BANKING RELATIONSHIP AND FIRM PERFORMANCE

A Master's Thesis

by
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Department of
Management
İhsan Doğramacı Bilkent University
Ankara
July 2013

To my father, mother and sister

BANKING RELATIONSHIP AND FIRM PERFORMANCE

Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

GÖZDE SUNGU

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in

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I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Management.

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Supervisor

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ABSTRACT

BANKING RELATIONSHIP AND FIRM PERFORMANCE

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This thesis examines the relationship between firm performance and the number of banking relationships for the publicly traded Turkish firms listed in the Borsa Istanbul (BIST) for the period 2003-2011, by using 2SLS model. In the analysis, banks are categorized according to their nationalities, ownership structures and orientations; firms are classified based on their size as small and large, the sample period is divided into two as crisis and non- crisis years, considering the effect of the 2008 global crisis on the Turkish economic and financial system. I find that firm performance decreases as the number of banking relationships increases, regardless of bank types. However, this negative relationship between firm performance and the number of banks is observed only in non-crisis times and for only small-sized firms. I also find that firm age, size, obtaining funding from external sources other than bank loans, belonging to a group, related lending, being a multinational company, incentives obtained from government and state-ownership are significant factors affecting the number of banking relationships. However, the significances of these variables differ for different bank and firm types, and for sub-periods.

Keywords: banking relationship, firm performance, crisis, firm size

ÖZET

BANKA İLŞKİLERİ VE FİRMA PERFORMANSI

Sungu, Gözde

Yüksek Lisans, İşletme Bölümü

Tez Yöneticisi: Doç. Dr. Zeynep Önder

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Bu tez, Türkiye'de 2003-2011 tarih aralığında Borsa İstanbul'da listelenmiş olan firmaların performanslarıyla, bu firmaların kredi kullandıkları bankaların sayısı arasındaki ilişkiyi 2AEK (iki aşamalı en küçük kareler) modeli kullanarak incelemektedir. Araştırmada, bankalar uluslarına, sermaye yapılarına ve yönelimlerine göre; firmalar büyüklüklerine göre ve araştırma dönemi 2008 yılında yaşanan küresel krizin Tük ekonomisi ve finansal sitemi üzerine etkilerine göre kriz ve kriz harici dönem olarak ayrılmıştır. Araştırma sonuçları; firma performanslarıyla kredi kullanılan bankaların sayısı arasında negatif bir ilişki olduğunu göstermiştir. Fakat firmalar büyüklüğüne göre ve araştırma dönemi kriz ve kriz harici dönem olarak ayrıldığında, bu negatif ilişkinin sadece küçük firmalar ve kriz harici dönem için geçerli olduğu bulunmuştur. Bununla birlikte, firma yaşı, büyüklüğü, banka kredileri haricinde kullanılan diğer borçlanma araçlarının varlığı, grup firması olması, ait olunan grubun içindeki firmalardan birinin banka olması, uluslararası bir firma olma, hükümetten teşvik alma ve devletin sermayedarlar arasında olması kredi alınan bankaların sayısını istatistiksel olarak anlamlı etkilediği gözlenmiştir. Fakat bu faktörlerin anlamlılıkları banka türüne, firma büyüklüğüne ve araştırma dönemine göre farklılık göstermektedir.

Anahtar kelimeler: banka ilişkileri, firma performansı, kriz, firma büyüklüğü

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CHAPTER 1

INTRODUCTION

In the literature, the importance of the financial intermediaries for markets and firms has been known for decades (e.g., Leland and Pyle, 1977; Stancill, 1980). Researchers have explained this importance by referring to the roles of financial intermediaries in solving problems resulted from informational asymmetry in imperfect markets. Among these financial institutions, banks are unique in their ability to solve these problems by gaining private information about their customers through subsequent and long-term provided services (Fama, 1985). Therefore, a remarkable number of analysts have highlighted possible effects of the qualifications of the relationship between banks and firms on the economy. For example, Mishkin (2008) has recently argued the possible agency problem in the lending activities of banks, including securitizations of many credits, as the crucial reason for the 2008 global financial crisis. In this thesis, I consider the importance of

the financial intermediations by examining the relationship between firm performance and the number of banking relationships.

The term “banking relationship” is defined in many ways in the literature. For example, Ongena and Smith (2000a) define it as the connection between a bank and its customer that goes beyond the execution of simple, anonymous, financial transactions. More broadly, Boot (2000) explains it as the provision of financial services by a financial intermediary that:

(i) invests in obtaining customer-specific information, often proprietary in nature,

(ii) evaluates the profitability of these investments through multiple interactions with the same customer over time and/or across products. As these definitions indicate, the term banking relationship can be used to express different types of intermediary services such as cash or liquidity management and lending related services. In empirical studies, researchers commonly use this term to define only the lending (or credit) relationship which involves both short-term and long-term loans. Thus, in this study, I focus on the lending relationship and use the terms “banking relationship” and “lending relationship” interchangeably.

In the literature, most of the empirical evidence for the association between banking relationships and firm performance are from developed countries. However, there is no clear-cut finding about the impacts of the banking relationships on the performances of firms (see Degryse, Kim and Ongena, 2009: 109-115 for the review of this literature). Results are different depending on the country being analyzed, the proxy used to measure

firm performance and the types of banking relationships. For example, Degryse and Ongena (2001) show that firm performance measured with sales decreases with the number of banking relationships in Norway, whereas Refait (2003) finds that multiple number of banking relationships results in better firm performance in France. In addition, in Germany, Gorton and Schmid (2000) report a positive relationship between firm performance and the scope of the banking relationship, in contrast to the findings of Weinstein and Yafeh (1998) in Japan.

The characteristics of the relationship between firms and banks in emerging countries are different from the ones in developed countries. One reason for this difference is that emerging countries have different legal frameworks and firm financial structures relative to developed countries (La Porta, López-de-Silanes, Schleifer and Vishny 1998; Demirgüç-Kunt and Maksimoviç, 1998; Levine, 1999). Since financial markets are not well-developed in emerging countries, it is more difficult and costly to raise funds by using other external financing sources such as issuing equity or bonds. This makes bank loans the main source of external capital and thereby, the relationship between banks and firms becomes more important for the firms in emerging markets. Furthermore, banks in emerging markets undertake not only the firm risk but also the country risk related to the fragility of the banking sector, weak creditor rights or judicial inefficiency (Ongena and Smith, 2000b; Qian and Strahan, 2007). Therefore, the relationship between banks and firms may be affected by different factors and the impact of this relationship on firm performances might differ in emerging markets.

