domestic banks in the third column, any form of conjectural variation oligopoly or monopoly structure for the domestic banks are rejected. However, the calculated *H*-Statistics is

not statistically different from zero in the case for foreign banks. This might signal that conjectural variation oligopoly or monopoly structure for the domestic banks is not always rejected.

When the interaction variables are included in the model (3), there exist two H-Statistics, for foreign and local banks categories. When we compare the two H-Statistics, we see that at first, the banks without foreign assets seems more competitive than the ones with foreign investment. Since the two H-Statistics are both positive, it is crucial to understand whether the competition levels for both bank categories are different from each other. The F-Test provides that, the hypothesis of H-Statistics of domestic banks equal to H-Statistics of foreign banks can be rejected. This means that the H-Statistics of foreign banks is different from the H-Statistics of the remaining local banks. This can be expected because the size of the foreign banks is less than the size of the domestic banks; this can enable us to distinguish meaningfully for this period.

Table 1.5 denotes the fixed effects regression results for the years 2007 – 2017. As with the first period, expenses made on deposits appears to be positive and is statistically significant. Different from the first results, operating expenses seemed to have a significant negative impact on bank revenues in the first two models and the same happened for the personnel expenses in the third model. This suggests that expenses made on operating activities and labour, decreased the level of revenues in this period. In all three models, the effects of the loans provided, and equity are positive. Given the intense foreign acquisition took in this period, foreign-owned banks became well capitalized more and from this, they can generate higher revenues. For the interaction variables, only the personnel expense is statistically insignificant. The result tells that, when a bank is foreign owned totally, the total effect of expenses made on deposits is 0.239 while the expenses made on

operating activities is negative with a value of 0.134. This means that foreign banks generate more revenues rather than domestic banks in the sense of operating activities in the second period. When the foreign acquisition is intense, it did not change the balance between the two bank categories through gathering revenues from the costs made on deposits.

In the first two columns, the calculated *H*-Statistics are positive but are not different from 0 for the period 2007 – 2017 which contradicts the literature studied on the Turkish banking industry. Many studies with scaled price equations imply monopolistic competition for the Turkish banking industry (Vardar et al., 2014; Repková et al., 2014; Sakınç et al., 2015). This contradiction could be the result of the scaled model selections since the scaled model has an upward effect on the estimation of the coefficients. When we come up to the third column, the competitive natures for both bank categories first implies a large extent of diversity also compared to the first period. Domestic banks are under monopoly, while the foreign banks are monopolistically competitive. This difference can be a result of domestic banks may be forced to focus on more opaque customers and providing unique financial services which can lead to open the price margins. Despite these different statistics, both values are not separate from each other. That is why it is impossible to make a healthy comparison based on foreign capital entry in the banking industry in this period. This can be expected because the banks are operating in the same market and they are under regulations of the same authority.

Table 1.5: Fixed Effects Estimation Results for the period 2007 – 2017

Dependent Variable: lnR	Model 1	Model 2	Model 3
lnDEP	0.236505	0.234468	0.369674
	(0.025540) *	(0.025502) *	(0.114407) *
lnOP	-0.166335	-0.166985	-0.207926
	(0.056502) *	(0.056347) *	(0.167582)
lnPER	0.005779	0.023725	-0.311052
	(0.101656)	(0.102006)	(0.166854) ***
lnLO	0.221466	0.225375	0.248924
	(0.024867) *	(0.024921) *	(0.025283) *
lnEQ	0.733839	0.755886	0.772938
	(0.058101) *	(0.059590) *	(0.059052) *
FO	-	-0.204408	-1.858913
	-	(0.129106)	(0.618933) *
LnDEP * FO	-	-	0.238515
	-	-	(0.025211) *
LnOP * FO	-	-	-0.134227
	-	-	(0.059593) **
LnPER * FO	-	-	0.032037
	-	-	(0.099845)
Constant	0.274000	-0.038772	1.007819
	(0.970012)	(0.987293)	(1.049437)
***H*-Statistics**	0.07595	0.091208	-
	(0.106229)	(0.106372)	-
Foreign *H*-Statistics	-	-	0.136325
	-	-	(0 .106954)
Non-Foreign *H*-Statistics	-	-	-0.149305
	-	-	(0 .312661)

F-Statistics (*H*=0)	0.51	0.74	-
F-Statistics (*H*=1)	75.67 *	72.99 *	-
Foreign F-Stat (*H*=0)	-	-	1.62
Non-Foreign F-Stat (*H*=0)	-	-	0.23
Foreign F-Stat (*H*=1)	-	-	65.21 *
Non-Foreign F-Stat (*H*=1)	-	-	13.51 *
F-Test ($H_F = H_{nF}$)	-	-	0.83
R-Squared (within)	0.8241	0.8258	0.8350
Observations	321	321	321

Note: Standard errors in parentheses. *, **, *** represent significant at 1%, 5% and 10%, respectively. Year dummies are from 2008 to 2017. DEP is the ratio of banks' Interest Expenses on Deposits over Total Deposits. OP is the ratio of Other Operating Expenses over Total Assets. PER is the ratio of Personnel Expenses over Number of Employees. LO is the ratio of Total Loans and Receivables over Total Assets. EQ is the ratio of Total Equity over Total Assets. FO is the Foreign Ownership Percentage in decimals.

As a summary of the fixed effects estimations, the provided F-Tests imply a monopolistic competitive environment for the industry except for the domestic banks in the second period. It appears that the banks became less competitive in the 2007 – 2017 period, where there exists a higher degree of foreign presence accordingly to the 1994 – 2004 period. However, we cannot reject the *H*-Statistics are not different from each other, especially in the second period and we should consider the possible endogeneity bias in the estimation. Therefore, it has been decided to adopt the system GMM dynamic panel data estimation to have more effective results.