However, despite these differences and much research in developed countries, there are only two studies that investigate banking relationship in emerging markets. Maurer and Haber (2007) investigate related lending in Mexico for the sample period 1888-1913. They find that Mexican bankers did not choose to lend to poor performed firms measured with productivity level. Limpaphayom and Polwitoon, (2004) examine the relation between close bank relationships and both short- and long-term market performances in Thailand for the sample period 1990-1996. They measure the relationship with the ratio of bank loans to total assets and observe that it does not increase firm performances measured with Tobin's Q. To my knowledge, there is only one study that investigates bank-firm relationships in Turkey. Ongena and Şendeniz-Yüncü (2011), using 16,056 observations, examine Turkish firms' choices over the bank types in 2008. They find that the mean number of banks is 2.1 for 7659 firms that have one or more banking relationships. However, they do not investigate the determinants of banking relationships and the impact of the banking relationships on firms' performances. In this thesis, I try to empirically analyze the relationship between banks and firms' performances in another emerging market, Turkey, for the period 2003-2011.

After the establishment of Banking Regulations and Supervision Agency (BRSA) in 2000, the Turkish banking sector has started to be regulated more and has started to attract international financial intermediaries from all over the world. With the entrances of many foreign banks, there has been a rapid growth in the sector and the degree of competitiveness between banks has increased in the 2000s. In addition, the inflation rate has been very high in Turkey until quite recently and so, it has been very difficult and

costly to raise funds by issuing securities for Turkish firms. For all these reasons, even though Turkish financial sector is characterized as a market-based system (Demirgüç-Kunt and Levine, 1999), bank loans have been relatively easier way of obtaining funds compared to other financial alternatives, resulting in higher leverage ratios for Turkish firms. Cakova (2011) finds the mean debt ratio as 61% for small- and medium-sized Turkish firms, over the period between 1998 and 2008. The mean debt-to-asset ratio was 41% for the firms listed in the Borsa Istanbul (BIST) for the period 2003-2011. However, in Turkey, there is a regulation which restricts the total amount of credit that a firm can borrow from a bank. The current banking law No. 5411 (Section 3, Article 54) limits the total amount of credit provided to a firm. According to this law, banks are not allowed to provide loans more than 25% of their shareholders' equity. Moreover, a manager of one Turkish bank stated that although the amount of credit demanded by firms are below the limits, banks do not want to take the total risk by themselves and prefer to share the credit risk with other banks, especially after the 2001 Turkish banking crisis. The regulations and the behavior of banks might cause Turkish firms to have multiple banking relationships and increase the number of banking relationships that firms have. As a result, although bank loans have constituted an important source of financing for Turkish firms, no "main bank" or "hausbank" relationship is observed between banks and firms in Turkey, unlike Japan or Germany. With these characteristics, Turkish banking sector has its own idiosyncratic dynamics different from other developed countries. However, the association between banking relationships and firm performance has not been examined yet and it is important to empirically investigate the possible effects of banking relationships on firm performances in Turkey.

This thesis analyzes banking relationships for publicly traded firms listed in the BIST for the period 2003-2011.Although the Turkish banking system started to be regulated with the establishment of BRSA in 2000, in order not to bias the results with the negative effects of the 2001 banking crisis in Turkey, the beginning of the sample period is determined as 2003.

In the first part of the thesis, I examine the factors affecting the probability of having a banking relationship, using the probit model. Then, I investigate possible determinants of the number of banking relationships, and the relation between firm performance and the number of banking relationships, using the two-stage least square (2SLS) estimation model. In this analysis, I control for the other firm characteristics such as firm age, size, debt structure and innovativeness, and for year and industry effects. In the literature, firm performance is measured with several proxies that indicate some activities of a firm over a period of time such as profitability, investment or growth opportunities. In this study, firm performance is measured with the profitability of a firm.

I also investigate whether there is any difference in the association between firm performance and banking relationships for different types of banking services. It can be argued that different types of banking services generate different levels of interaction between firms and banks. For example, even though non-cash credits are accepted as ordinary bank loans, they are not as risky as cash credits. Therefore, their collateral requirements are not as strict as the ones for cash credits, and firms can more easily

borrow non-cash credits from multiple banks relative to cash credits. Moreover, since non-cash credits seem like trade assurances for firms, these credits do not directly affect firm performances, but support them. Thus, the determinants of banking relationships and the relationship between firm performance and the number of banks may vary according to different types of banking relationships. To investigate this, banking relationships are divided into two as cash and non-cash credit relationships and the models are estimated separately for these types of bank services.

In the literature, some researchers show that the relationship between firms and banks changes during the crisis times. For example, considering the effect of the Asian financial crisis around 1997, Fok et al. (2004) explore that Taiwanese firms establish new banking relationships with domestic banks and end current relationships with foreign banks during the crisis time. Thus, to examine possible impacts of the 2008 global crisis on the relationship between Turkish firms and banks, I also divide the whole sample period into two as crisis and non-crisis periods. Then, I analyze the models for these two sub-periods separately.

In the literature, theoretically and empirically it is shown that the number of banking relationships is more valid for small-sized firms rather than the large-sized ones for two reasons. First, since raising funds by issuing stock or bond is too costly and more difficult for small- and medium-sized firms, these firms rely more on bank loans than large-sized firms. Second, small-sized firms are generally newly established or young firms which do not have enough credit history. Thus, these firms are more likely to suffer from

asymmetric information problems which can be solved through close banking relationships. Many empirical studies find that the relationship between firms and banks differs according to firm size in various countries. For instance, Cesarini (1994) find that small-sized firms maintain a small number of banking relationships, 2 on average; whereas large-sized firms maintain many banking relationships, 33 on average, in Italy. Harhoff and Körting (1998a) find that number of creditors increases as the size of the small- and medium-sized German firms increases. Therefore, I also differentiate my sample into two as large- and small-sized firms and I investigate the relationship between firms and banks for these two types of firms separately.

In the analysis, banks are categorized according to their ownership structure, nationality and orientation, as in Ongena and Şendeniz-Yüncü (2011). They find that young, large, multiple-bank, and industry-diversified firms that are located in or close to Istanbul work with foreign banks. They also state that Islamic banks mainly deal with young, multiple-bank, industry-focused and transparent firms. Moreover, differentiating banks according to their nationality, Fok et al. (2004) find that there is a negative relation between the number of domestic-bank relationships and firm performance, but a positive one between the number of foreign-bank relationships and firm performance. Thus, I also examine whether the relationship between firm performance and the number of banks changes according to the bank's ownership structure, nationality and orientation.

When investigating the probability of having a banking relationship, I find that some factors affect both the probability of having one and also the probability of maintaining

multiple banking relationships. For example, these two probabilities increase with firm size, leverage and obtaining incentives from the government, but decrease with the ability of obtaining funding from external sources other than bank loans or from a group it belongs to. On the other hand, some factors affect only one of these two probabilities. Firm age and being a multinational company affect only the probability of having a banking relationship, whereas belonging to a group that owns a bank only affects the probability of having multiple banking relationships.

The results from the firm performance estimations show that there is a significantly negative relationship between firm performance and the number of banks, independent from bank and credit relationship types. More profitable firms maintain a smaller number of banking relationships for both cash and non-cash credits regardless of bank types. However, this negative relationship between firm performance and the number of banks holds for only non-crisis years and small-sized firms and this finding holds for all bank types, except Islamic banks.

Results from the banking relationship estimations show that firm profitability and other firm characteristics, except firm innovativeness and leverage, are significant factors in determining the number of banking relationships. After categorizing banks, I find that the factors that significantly affect the number of relationships with foreign and private domestic banks are similar and, the relationships with state-owned and Islamic banks are also determined by similar factors. For example, as firm profitability increases, the number of relationships with foreign and private domestic banks decreases, but the

number of relationships with state-owned and Islamic banks increases. Controlling the effect of different types of credit relationships, I find that factors affecting the number of banking relationships vary across cash and non-cash credit relationships. For example, it is observed that there is a negative and significant relationship between obtaining funds from external sources other than bank loans and the number of banking relationships for only cash credits, but not for the non-cash ones. It is also found that factors that are significantly related with the number of banking relationships are different for crisis and non-crisis years and these differences change according to bank types. For instance, results show that firm performance is a significant factor affecting the number of banking relationship for only crisis years and for only private domestic banks. Lastly, categorizing firms as small- and large-sized ones, it is found that the factors affecting the number of banking relationships, except belonging to a group or a holding, are totally different for small- and large-sized firms.

The remainder of the thesis is organized as follows. In chapter 2, I review the theoretical and empirical literature on banking relationships and their effects on firm performance. Section 3 describes methodology and the data. Section 4 discusses the results of the analyses. Lastly Section 5 concludes the study

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CHAPTER 2

LITERATURE REVIEW

In this section, I first review the theoretical and empirical models that examine whether firms have relationships with a single or multiple banks. Then, I summarize the literature available on the relationship between firm performance and the number of banking relationships.

2.1. Literature on Banking Relationships

2.1.1. Theoretical Models

The need for a financial intermediation has emerged as a natural response of the perfect market to the presence of asymmetric information jointly with transaction costs (Leland and Pyle, 1977). And among these financial institutions, banks are unique relative to

other intermediaries because of their ability to gain private information about their customers through the subsequent services provided (Fama, 1985). However, in the literature, there are various views about the optimal number of banking relationship to benefit from their roles in imperfect markets or from their uniqueness. Within a static theoretical setting, Diamond (1984), Ramakrishnan and Thakor (1984), and Boyd and Prescott (1986) argue that a single banking relationship arises as the optimal delegated mechanism in order to reduce monitoring, renegotiation and screening costs that arise from informational asymmetries in imperfect markets.

On the other hand, single banking relationships may not be optimal for a firm, since it may cause a holdup problem. Sharpe (1990), Fisher (1990) and von Thadden (2004) show that a firm may encounter a holdup problem in a single banking relationship since single banks can gain ex-post monopoly power by using the proprietary information about the firm obtained through close and subsequent relationships. Within a dynamic theoretical setting and in a competitive market environment, Sharpe (1990) argues that using such a monopoly power, a bank can "informationally" capture a firm, preventing it from switching to another bank, if long-term contract possibilities are limited with respect to the term of renewals. He proposes multiple banking relationships as a way to cope with this holdup problem for firms. Fisher (1990) also studies a simpler version of the Sharpe's (1990) model in his independent work. However, Fisher (1990) indicates that multiple banking relationships can be an equilibrium solution only in a mixed strategy, not in a pure strategy as Sharpe (1990) indicates. Von Thadden (2004) provides a correct analysis for the study of Sharpe (1990). He indicates that the model developed

by Sharpe (1990) can only have an equilibrium solution in mixed strategies, which features a partial information lock-in by firms and random termination of lending relationships. In this way, von Thadden (2004) argue that multiple banking relationships can be an equilibrium solution when there is a partial holdup problem and firms are able to terminate their lending relationships in such circumstances.

Rajan (1992) argues another type of holdup problem for firms in his comprehensive dynamic contracting model. He shows that a bank may call-back loans by using its monopolistic power gained through a single banking relationship, when it detects that the firm is incapable of performing its financial obligations. He indicates that in such cases, the firm suffers from a holdup problem, since it cannot find funds from another bank and thereby has to liquidate its project early. He presents multiple banking relationships as a solution to this type of holdup problem. However, differently from Sharpe (1990) and Fisher (1990), he warns that this solution can cause a winner's curse problem, for an arms' length bank. He indicates that within a competitive market environment where repeated lending is allowed, when an arms' length bank competes with a preexisting bank, it offers lower interest rates for firms aiming to gain them. At the same time, knowing the proprietary information of its customers, the pre-existing bank differentiates its interest rates offered according to the quality of the firms: lower interest rates offered for good firms but higher interest rates offered for bad firms. In the end, bad firms choose an arms' length bank, whereas good firms maintain their relationships with the preexisting bank. In such cases, the existing bank experiences a winner's curse, since it seemingly succeeds in winning new customers, but actually ends up with the bad firms.

Von Thadden (1995) shows that a long-term single credit relationship with a termination clause might eliminate both the holdup and winner's curse problems. He suggests such a termination clause that warrants ending the credit relationship when the loan subject to the banking relationship is not successful, or continuing the credit relationship with the preexisting conditions. He shows that such a clause is beneficial for both firms and banks. It allows firms to continue their banking relationships with favorable preexisting conditions specified in the initial contract. At the same time, it enables banks to unilaterally end the credit relationship early on, if the project financed is not as profitable as it is supposed. In this way, von Thadden (1995) presents a dynamic perspective on Diamond's (1984) study. Von Thadden (1995) argues that such a single credit relationship with a termination clause can be still optimal for firms in the presence of information asymmetry, as Diamond (1984) suggests.

In addition to the holdup problem, single banking relationships may cause another problem for firms, called the soft budget constraint problem. It was originally introduced by Kornai (1979, 1980 and 1986) as the proliferation of inefficient enterprises resulted from the absence of bankruptcy threats in socialist economies. In the banking relationship framework, Hart (1995), Dewatripont and Maskin (1995) and Bolton and Scharfstein (1996) discuss the soft budget problem as the insufficient firm's effort in preventing a bad consequence resulting from the absence of bankruptcy threats. Dewatripont and Maskin (1995) investigate the incentives of a firm in a decentralized and centralized credit market environment, when there is an asymmetric information problem. They argue that in a centralized market environment, the absence of bankruptcy threat may

encourage banks to continue lending further credits, expecting that the firm will recover and pay previous debts. They indicate credit decentralization as a solution for such cases. Dewatripont and Maskin (1995) show that credit decentralization provides financial discipline by offering a way for creditors to not finance ex-post inefficient long-term projects and thereby, discouraging ex-ante the incentive of managers to accept such projects.