It has been mentioned above that there might be an endogeneity problem between the bank revenue and foreign ownership structure of the bank. Both variables can be affected by omitted variables like macroeconomic variables. For example, higher GDP and high growth rates might attract foreigners to invest more and might increase bank

revenues. More than that, foreign investments will take place in high revenue promising firms; this means that there can be a reverse causality between the bank revenue and foreign ownership structure. To eliminate these possible problems, system GMM is being used. Table 1.6 and Table 1.7 give the results of the system GMM estimation for the periods 1994 − 2003 and 2007 − 2017, respectively. In addition to the former models, the lagged dependent variable is added as an independent variable.

Starting from the first period 1994 − 2003, all input prices and control variables are statistically significant. Input prices as a proxy for deposits and personnel appear to be positive and are both statistically significant. This suggests that expenses made on funds collected and staff, generate more revenues in the banking industry. However, the expenses composed from operating activities have a significant negative impact on bank revenues. As it is found in the fixed effects of the same period, loans and equity, similar interpretations can be done. When we look at the interaction variables, all the variables are significant. First, it can be concluded that when a bank is foreign owned totally, the total effect of deposits on revenue is positive with a value of 0.20 which is very close to the fixed effect result. For the case of labour, the impact of personnel expenses on revenue is 0.29 and -0.175 for operating expenses. These results suggest that domestic banks generate more revenues than the foreign banks in the case of deposits and labour. The calculated *H*-Statistics are all significant and positive. They are all different than zero and unity. The statistics for foreign and domestic banks are also different from each other. In this situation, we can conclude that the Turkish banking industry is under monopolistic competition between the years 1994 − 2003 and foreign banks in this period are less competitive than the remaining domestic banks.

Table 1.6: GMM Estimation Results for the period 1994 – 2003

Dependent Variable: lnR	Model 1	Model 2	Model 3
L.lnR	0.573756	0.536095	0.521950
	(0.009607) *	(0.010228) *	(0.012094) *
lnDEP	0.313585	0.312524	0.524657
	(0.011643) *	(0.012522) *	(0.049086) *
lnOP	-0.259902	-0.246396	-0.220057
	(0.012694) *	(0.014383) *	(0.031344) *
lnPER	0.388061	0.438144	0.486811
	(0.016264) *	(0.018754) *	(0.022457) *
lnLO	0.056492	0.069096	0.051031
	(0.013504) *	(0.014599) *	(0.011775) *
lnEQ	-0.187429	-0.171230	-0.174642
	(0.023209) *	(0.020642) *	(0.030659) *
FO	-	-0.606778	-0.757350
	-	(0.037757) *	(0.248601) *
LnDEP * FO	-	-	0.200148
	-	-	(0.012885) *
LnOP * FO	-	-	-0.175436
	-	-	(0.023748) *
LnPER * FO	-	-	0.291239
	-	-	(0.031176) *
Constant	3.420983	3.987571	4.562093
	(0.076304) *	(0.086776) *	(0.196816) *
***H*-Statistics**	0.441744	0.504273	-
	(0.019203) *	(0.018982) *	-
Foreign *H*-Statistics	-	-	0.315951
	-	-	(0.025087) *

Non-Foreign *H*-Statistics	-	-	0.791411
	-	-	(0.047582) *
F-Statistics (*H*=0)	529.18 *	705.72 *	-
F-Statistics (*H*=1)	845.15 *	682.00 *	-
Foreign F-Stat (*H*=0)	-	-	158.62 *
Non-Foreign F-Stat (*H*=0)	-	-	276.64 *
Foreign F-Stat (*H*=1)	-	-	743.52 *
Non-Foreign F-Stat (*H*=1)	-	-	19.22 *
F-Test ($H_F = H_{nF}$)	-	-	80.64 *
Sargan Test	0.111	0.115	0.094
AR (1)	0.000	0.000	0.000
AR (2)	0.843	0.918	0.576
Observations	397	397	397

Note: Standard errors in parentheses. *, **, *** represent significant at 1%, 5% and 10%, respectively. DEP is the ratio of banks' Interest Expenses on Deposits over Total Deposits. OP is the ratio of Other Operating Expenses over Total Assets. PER is the ratio of Personnel Expenses over Number of Employees. LO is the ratio of Total Loans and Receivables over Total Assets. EQ is the ratio of Total Equity over Total Assets. FO is the Foreign Ownership Percentage in decimals. P-values of Sargan and AR tests.

When we look at the dynamic GMM estimations for the years 2007 – 2017, we also obtain here more significant results compared to fixed effect estimation. The input price for staff became substantial in the first two models, but it is appeared to be insignificant in the third model. For the first two columns, it can be obtained the same explication that has been done in fixed effects regression. We can say, when a bank is foreign owned totally, the total effect of expenses made on deposit on bank revenues is positive with a value of 0.215 where for the domestic banks it is 0.721. Same for the operating activities, foreign banks appear to generate higher revenues than the domestic banks. All

H-Statistics gathered from the dynamic panel estimation show that the Turkish banking industry is in monopolistic competition and are different from zero and unity. Also, foreign banks approved to be less competitive than the domestic banks. When we compare the two statistics both for foreign and domestic categories, we can reject the hypothesis of being equal.

Table 1.7: GMM Estimation Results for the period 2007 – 2017

Dependent Variable: lnR	Model 1	Model 2	Model 3
L.lnR	0.277059	0.266991	0.260198
	(0.007277) *	(0.001888) *	(0.014481) *
lnDEP	0.254905	0.255974	0.721377
	(0.002725) *	(0.003144) *	(0.043064) *
lnOP	-0.235947	-0.214243	-0.262310
	(0.005519) *	(0.006069) *	(0.083322) *
lnPER	0.058171	0.017627	-0.032151
	(0.005518) *	(0.005184) *	(0.037647)
lnLO	0.251174	0.262422	0.273515
	(0.003588) *	(0.002913) *	(0.006784) *
lnEQ	0.342211	0.356777	0.380656
	(0.009304) *	(0.005069) *	(0.014743) *
FO	-	0.286323	-1.367668
	-	(0.053778) *	(0. .512379) *
LnDEP * FO	-	-	0.215248
	-	-	(0.003548) *
LnOP * FO	-	-	-0.195037
	-	-	(0.012342) *
LnPER * FO	-	-	0.056068
	-	-	(0.021918) **