Extending the study of Dewatripont and Maskin (1995), Bolton and Scharfstein (1996) consider the case of strategic default occurring because of firm managers. They argue that managers who perceive that banks expecting to recover their previous loans will ex-post continue lending credits might extensively borrow ex-ante. Furthermore, such managers aiming to divert cash to them might even cause strategic default for a firm. Bolton and Scharfstein (1996) show that borrowing from many banks may prevent such situations, since managers must negotiate a restructuring plan with each of many claimants at the same time in case of strategic default. On the other hand, they also show that borrowing from multiple banks cannot be preferable for firms during the times of project refinancing because of the increasing renegotiation costs. In this way, Bolton and Scharfstein (1996) present the choice of the optimal number of banking relationships for a firm as a tradeoff between the costs or inefficiencies experienced in times of project renegotiation and benefits experienced in cases of strategic default.

Following Bolton and Scharfstein (1996), Bris and Welch (2005) construct an agency/signaling model. They show that when the quality of the firms is settled

endogenously via the number of the creditors in the model, the higher quality firms choose to borrow from fewer banks in order to signal their quality and confidence of not going to default. They even state that the extreme case, borrowing from a single bank, may be preferred by the firms who need to signal the highest quality. On the other hand, Bris and Welch (2005) also indicate that when the quality of the firms is known, then firms choose to borrow from many banks since there is no more necessity for signaling or financial discipline imposed by the markets.

Petersen and Rajan (1995) develop a multi-period state-contingent loan contract model to examine the optimal number of banking relationships. They investigate a firm's ability to borrow from banks that have different market powers. To do this, they measure the market power of banks in both concentrated and competitive market environments. They show that when the market power of a bank increases, the credit-constrained young firms get more finance at lower rates and therefore, the value of single banking relationships enhances for such firms. On the other hand, they indicate that the reverse case is true for older and good quality firms that are, on average, older; and good firms are faced with higher interest rates when the monopoly power of the bank increases.

Considering the impact of exogenous liquidity shocks in the market, Detragiache, Garella and Guiso (2000) argue that relationship banks may be unable to continue funding profitable projects. In such times, if the firm cannot refinance its project with the existing bank, then it is required to either refinance by negotiating with an outside bank or prematurely liquidate the project. In these circumstances, they suggest that outside banks

might also refuse to lend since they do not know the quality of the projects. Therefore, multiple banking relationships arise as a solution for firms by reducing the probability of an early liquidation of the project in times of exogenous liquidity shocks in the market.

Von Rheinbaben and Ruckes (2004) theoretically model a firm's optimal choice of the number of lending banks over the extent of information disclosed to these banks. They present this choice as a tradeoff between the benefits of low credit rates offered by many banks and the costs of valuable private information leakage to competitors in the market. Hence, firms determine not only the number of banking relationships but also the scope of their relationship with banks based on the decision to reveal confidential information to the market. Von Rheinbaben and Ruckes (2004) predict a U-shaped relationship between the degree of innovativeness and the number of banking relationships. On one hand, they find that as long as a firm decides to reveal private information, a higher degree of innovativeness makes fewer banking relationships optimal and there is a negative relation between the degree of innovativeness and the number of banks. On the other hand, after some degree of innovativeness, firms become highly sensitive to the information leakage and therefore, choose not to reveal its confidential information in order not to impair output market success. In such cases, firms maintain multiple banking relationships and create competition among these banks in order to decrease borrowing rates. Consequently, the initial negative relation between the degree of innovativeness and the number of banking relationships reverses as the degree of innovativeness continues to increase.

Most of the papers examining the optimum number of banking relationships assume that firms borrow equal proportions from each bank. However, there could be asymmetric or concentrated borrowing activity; that is, while a firm borrows smaller amounts from multiple arms' length banks for daily capital needs, it may mainly finance its big investment projects by extensively borrowing from a single relationship bank. Because of this, asymmetric borrowing activity is an important issue and thus, deserves to be examined. In the literature, Hubert and Schafer (2002) argue that under the presence of coordination failure between lending banks, many banks wrongly evaluate a firm as financially distressed and as a result, successively withdraw loans to preempt assets of the firms in case of a default. They show that at such times, a firm may be forced into bankruptcy with successive withdrawals, even though it is not the actual case. Hubert and Schafer (2002) indicate that firms may prevent such situations with multiple but asymmetric borrowing activities, which increase the bargaining power of the main bank and thus, provide coordination among lending banks.

Following Hubert and Schafer (2002), Elsas, Heinemann and Tyrell (2004) also analyze the optimal debt structure of a firm by allowing multiple but asymmetric bank borrowing. In their study, Elsas, Heinemann and Tyrell (2004) present supporting results for the findings of Hubert and Schafer (2002). They indicate that large scaled borrowings from a main bank and small scaled borrowings from other arm's length banks at the same time can be optimal, when many arm's length banks decide to call back their loans at the interim stage of an investment project because of the coordination failure. In addition to

this, they also suggest that such a multiple but asymmetric borrowing structure may be optimal especially for risky firms or for firms with low expected cash flows.

In contrast to the study of Hubert and Schafer (2002), Guiso and Minetti (2006) argue that lending banks may also prefer to continue financing investments if these banks aim to seize assets of a firm by preempting in case of any default. However, Guiso and Minetti (2006) indicate that with multiple but asymmetric borrowing activities, firms may prevent such an opportunistic activity by creating differences in the seizing abilities of lending banks. In their study they show that arm's length banks may object to continue of financing bad investments, since these banks have limited seizing ability with their small scaled lending amounts compared to the seizing ability of a relationship bank.

In summary, the theoretical literature presents mixed evidences for the optimal number of banking relationships. One group suggests single banking relationships as an optimal mechanism to reduce costs arising from information asymmetries between firms and banks. The other group argues that having multiple banking relationships is optimal to deal with the holdup and soft budget constraint problems. Another group of studies indicates that the choice of the optimal number of banking relationships is a tradeoff between the costs of strategic defaults and the benefits experienced in times of liquidity shock. Also, some other research constructs this tradeoff based on the costs and benefits resulting from the decision to reveal the firm's confidential information to the market. These studies predict a U-shaped relationship between the importance of revealing confidential information and the number of banking relationships. Under the assumption

of asymmetric and concentrated borrowing activity, another group shows that large scaled borrowings from a main bank and small scaled borrowings from other arm's length banks can be optimal for firms in the presence of some conditions. Therefore, many empiric studies test the validity of these theoretical findings for different countries or firms within a country.

2.1.2. Empirical Evidences

For a variety of countries, there are many empirical studies which estimate the number of banking relationships. Both mean and median number of banks presents a great difference across countries. For example, the mean number of banks is one for Belgium firms (Degryse, Masschelein and Mitchell, 2004) and 30 for Italian firms (D'Auria, Foglia and Reedtz, 1999). The striking thing is that there is a large variation among firms within the same country in the terms of the number of banking relationships. For example, the firm size has an effect on the number of banking relationships. In Italy, while small-sized firms maintain on average two banking relationships, large-sized firms maintain on average 33 numbers of banking relationships (Cesarini, 1994). Because of differences across and within countries, many studies have empirically investigated the macro and micro level determinants of the number of banking relationships.

On the micro level, almost all research indicates that both firm age and size are significant determinants of the number of banking relationships. For instance, the number

of creditors increases with the size and age of small U.S. firms for the sample period 1988-1989 (Petersen and Rajan, 1994) and of small- and medium-sized German firms for the sample year 1997 (Harhoff and Körting, 1998a). In addition, many studies present a variety of other firm characteristics as significant determinants such as profitability, leverage and bank debt level (see Degryse et al., 2009: 82-85, 87-91 for the reviews). However, some of these characteristics can have different effects on the choice of the optimum number of banking relationships in different countries. For example, Tirri (2007) finds that there is no relationship between firm profitability, measured by gross operating margin divided by sales, and the number of banking relationships, in Italy. However, Ziane (2003), and Harhoff and Körting (1998a) observe a negative relation between firm profitability and number of banks in France and Germany respectively, unlike Tirri (2007). They measure firm profitability by using different proxies. Ziane (2003) measures firm profitability with the ratio of operating profitability to turnover, whereas Harhoff and Körting (1998a) measure it with the ratio of net income to interest payments.

Controlling for borrowing firm characteristics, some studies investigate the effects of bank and market characteristics on the number of banking relationships such as ownership structure of banks or market concentration (Detragiache et al., 2000; Yu and Hsieh,2003; Tirri, 2007; Neuberger, Pedergnana and Räthke-Döppner, 2008; Berger, Klapner, Martinez and Zaida, 2008). For example, Detragiache et al. (2000) find a negative relationship between the number of banks and bank fragility for small-sized Italian firms, as they suggest theoretically. Their study measures bank fragility with two

different proxies: observed changes in the ratio of liquid funds to assets and weighted average of the ratio of nonperforming loans to assets. In addition to this, Neuberger et al. (2008) find that the number of bank relationships increase in bank size for the sample year of 1996 and Swiss firms with an average of 4 employees. Berger et al. (2006) and Yu and Hsieh (2003) indicate that the probability of having multiple banking relationships increases when the bank is owned by a governmental entity or by a foreign institution in India and Taiwan. Tirri (2007) and Berger et al. (2006) find that the probability of having a multiple number of banking relationships decreases as market concentration increases in Italy and India, respectively.

For Turkey, the empirical study of Ongena and Şendeniz-Yüncü (2011) provide information about the number of banking relationships. They investigate their analysis by using a representative dataset from Turkey and thereby indicate specific findings for Turkey. However, in their study, they examine firms' choices over the bank types according to r set of firm and bank characteristics, not the number of banking relationships. Therefore, their study indicates only some descriptive statistics and insights into how firm characteristics vary for different bank types. Using 16,056 observations for the sample year 2008, Ongena and Şendeniz-Yüncü (2011) find the mean number of banks as 2.1 for those that have one or more number of banking relationships.

In macro level, Ongena and Smith (2000b) present the first study that explains the variation across countries. They show that, controlling for a variety of firm- and country-specific variables such as dependence on public capital markets or market concentration

or legal structures, on average firms maintain more bank relationships in countries with inefficient judicial systems, poor enforcement of creditor rights, unconcentrated but stable banking systems and active public bond markets. Supporting the findings of Ongena and Smith (2000b), Qian and Strahan (2007) also show that the number of lending relationships is low in countries with better protection of creditor rights and in contrast, it is higher in more risky countries, as measured by the sovereign debt rating.

Apart from these empirical studies, Ongena, Tümer-Alkan and von Westernhagen (2007) investigate the determinants of multiple but asymmetric borrowing activities for German firms using both bank and firm level data. Controlling for both firm and bank's profitability and ownership structure with firm's asset specificity variables, they find that risky, illiquid, large and leveraged firms spread their borrowings more equally between multiple arms' length banks. Furthermore, they show that a relationship bank might capture funds provided by other arm's length banks if the relationship bank is a public sector bank and if the other banks are large enough to not tie up additional funds in capital.

A new interesting research question which recently draws attention is whether or how the number of banking relationships changes over the business cycle of a firm. However, only a few studies have access to the necessary data for investigation and present evidence about the variation of number of banking relationships over the business cycle. For example, D'Auria et al (1999) analyze the stability of lending relationships over time between the periods of 1985 and 1993 in Italy. They find that firms attempt to broaden

the range of financial sources rather than substitute the existing one with another, over time. Sterken and Tokutsu (2002) investigate the determinants of the number of banking relationships of listed Japanese firms between 1982 and 1999. Considering the effect of the asset price bubble in the 1980s, they show that there was a general increase in the number of loans over this period, whereas the average number of banking relationships started to decrease in 1982 and reached the lowest level in 1989 when the bubble bursts. Therefore, Sterken and Tokutsu (2002) argue that there was a credit concentration in the number of banking relationships during the bubble period. However, they also show that this credit concentration dispersed with the burst of the bubble, in 1990s.

To sum up, the empirical studies indicate that the optimum number of banking relationships varies both across and within countries. Furthermore, studies suggest that both country characteristics such as the judicial system, the risk level of a country or type of banking system in a country, as well as firm and bank characteristics affect the number of banks with which a firm has a relationship.

2.2. Literature on the Relationship between Firm Performance and Banking Relationships

2.2.1. Theoretical Models

The number of banking relationships can affect firm performance in different ways. In a static theoretical setting, Diamond (1984), Ramakrishna and Thakor (1984) and Boyd and Prescott (1986) argue that single banking relationships enhance firm performance by reducing monitoring, renegotiation and screening costs arising because of informational asymmetries. Even though these studies acknowledge that multiple banking relationships may likewise reduce these costs, they also point out that multiple banking relationships may increase borrowing costs as well and thus mitigate firm performance.

In a different theoretical setting, Yosha (1995) and Bhattacharya and Chiesa (1995) also argue the positive effect of a single banking relationship on firm performance. In their studies, they analyze the effect of private information leakage resulting in a multiple banking relationship on firm performance. Yosha (1995) shows that firms that are expected to lose more in case of an information leakage prefer single banking relationships and thereby increase firm performance. Similar to Yosha (1995), Bhattacharya and Chiesa (1995) also show that if interim disclosure of R&D knowledge is too severe, then R&D intensive firms perform better by maintaining a single banking relationship rather than maintaining multiple banking relationships.