Constant	1.004182	0.849934	1.861376
	(0.028848) *	(0.037843) *	(0.463672) *
H-Statistics	0.077130	0.059357	-
	(0.005109) *	(0.007069) *	-
Foreign *H*-Statistics	-	-	0.076279
	-	-	(0.019503) *
Non-Foreign *H*-Statistics	-	-	0.426916
	-	-	(0. 048709) *
F-Statistics (*H*=0)	227.92 *	70.51 *	-
F-Statistics (*H*=1)	32630.09 *	17706.75 *	-
Foreign F-Stat (*H*=0)	-	-	15.30 *
Non-Foreign F-Stat (*H*=0)	-	-	76.82 *
Foreign F-Stat (*H*=1)	-	-	2243.33 *
Non-Foreign F-Stat (*H*=1)	-	-	138.43 *
F-Test ($H_F = H_{nF}$)	-	-	64.84 *
Sargan Test	0.978	0.983	0.993
AR (1)	0.006	0.005	0.005
AR (2)	0.165	0.155	0.164
Observations	286	286	286

Note: Standard errors in parentheses. *, **, *** represent significant at 1%, 5% and 10%, respectively. DEP is the ratio of banks' Interest Expenses on Deposits over Total Deposits. OP is the ratio of Other Operating Expenses over Total Assets. PER is the ratio of Personnel Expenses over Number of Employees. LO is the ratio of Total Loans and Receivables over Total Assets. EQ is the ratio of Total Equity over Total Assets. FO is the Foreign Ownership Percentage in decimals. P-values of Sargan and AR tests.

When it is controlled for the possible endogeneity problems, unobserved bank heterogeneity, heteroscedasticity and serial correlation through the dynamic GMM panel estimation, the results appear more significantly and efficiently. Both the lagged dependent

variables for the two periods have a positive and significant value which indicates that the bank revenues show continuity. In all periods, the tests required for GMM estimation which are for the validity of instruments and the serial autocorrelation of the error terms are adequately fulfilled except for the GMM estimation for the third model in the 1994 – 2004 period. Sargan test results suggest that the model is over-identified at 10%. The market with foreign assets are appeared to be less competitive than the other in all periods. When we compare the two periods, the competition index is higher when the foreign penetration is low. This concludes that the more foreign asset existence, the more banks become monopolistic since the *H*-Statistics are less in 2007 – 2017 than the 1994 – 2004 period. This difference occurred in these estimations may be a result of the foreign banks' strategy choice. Since the foreign banks are backed by their parents, they may imitate the national banks to offer financial services to survive or focus on risky customers. They can vary their products and tend to be in more risk-taking action. This idea is also proved by the statement done by Torre et al. (2010) that foreign banks might work with small-medium size entrepreneurs which are opaquer than the remaining clients and this can increase the risk of foreign banks. Working with risky clients can generate higher revenues and because of being well-capitalized, they can reduce their operating activity expenses, foreign banks appear to be more monopolistic than the national banks. Also, Yeyati et al. (2007) indicated that there exists a negative relation between competition and bank risk appetite.

Conclusion

In this chapter, the competitive conditions of the Turkish banking industry have been examined by controlling foreign participation. Briefly, the periods 1994 – 2003 and 2007 – 2017 are compared because the latter period includes more foreign inhesion. The radical changes in

the foreign ownership structures in the banks make it available to investigate effectively. Panzar and Rosse (1987) model has been selected to analyse the competitive structure of the industry but rather than the literature's model specification mostly; an unscaled revenue model has been chosen in all regressions. To cover the endogeneity problems, unobserved bank heterogeneity, heteroscedasticity and serial correlation problems in the dataset, a system GMM dynamic panel estimation is preferred.

In brief, dynamic GMM results indicate more significant results to fixed effects regressions and demonstrate monopolistic competition in the overall banking industry. Although the literature mostly indicates a positive link between foreign ownership and bank competition for the developing countries, the overall *H*-Statistics generate less competitive environment when the foreign inhesion is intense. This may be a result of bank risk-taking behaviour and able to manage to work with risky customers through the insurance and better monitoring skills provided by their foreign investors.

Chapter 2

THE ROLE OF CREDIT SUPPLY IN INCREASING DEMAND: EVIDENCE FROM TURKISH AUTOMOBILE MARKET

Introduction

Vehicle prices in Turkey show a rising trend due to the devaluation of the Turkish Lira against the Euro and US Dollar since vehicles are mostly imported. Furthermore, the government imposed high percentages of taxes on vehicle purchases and fuel prices also increased due to the devaluation. Despite those developments, the demand for vehicles in Turkey escalated. Normally, when the price of a good increases due to several reasons, a drop in the demand is expected. This demand growing in the Turkish vehicle market can be a result of consumers using their savings to buy cars or purchasing cars through applying for bank credit.

Credit availability is crucial for the mobility of the market since it can provide financing to small and medium-size entrepreneurs who are opaquer and more dependent on external financing than others (Berger et al., 2002). In the macro-economic point of view, it provides descriptive provisions for future consumption and income growth. In the case of consumer behaviour, it is mostly found that the credit availability and household consumption are highly interacting each other (Chrystal et al., 2005) and credit availability plays an important role also in investment decisions. For developing countries, it has been found that consumer credits are parallel with consumption and there exists a strong relationship (Holmes, 2011). In fact, in line with a reduction in credit availability, consumer spending significantly declines (Ludvingson, 1989; Beaton, 2009). Especially for durables goods, i.e., houses, mortgage credit availability is the critical

determinant for the demand in the housing sector (Guttentag, 1961; Meltzer, 1974). Many examples through applying different methodologies regarding consumer-credit relationship can be found in the literature review section.