Different form Yosha (1995) and Bhattacharya and Chiesa (1995), von Rheinbaben and Ruckes (2004) show that the relationship between the number of banks and firm performance depends on the decision of information disclosure made by a firm itself. In their study, they assume that the decision of revealing private information is independent from the choice of the optimal number of banking relationships, since a firm itself, not a bank, decides to disclose private information. Based on this assumption, von Rheinbaben and Ruckes (2004) indicate that the profitability of a firm decreases with the number of banking relationships if it decides to reveal its private information. On the other hand, they also show that if a firm decides not to disclose its private information and if there is enough competition among banks, then multiple banking relationships may reduce borrowing rates and thereby enhances firm performance.

Rajan (1992) and von Thadden (1995) discuss that multiple banking relationships may enhance firm performance by eliminating information lock-in problems and decreasing holdup costs that occur when banks exploit their monopoly powers obtained through single banking relationships. Beside these studies, Detragiache et al. (2000) analyze the effect of exogenous liquidity shocks on the relationship between the number of banks and firm performance. They argue that in time of exogenous liquidity shocks, a relationship bank may object to refinance good projects and thus the firm has to prematurely liquidate its project. They show that in such cases, multiple banking relationships may increase firm performance by reducing risk of premature liquidation of profitable projects.

Bolton and Scharfstein (1996) discuss two-sided effects of multiple banking relationships on firm performance. On one hand, they indicate that multiple banking relationships may decrease firm performance by increasing negotiation costs occurred at the time of strategic defaults. On the other hand, as Detragiache et al. (2000) suggest, Bolton and Scharfstein (1996) also indicate that multiple banking relationships may increase firm performance by diversifying risks arising in case of exogenous liquidity shocks to the banking system.

In summation, theoretical models show different relationships between firm performance and the number of banks. One group of studies considers the effect of costs associated with informational asymmetries and private information leakage. These studies argue that having a single banking relationship reduces these costs and thereby enhances firm performance. The other group of studies considers the effect of costs resulting from information lock-in and holdup problems. And in contrast to the first group, this group argues that having multiple banking relationships increases firm performance by decreasing costs arising from information lock-in and holdup problems. Different from these two groups, the study of Bolton and Scharfstein (1996) considers the effect of strategic defaults and presents the effect of banking relationships on firm performance as two-sided.

2.2.2. Empirical Evidences

Several empirical studies examine the impact of the number of banking relationships on firm performance in various countries. These studies measure firm performance with different proxies such as profitability, investment and growth opportunities. Table 1 summarizes the results of the studies that measure firm performance with profitability measures. Like theoretical results, empirical results presented in the fourth column of Table 1 also indicate that there is no consistent relationship between the number of banks and firm performance. For example, Degryse and Ongena (2001) find that Norwegian firms with a single banking relationship actually perform better than others with multiple banking relationships. They measures firm performance with three different profitability proxies; ratio of operating income to sales, return of assets (ROA) and return on equity (ROE) and for all, this finding is valid. Similarly, Castelli et al. (2012) and Montoriol-Garriga (2006) also find a negative relationship between firm performance and the number of banks in Italy and Spain, respectively. Measuring firm performance with ROA and ROE, Castelli et al. (2012) indicate that firm performance increases as the number of banks decreases. They also show that this finding is stronger for small firms than for large firms. Montoriol-Garriga (2006) uses ROA and sales growth to measure firm performance for the main study. She also uses five more measures; economic profitability, financial profitability, return on shareholders' funds, asset turnover and value added growth, to measure firm performance for the robustness check analysis. Using a panel data set for small- and medium-sized firms in the period 1993-2004, Montoriol-Garriga (2006) find that firms maintaining multiple banking relationships have

lower profitability. These results provide evidences supporting the theoretical view that fewer bank relationships reduce information asymmetries and agency problems, which outweigh the negative effects arising from holdup problems, and thus increase firm performance better than multiple banking relationships.

Table 1: Impact of the Banking Relationships on Firm Performance

Study Country	Sample Period, Firm Size	Number of Observation	Measure of Firm Performance	Relation with Firm Performance
Castelli, Dwyer, Jr. and Hasan (2012) Italy	1998-2000, (30) number of employees	10.764	ROA, ROE, Interest over Assets, Sales over Assets	↔↔
Horiuchi (1994) Japan	-	-	ROA	0
Hiraki, Ito and Kuroki (2003) Japan	1991-98, Listed Firms	10.344	ROA	+++
Degryse and Ongena (2001) Norway	1985-96, Listed Firms	1.897	Various Profitability Measures (Simultaneous Equations)	↔↔↔
Montoriol-Garriga (2006) Spain	1993-2003, Small Firms	41.593	7 Profitability Measures (Simultaneous Equations)	↔↔↔
Fok et al. (2004) Taiwan	1994-98, Large Firms		ROA (Simultaneous Equations)	Domestic: ↔↔↔ Foreign: +++
Yu et al. (2007) Taiwan	1991-2000, Large Firms	579	ROA (Simultaneous Equations)	↔↔↔

Source: Degryse et al., 2009, pg. 111-114, Table 4.13
Studies are listed according to country and then, year of the study.
0 No relationship
+++ Positive and significant at 1% level
↔↔↔ Negative and significant at 1% level
↔↔Negative and significant at 5% level

Yu et al. (2007) examine how issuing public debt affects the relationship between firm performance and the number of banks, using a three stage least square (3SLS) simultaneous estimation model. They find that public debt issuance plays a significantly

negative role in determining the effect of the number of banks on firm performance, whereas it plays a significantly positive role in determining the effect of firm performance on the number of banking relationships. That is, firms accessing public debt end up with lower profitability levels, and with larger number of baking relationship.

On the other hand, by distinguishing domestic and foreign banking relationships, Fok et al. (2004) find that firm performances negatively related with the number of domestic banking relationships but positively related with the number of foreign banking relationships in Taiwan. They also explore firms' behavior during the Asian crisis in the 1990s. They find that firms establish new banking relationships with domestic banks and end their relationships with foreign banks during the crisis time.

Horiuchi (1994) examine the relationship between number of "main bank" relationship and firm profitability in Japan. The major characteristic of the Japanese "main bank" relationship is that a firm's "main bank" is usually a principal shareholder of the firm and its primary lender. Thus, the firm's "main bank" usually plays an important role in monitoring the firm and assisting it during periods of crisis (Aoki, Patrick and Sheard, 1994). In this framework, Horiuchi (1994) finds that there is no statistically significant difference between ROA values of Japanese firms having one, two or three "main banks." Like Horiuchi (1994), Hiraki et al. (2003) investigate the impact of "main bank" relationships on firm profitability but find that when borrowing from a single main bank, borrowing is negatively related to the profitability of the Japanese companies listed on the Tokyo Stock Exchange. Moreover, they also report that having multiple "main bank"

relationships is associated with an increase in firm profitability by reducing the holdup costs of firms, especially for those with higher value of growth opportunities.

Beside these, some studies measure firm performance with other ratios instead of profitability measures in order to examine the impact of the number of banking relationships on firm performance. For example, considering all banking relationships besides "main bank," Kang and Stulz (2000) measure firm performance with stock performance measures and examine the effect of the Japanese banking crisis on firms listed on the Tokyo Stock Exchange from 1986 to 1993. The Japanese banking crisis occurred when the asset price bubble burst in 1989. Thus, Kang and Stulz (2000) divide the sample period into two as before and after banking crisis periods. They find that firms with close banking relationships had better stock performance before the banking crisis, whereas these firms had worse stock performance during the crisis period.

Some studies examine the relationship between number of banks and the probability of survival of new firms in the market. Foglia, Laviola, and Reedtz (1998) show that small and financially distressed Italian firms prefer to have more creditors. Using a dataset for Portuguese firms, Farinha and Santos (2006) find that startup firms maintaining a single banking relationship are more likely to survive for longer periods than those firms with multiple banking relationships. They also show that startup firms which have a bank, except state-owned banks, among its shareholders have a higher probability of survival in future. However, this relationship does not hold if one of the shareholders is a state-owned bank.

For publicly traded U.S. firms over the period 1980-1993, Houston and James (2001) examine whether financial constraints vary with the reliance on bank debt and with the number of banks that a firm has a relationship. Defining cash flow sensitivity as a financial constraint, they show that single-bank firms are significantly more cash-flow-constrained than multiple-bank firms. However, Houston and James (2001) also point out that cash flow sensitivity of a single-bank firm arises from greater cash flow sensitivity for a large investment project. Thus, for a modest level of investment projects, there is no difference between single-bank and multiple-bank firms in terms of being financially constrained.

There are other studies that investigate the impact of the banking relationships on the availability and costs of borrowings to the firms (Weistein and Yafeh, 1998; Harhoff and Körting, 1998b; Petersen and Rajan, 1994).These studies examine the indirect effect of the number of banking relationships on firm performance. Analyzing only main bank relationships in Japan between 1977 and 1986, Weistein and Yafeh (1998) show that main banks offer higher interest rates to their clients and firms with multiple main banks are offered lower borrowing rates. This result provides supporting evidence to the theoretical results of Rajan (1992) and von Thadden (1995). However, for small U.S. firms, Petersen and Rajan (1994) find that multiple bank relationships increase lending rates and reduce the availability of credit. Thus, unlike Weistein and Yafeh (1998), they show that multiple banking relationships indirectly decrease firm performance.

Harhoff and Körting (1998b) study the impact of "hausbank" relationship in Germany. In the German "hausbank" relationship, companies give priority to one bank which runs the core of their banking business, and in return, banks also give priority to their "hausbank" customers. In such a relationship, "hausbank" supports their customers' day-to-day business activities through electronic and international banking services, receivable management and treasury activities. The "hausbank" relationship is generally seen as long-term and stable partnership. In this vein, Harhoff and Körting (1998b) indicate that the "hausbank" relationships and concentrated borrowings are desirable for German firms since such firms are significantly better than other firms in terms of collateral requirements, interest rates and credit availability.

Despite these studies in the developed countries, there are only two studies that investigate the impact of the banking relationships on firm performance in emerging markets. Maurer and Haber (2007) investigate related lending relationships in Mexico for the sample period 1888-1913. They find that Mexican bankers did not choose to lend to poor performed firms measured with productivity level. Limpaphayom and Polwitoon (2004) investigates the impact of the lending relationships measured with the ratio of both short- and long-term bank loans to total assets on firm performances in Thailand for the sample period 1990-1996. They find a negative relationship between bank lending and both short- and long-term performances of firms measured with Tobin's Q. To my knowledge, there is no study that investigates the impact of the banking relationships on firm performances in Turkey.

Consequently, the empirical studies indicate that the relationship between firm performance and the number of banks differ both across and even within countries. Furthermore, studies suggest that bank type and the degree of the relationship between banks and firms affect the results.

CHAPTER 3

EMPIRICAL MODELS AND DATA

In this thesis, first, the probability of having a banking relationship is examined. For all firms in the sample, initially the factors affecting the probability of having any banking relationship is analyzed. Then, for firms that have a banking relationship, the probability of having a single and multiple banking relationships is investigated. Probit model is used in these two analyses.

Second, the relationship between the number of banks and firm performance is analyzed. Initially, I investigate the determinants of the number of banking relationships, and then examine whether the number of banking relationships affects firm performance or not.The2SLSmodel is used in the analysis as in the studies of Degryse and Ongena (2001), Fok et al. (2004), Montoriol-Garriga (2006), and Yu et al. (2007). Hence, the firm performance equation is estimated jointly with the banking relationship equation. I also

differentiate banks into various types in order to analyze whether the results change or not. Following Ongena and Şendeniz-Yüncü (2011), banks are categorized according to their nationality, ownership structure and orientation, as domestic, private, foreign, state-owned and participation (Islamic) banks.

Third, I investigate whether the types of credit relationships between a firm and a bank affect the determinants of the number of banks or the impact of the number of banks on firm performance. In this thesis, since I just focus on the credit relationship between a firm and a bank, I can only differentiate banking relationships as cash and non-cash credit ones.

Fourth, I examine whether the 2008 global crisis creates any difference in the relationship between firm performance and the number of banks. The whole sample period is divided into two sub-periods as crisis and non-crisis years. The crisis years are those that the global crisis affected the Turkish economic and financial system. In the literature, some studies state that the effects of the 2008 global crisis was firstly seen in the second quarter of the year 2008 and continued till the end of 2009 in Turkey (for example, Claessens, Dell'Ariccia, Igan and Leaven, 2010; Alp and Elekdağ, 2011). In addition, the growth rate of the gross domestic product in Turkey started to reduce in 2008 and was negative until the fourth quarter of 2009 (Table A). Therefore, the 2008 global crisis is assumed to affect the Turkish economic and financial system in 2008 and 2009. These years are taken as crisis years.

Lastly, I analyze whether the relationship between firm performance and the number of banks changes for different firm sizes. The sample is divided into two as large- and small-sized firms based on the median value of the market value of firms in each year. The models are estimated separately for these two firm types.