Literature Review

The relationship between credit availability and consumption of households is mainly studied in the literature by focusing on macro-economic variables, household financing conditions and credit constraints. It has been indicated that vehicles sales went down as a result of the credit tightening in the $2007 - 2009$ recession period in the US car market (Johnson et al., 2014). Depending on income level and interest rate-maturity conditions of credit availability, it has been found that low-income households are more sensitive to borrowing constraints especially to maturity than high-income households (Attanasio et al., 2008). On the other hand, payment to income ratio of households is not a suitable proxy to determine the consumption behaviour; instead, nominal interest rates and unemployment rates have a more significant effect on purchases than real interest rates do (Wilcox, 1989). Credit availability has an increasing impact on durable good consumption for the high-income level consumers, while it decreases the saving ratios in small and medium income level households (Chang, 2005). Coricelli et al. (2006) indicates that, in Eastern Europe countries, including Turkey, there exists a positive relationship between the liquidity rise and consumption. Gross et al. (2002) found that car credits have a booster effect on consumption.

Through times series analyses, many studies examined the actual causality between credit availability and consumption. However, the elasticity between consumer spending and liquidity conditions are not apparent. For example, even though the credit availability increases

during an economic recession, it does not increase the consumption; but in an expansion period, the consumption increases through a rise in income (Dynan et al., 2006). Mostly what has been found that an increasing effect on consumption through credit availability (Pollin, 1988; Ludvingson, 1999; Hoosain, 2012). Demirezen, (2015) finds that credit availability has a significant positive effect on consumption. Schooley et al. (2010) signals that consumption is more frequent in young population during liquidity availability. On the contrary, it has been found that consumer credits have a decreasing effect on consumption (Beck et al., 2012).

Rather than the macroeconomic policies, credit availability can be raised by investments, especially from abroad. Foreign direct investments in the domestic banking sector have advantages for the purchased banks since foreign-owned domestic banks, partially or totally, are more able to access funding and equipped with better technological software and labours (Hermes et al., 2004). Evidence shows that foreign subsidiaries in banking industry canalise capital and credit in developing countries' banks which results in an expansion in credit supply (De Haas et al., 2004) and being a back-up component for risk posing environments (De Haas et al., 2006). Since 2000, Turkey is enjoying a tremendous foreign direct investment to the banking sector, and despite the rising prices, this increasing demand on cars can be explained by the foreign investment that has been taking place in the Turkish banking industry.

The focus of this paper is to examine the effect of credit availability on durable good demand in the sense of foreign – domestic bank discrimination. To answer this question, data from the Turkish car market will be used. The car credits given will be taken into the analysis separately, namely domestic bank car credits and foreign bank car credits. To explore how the car sales interact within the shocks in the

car credits, income level, gasoline prices and employment conditions, Bayesian VAR will be used. In the next section, the brief information of the Turkish car market indices is explained visually.

Turkish Car Market

Figure 2.1 demonstrates the new vehicle sales (right-sided) and the balance of car credits (left-sided) in Turkey given for the years 2005 – 2018. Since the car sales are affected from seasonality, i.e., many consumers tend to buy the cars at the end of the year due to the discounts made on previous year's car models and new models will be launched for the upcoming year, the data used in Figure 2.1 are seasonally adjusted car sales. Even though the seasonally adjusted sales cannot demonstrate a noticeable increase, an upward trend can be beheld in the overall period. From the beginning of the period till the late 2006s, an increase in the credits given by both banks can be observed, since in that period Turkey was experiencing excess liquidity and many acquisitions held by the foreign investors after the bank crisis happened after 2000. The first drop in 2008 September for car credits can be a consequence of the global financial crises through experiencing liquidity shortage all over the world. Even though the domestic banks were experiencing a decline in their car credits, foreign banks credits show a stable pattern. It is necessary to mention here that; the banks are aggregated by banking supervision agencies depending on the foreign-owned percentage. If a bank is foreign owned less than around 30% than it is defined as a domestic bank. In domestic bank category, there are also banks which have foreign capital and mostly are holding less than 30% of foreign assets. Even though a bank with foreign assets is considered as domestic, through the stock partnership, it can also enjoy high liquidity levels. So, the data that has been used in this paper, it is not possible to make exact monthly discrimination at this point. But it

is clear that domestic banks capture the car credit market more than the foreign banks; however, this became reverse after 2015 August through the increasing acquisition held in the overall period by foreign investors.

Despite the reduction in the credit availability after 2008, a sharp increase in the car sales stand out for the mid 2009s. This contrast can be explained by the tax deduction policies held by the Turkish government to stimulate the economy for a few months. In that period, it can be claimed that households might use their savings to purchase cars. After 2010, an upward trend in domestic car credits can be observed. Domestic banks seem more volatile accordingly to foreign credits, and these patterns can be explained by the size of the banks; also, domestic banks capture the overall country more than the foreign banks do. Besides, car sales seem to follow the same trend as credits, with a few exceptions such as minor falls in 2014 and 2016. These descents might be a result of political tensions since households reduce consumption when the overall country is not promising a safe environment for acquisitions. After 2017 October, a huge drop can be a signal from the bad course of events happening in the Turkish economy. At those times, exchange rates increased quickly, and this resulted in households to reduce their consumption, especially on cars, since as it is denoted before, the cars' prices in Turkey are highly dependent on the currencies.

The second graph Figure 2.2 introduces the real car prices (left-sided) with fuel prices per litre, mainly gasoline, diesel and LPG price (right-sided). All fuel prices show an exact pattern, and LPG appeared to be the lowest price among the other fuel prices. In car prices, except the ascent between the years 2006 and 2007, real car prices and fuel prices are highly interactive.

Figure 2.1: New Car Sales and Domestic – Foreign Bank Car Credits Given (2005 – 2018)
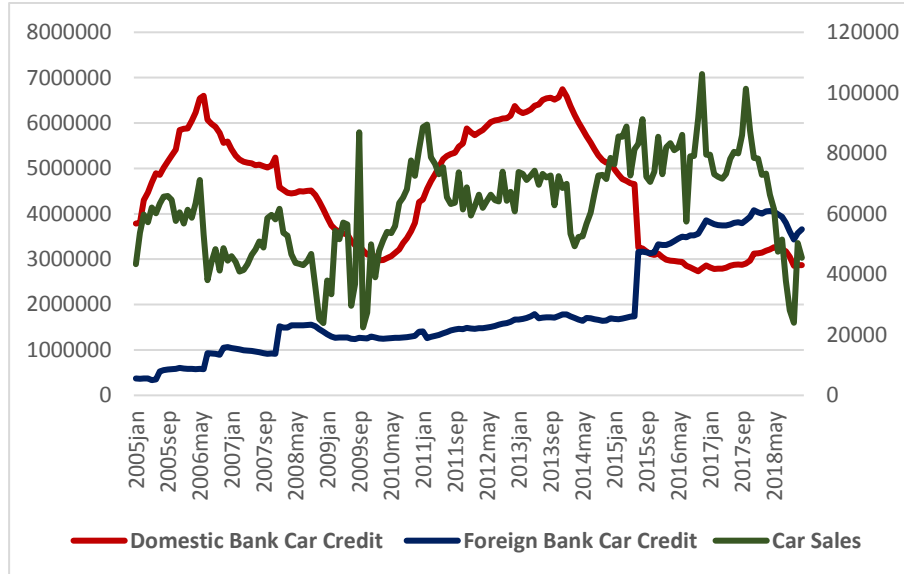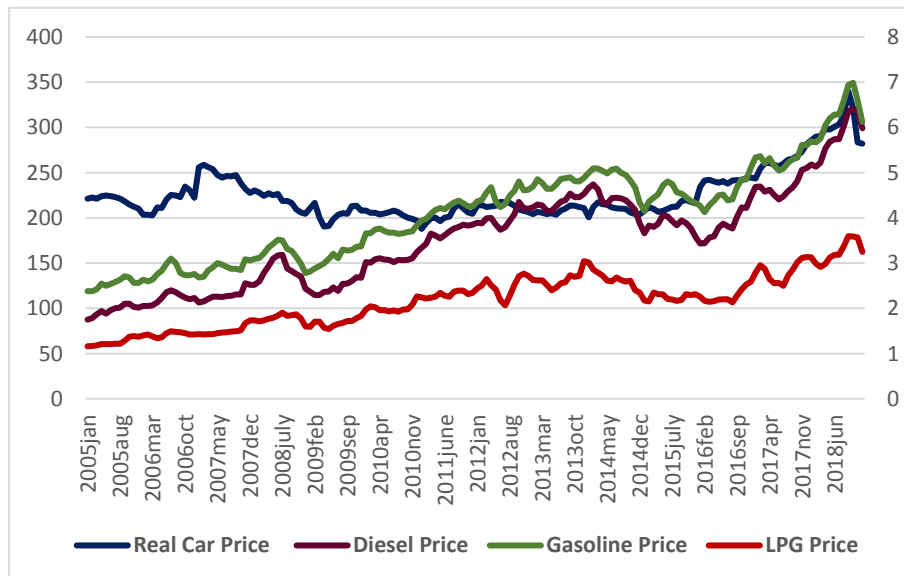

Figure 2.2: Real Car Prices and Fuel Prices (2005 – 2018)

The increase demand and availability of car credits in that period can express the notable ascent of real prices in earlier of the overall period. When the effects of the global financial crises began to be felt by the market, the decay after 2007, many companies went on discounts and campaigns on current car prices to boost the car market.

Among the increase of the currency rates and prices, the tax rates for car purchases in Turkey are implemented as 60% and 110% depending on the cylinder volume of the engine. This high taxation is a vast deterring factor for consumers to purchase cars, but the availability of credit can be defined as a subsidiary that can compensate for the financing process for the households. Moreover, Turkey has a high young population percentage. From the practice held by the Turkish Statistical Institute, the population for the age group 15 – 24 captures the 16,01% of the overall population in 2017. Since young people do not have enough savings generally to purchase a durable good, they are more likely to be attracted by credit availability. In these conditions, credit became an integral part of consumption behaviour for durable goods in Turkey.

As a summary, given all the descriptions for the Turkish car market, it is expected to have a significant positive impact on car sales through credits. Since the foreign credits exceed the domestic credits, foreign ownership can be the trigger effect on the sales. Even though it is mentioned above that domestic banks can also include foreign assets, the banks are categorized as it is recommended by the Banking Regulation and Supervision Agency. For the case in fuel prices, LPG can be assumed as alternative energy for the households when the other fuel prices are high. However, for the households who desire to purchase cars that cannot be converted to LPG or even do not consider converting it, the increase in gasoline and diesel price can have a decreasing effect on sales, for example through postponing or

abandoning the purchase. That is why the average of the fuel prices are included in the model. Since Turkey has a young population, the employment rate for the age group 15+ is decided to be added into the model. To have a credit, since it is obligatory to show regular earning, it is considered that the employment rate can be a good explanatory variable in car sales.

Methodology

To understand the several reasons for increasing car demand, a Bayesian vector autoregressive (BVAR) model is adopted to analyse the effects on car sales. Before explaining BVAR, let us consider a simple vector autoregressive (VAR) model of order p with n variables that is written in the following form:

$$Y_t = \alpha + A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + u_t$$

The index t denotes the time and α represents the vector of constants while A_i represents the matrix of parameters. The VAR model creates functions for each variable and with the lagged values of all variables that are introduced to the model since all variables are assumed endogenous. However, the VAR modelling mostly cannot identify the exact relationships and impacts that are driven from the shocks among the variables due to the introducing large number of parameters that are nonstable with limited length of observations. In this case, the VAR model most likely generates insignificant outcomes and reduces the efficiency of the estimation. Regarding these problems, Bayesian VAR, improved by Litterman et al. (1984), assumes the parameters as random variables. Through this uncertain structure of the model indices, a probability distribution is represented based on the

prior knowledge that is contained in the data. Broadly, the usage of the prior information in the system will allow us to scant the unrestricted pattern and transform the model into a tighter benchmark, concluding in more sufficient results.

In our case, the vector Y is comprised of car sales, car credits given by domestic and foreign banks separately, real car prices, average of fuel prices, employment rate and per capita income. Car sales, per capita income and employment rate are seasonally adjusted. Car credits, car sales, average fuel prices, per capita income are in log levels while the employment rates are in levels. For the prior and posterior distributions, normal – Wishart family has been applied. All variables are monthly with 168 observations and the model will be estimated for the years 2005 – 2018.

Data

In this chapter, the data covers for the period 2005 – 2018 with 168 observations. The monthly data consists of new vehicle sales, the balance of car credits (in thousand TL) given for each two bank categories: foreign and domestic banks, real car prices, employment rate, gross domestic product over labour force and the average of gasoline, diesel and LPG prices. The banks are deposit and participation banks; investment and development banks are not included in the sample. Sales of new cars and commercial vehicles are obtained from the website of Automotive Distributers' Association of Turkey.

Table 2.1: Descriptive Statistics of Turkish Car Market (2005 – 2017)

	New Car Sales	Domestic Bank Car Credits	Foreign Bank Car Credits	Average Car Price	GDP/Labour Force	Gasoline Price	Diesel Price	LPG Price	Employment Rate
Obs.	168	168	168	168	168	168	168	168	168
Mean	62769	4520462	1873810	49014	15493.64	4.095	3.529	2.163	43.268
Median	61206	4618045	1524095	42260	14517	4.272	3.679	2.199	43.15
Std. Dev.	25788	1269190	1092824	22830	6248.228	1.066	1.087	0.58	2.939
Skewness	1.065	0.046	0.844	1.539	0.769	0.303	0.346	0.182	-1.095
Kurtosis	1.987	-1.429	-0.636	1.952	-0.222	-0.517	-0.443	-0.681	-0.036
Min	19606	2733750	334980	25152	6628.043	2.38	1,75	1.16	37.3
Max	156173	6745230	4079310	132928	31456.28	6.989	6.411	3.596	48.4

Monthly car credit balances are acquired from the website of Banking Regulation and Supervision Agency of Turkey. Monthly employment rate, labour force, average car prices and fuel prices are taken from the website of the Turkish Statistical Institute (TSI). From the TSI website, quarterly GDP values are gathered and converted to monthly data by the cubic spline method. After that, GDP is divided by the labour force for the age group 15+. The remaining variables which are monthly average car prices and fuel prices are gathered from the website of the TSI. Descriptive statistics table for the data is given in Table 2.1.

Empirical Results

The following graphs represent the response of car sales from a shock of each variable. The solid lines in the charts show the response of car sales in the next 30 months after a given one standard deviation shock from each variable. The dashed lines describe the 68% the confidence interval around each point on the solid line. The target variable is the car sales and car credits given by the foreign banks are ordered first and it is followed by the car credits given by domestic banks. The left side of the graphs are the percentage responses and the numbers denoted beneath the graphs are the months.

The first two graphs which are Figure 2.3 and 2.4 below, are the graphs that depict the response of car sales with respect to one standard deviation shock in foreign and domestic bank car credits separately.

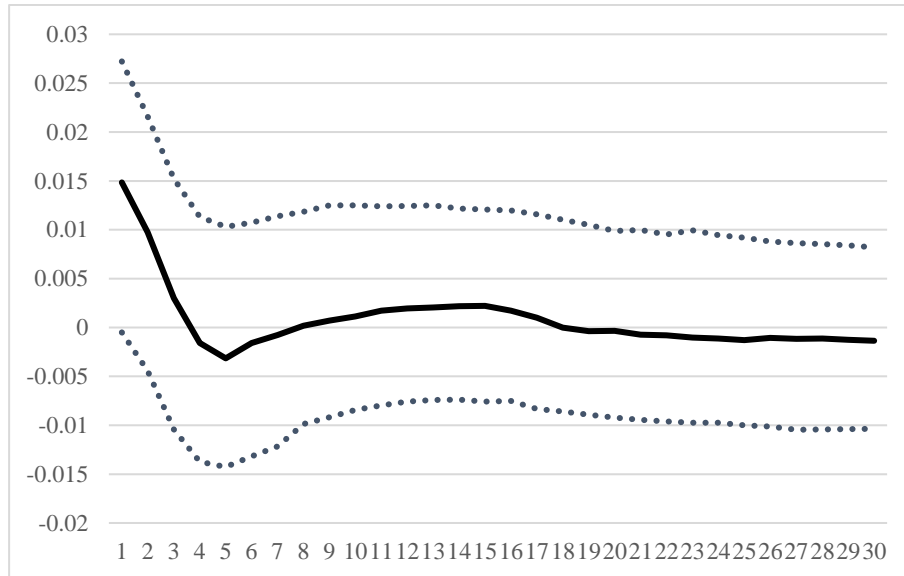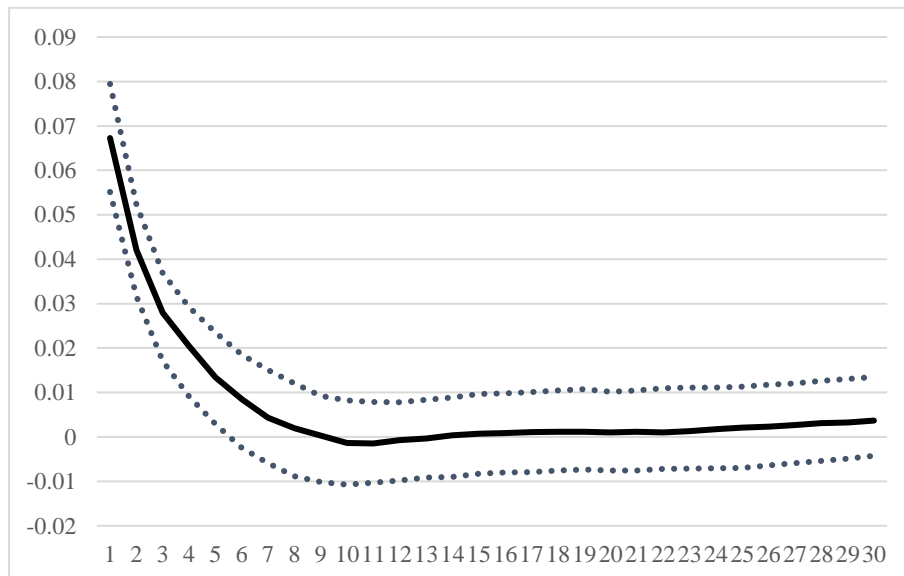**Figure 2.3: Response of Car Sales to Foreign Bank Car Credit
Shocks**

**Figure 2.4: Response of Car Sales to Domestic Bank Car Credit
Shocks**

When we look at the foreign bank credit shock on car sales graph,
foreign car credit has an insignificant impact on car sales over the whole

period. However, in the case for domestic banks, a significant positive effect from 7% to 1% through one standard deviation of domestic car credit shock can be observed until the 6th month of the period. From the 7th month in the same graph, an insignificant impact can be seen. This results for the car sales can pretty contradict our expectation due to the increasing trend of foreign bank car credits in the overall sample. Even though the international banks became to lend more than the domestic banks, the local banks seem to be positively effective than the remaining bank category.

Figure 2.5: Response of Car Sales to Per Capita Income
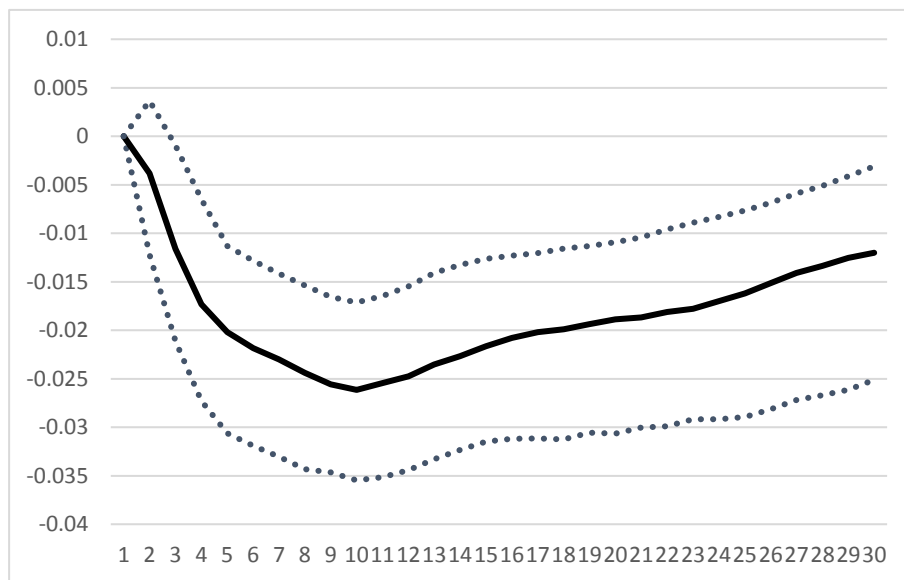
The following graph Figure 2.5 represents the impact of per capita income on car sales. From the 3rd month, an increasingly negative impact with a maximum of 2,5% on car sales proceeds to the 10th month, hereafter shows a decreasing negative effect until the 21st month. It is mostly expected that, in the presence of a higher income, individuals are expected to consume more; however, these results can signal us that,

higher income may also lead the household to do savings rather than buying a car.

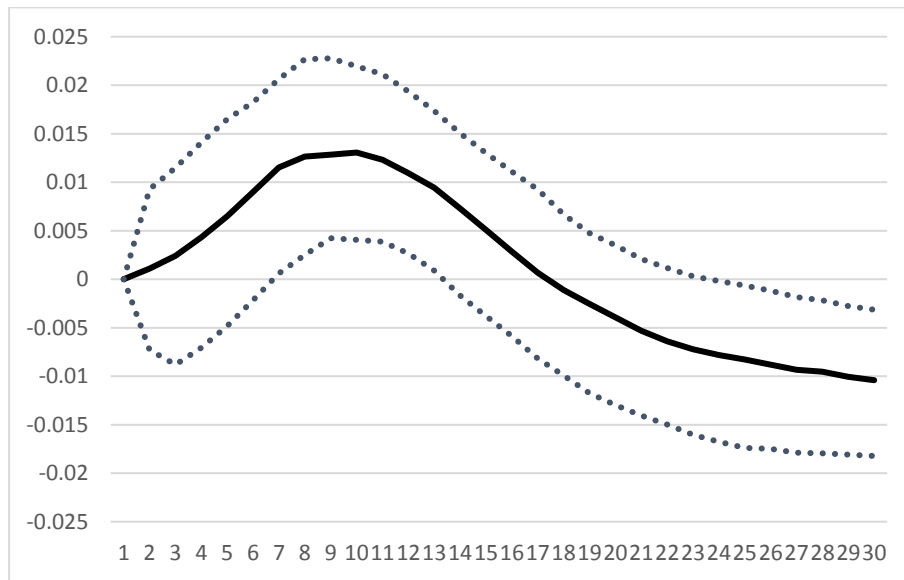**Figure 2.6: Response of Car Sales to Employment Rate Shocks**

Figure 2.6 shows us the response of car sales to the employment rate. There exists a significant positive impact on car sales through being employed between the 7th – 14th months and this result turned out to be significantly negative after the 24th month. Figure 2.7 gives the response of car sales from a shock in real car prices. As it is evident, after the 6th month, car sales are affected negatively close to 2% until the 30th month. When there is a price increase, it is expected from the households to delay or abandon their purchases.

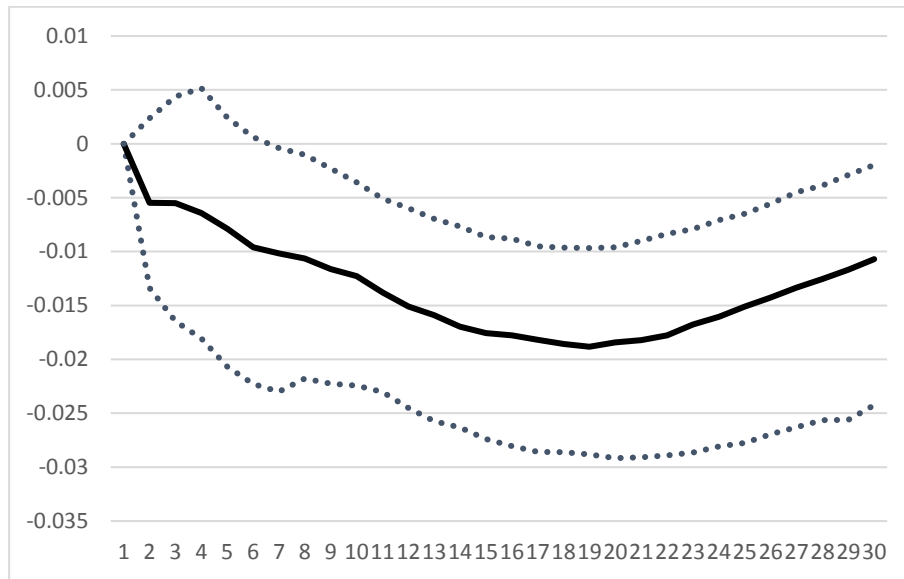**Figure 2.7: Response of Car Sales to Real Car Price Shocks**
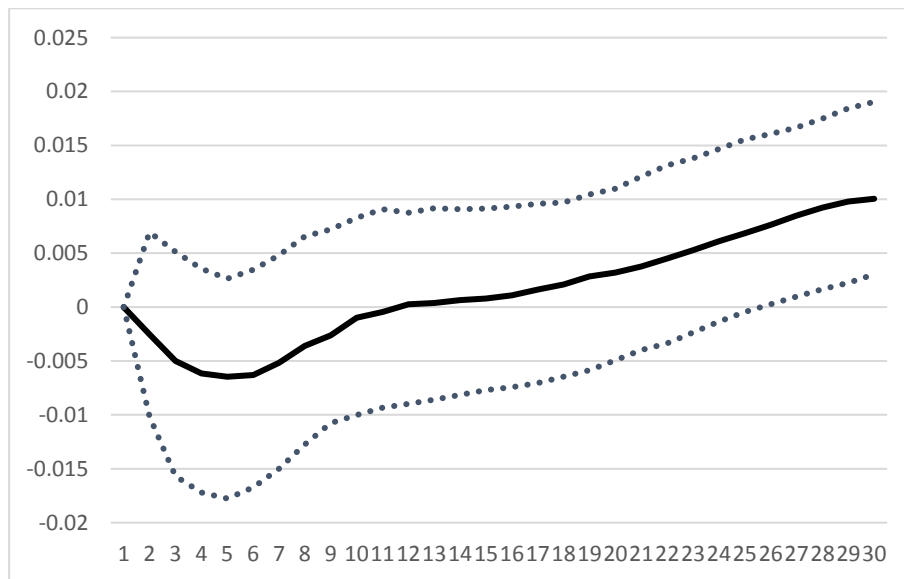

Figure 2.8: Response of Car Sales to Average Fuel Price Shocks

Lastly, Figure 2.8 presents the response of car sales to a shock in average fuel prices. One can think that, when the price of complementary goods can lead to decrease in the sales of the actual good, we see that, from 25th month till the end, a significant positive

impact up to 1% exists. This could be the result of households converting their cars to LPG system. Since LPG is cheaper than the remaining fuels, it can encourage the households to buy, and this satisfies the expectation given in the beginning.

Table 2.2: Proportions of Variance of Car Sales

	T=4	T=8	T=16	T=30
Foreign Bank Credits	1.4%	1.9%	2.6%	3.3%
Domestic Bank Credits	14.25%	13.24%	12%	11.1%
GDP/Labour Force	0.91%	4.2%	10%	13.8%
Emp. Rate	0.33%	1.3%	2.6%	4%
Car Price	0.41%	1.3%	4.1%	8.3%
Fuel Price	0.36%	0.9%	1.6%	3%

When we check for the variance decomposition structure of car sales, from the beginning of the period, the proportion of variance in car sales by a shock in domestic bank car credits is explained by decreasing value of 14% to 11% until the end of the period. The share of variance in car sales due to a shock in foreign bank car credits remain less than the domestic banks which is 0,7%. However, the impact of a shock in foreign bank car credits depicts an increasing value up to 3,3% while the effect from a shock in domestic bank car credits shows an opposite attitude. This manner can be the result of foreign banks started to comprise the market share in car credits more than the domestic banks do through the time. In the case of income, employment rate and prices, all have an increasing effect on fluctuations in the variance of car sales, which indicates that car sales become more sensitive to the shocks in these variables. Briefly stated, from the beginning of the period, car price has the most fluctuating impact on car sales; yet, the income becomes more influential in the end. Employment rate and average fuel prices also draw a rising value of changes in the variance

of sales; even so, they stand limited with respect to other indices. This means that car sales seem more sensitive to the shocks in income, even though the prices are scaling up.

Conclusion

In this chapter, the reasons for an increase in car sales in the condition of rising prices are tried to be understood through time series analysis using the Bayesian VAR model for the years 2005 – 2018. It is understood that car credits provided by the domestic banks have a strong positive impact rather than the foreign banks while the latter has no significant effect on car sales. This contradicting result upon our expectations can be a result of the categorization held by the BRSA since the banks in the foreign category remain limited accordingly to domestic bank category. It should not have been forgotten that domestic banks can also include foreign assets up to 30% and the 7% rise in car sales could also be a result of the liquidity provided by domestic banks through their foreign partnerships.

In the case of income and car prices, significant adverse effects are observed. For the prices, it is supposed to have a negative impact and yet that is what we see; but in income, the reason may be the household financing choices dependent to good price or overall economic condition of the country. Turkey's unstable and fragile economic and political conditions could lead households to consume less which is consistent with the evidences that are given in Johnson et al. (2014). Besides, in the variance decomposition structure, car sales appeared to be more dependent on income shocks rather than prices. For the case of credits, fluctuations in car sales variance still appeared to be more sensitive to domestic bank car credits, even though the balance of car credits provided by foreign-owned banks exceed what has been supplied by local banks at the end of the period.

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