3.1. Empirical Models

3.1.1. Model for the Probability of Having a Banking Relationship

First, the factors affecting the probability of having any banking relationship are examined. Second, for the firms that have any banking relationship, the factors affecting the probability of having a single or multiple banking relationships is analyzed. Two dummy variables are created for these estimations: RELATION and MULTIPLE. The dummy variable RELATION equals to one if a firm has any banking relationship and zero otherwise. The dummy variable MULTIPLE takes the value of one for firms with multiple banking relationships and zero for firms with a single banking relationship. The following models are estimated using the probit models:

$$\text{RELATION} = \text{f}(\text{ROA}, \text{AGE}, \text{SIZE}, \text{INNOVA}, \text{LEVERAGE}, \text{NONFIN}, \text{GROUP},$$
$$\text{BMEMBER}, \text{STATE}, \text{MNC}, \text{INCENT}, \gamma_i, \delta_t)$$

$$\text{MULTIPLE} = \text{f}(\text{ROA}, \text{AGE}, \text{SIZE}, \text{INNOVA}, \text{LEVERAGE}, \text{NONFIN}, \text{GROUP}, \text{BMEMBER}, \text{STATE}, \text{MNC}, \text{INCENT}, \gamma_i, \delta_t)$$

In these models, the dependent variable, banking relationship, is measured with the dummy variables, RELATION and MULTIPLE. The independent variables consist of several firm characteristics: performance of a firm, ROA, its age, AGE; its size, SIZE; innovativeness, INNOVA; leverage, LEVERAGE; obtaining funds external sources other than bank loans, NONFIN; belonging to a group or a holding, GROUP; having a related bank, BMEMBER; state-ownership of a firm, STATE; being a multinational company, MNC; and any incentives provided by government agencies to a firm, INCENT. The year and industry fixed effects, γ_i and δ_t, are controlled in the model. These variables are determined based on the models used in the literature.

Firm performance is used to express the overall results of any financial activity in a firm, namely firm profitability. ROA, net income divided by total assets, is used a measure of firm profitability. It is widely used in the literature as a proxy for firm performance. In the literature, there is no clear cut finding about the association between firm profitability and the probability of having any banking relationship. For example Detragiache et al. (2000) and Dietsch and Golitin-Boubakari (2002) find that firm performance decreases the probability of having any banking relationship in Italy and France. On the other hand, Tirri (2007) find a positive relationship between firm profitability and the probability of having any and multiple banking relationships in France.

The age of a firm, AGE, is included in the models to capture the length of the firm achievement. It is measured as the logarithm of firm's age since its establishment. In general, since establishing a banking relationship takes time, the probability of having a banking relationship is expected to increase as firms get older. However, since older firms are better known in the market, they may face less adverse selection problems and thus have probably less need to maintain multiple banking relationships. Therefore the sign of the coefficient on AGE is expected to be positive in the first model but to be negative in the second one.

The size of a firm, SIZE, is measured by the natural logarithm of the market value of a firm, as it is widely used in the literature. I expect a positive relationship between firm size and both probabilities because of two reasons. First, larger firms may prefer to maintain multiple banking relationships in order to eliminate any risk coming from the liquidity shock to their banks. Second, larger firms conduct more businesses from different branches or a business in different regions. Thus, they may choose to maintain multiple banking relationships in order to finance such a complex business.

The innovativeness of a firm is calculated as R&D expenditures divided by sales, following Skinner (1993). In the literature, von Rheinbaben and Ruckes (2004) show a U-shaped relationship between the degree of firm innovativeness and the number of banking relationships. They show that as long as a firm decides to reveal private information, a higher degree of firm innovativeness makes fewer banking relationships

optimal. On the other hand, when profits are highly sensitive to information leakage, the firm chooses not to reveal its confidential information in order not to impair output market success. In such cases, firms prefer to maintain multiple banking relationships to decrease borrowing rates by benefiting from competition among banks. Although I expect a positive relationship between firm innovativeness and having a banking relationship, the relationship between innovativeness and the probability of having multiple banking relationships can be both positive and negative, controlling for the industry that a firm operates.

The variable LEVERAGE is included in the models to control the debt level of a firm. It is measured by a debt ratio, total debt to total asset. In the literature, some studies suggest that, ceteris paribus, banks may decline to lend to highly levered firms because of the high probability of default. Thus, as firms become highly leveraged, the probability of having multiple banking relationships might decrease. On the other hand, some empirical studies indicate that there is a positive relationship between leverage of a firm and the probability of having multiple banking relationships. For example, Roberts and Siddiqi (2004) and Tirri (2007) find that highly leveraged firms are more likely to have multiple banking relationships in the U.S. and Italy, respectively. Therefore, while the sign of the coefficient of this variable is expected to be positive in the first model, it can be both positive and negative in the second model.

The variable NONFIN is used to control the level of the firm's liabilities other than bank loans. It is calculated as a percentage of non-bank liabilities in total liabilities of a firm. If

a firm finds financing from other sources such as trade credits, rather than borrowing from banks, then the probabilities of having any and multiple banking relationships are expected to be lower and vice versa. Therefore, I expect a negative relationship between NONFIN and the probabilities of having any and multiple banking relationships.

I include the dummy variable of group membership, GROUP, to capture the effect of belonging to a group or a holding. It takes a value of one if a firm belongs to any group or a holding, and zero otherwise. If a firm is a member of a group of companies, it may easily find funds from the other firms in the group, and thus may rely less on borrowing from banks. Therefore, I expect a negative relationship between GROUP and the probabilities of having any and multiple banking relationships.

If a firm or its group owns a bank, this firm may get funding easily or get any other financial services from their banks at more favorable terms or conditions. Therefore, such firms may choose to maintain a banking relationship with only their bank. To capture this effect, I add a dummy variable BMEMBER in the models. This dummy variable equals to one if a firm is a part of a group that owns a bank, and equals to zero otherwise. This variable is expected to be negatively related to the probability of having multiple banking relationships.

STATE is another dummy variable which equals to one if any government entity owns at least 5 percent of shares of a firm and equals to zero otherwise. If any government entity is a shareholder of a firm, it will be easier to establish a banking relationship with a state-

owned bank. Thus, the variable STATE is expected to be negatively related to the probability of having multiple banking relationships.

I define a firm as a multinational company if a foreign owner holds more than 5percent of the company's shares or equity and create the dummy variable MNC which equals to one if a firm is a multinational company and zero otherwise. Multinational firms may prefer to maintain more and different types of banking relationships to finance its businesses in different countries, like large firms. Therefore I expect MNC to be positively related to the probabilities of having any and multiple banking relationships.

Firms that obtain incentives from the government may rely less on bank loans. In this context, to capture the impact of incentives on banking relationship, I add a dummy variable, INCENT, in the models. It equals to one if a firm obtains any type of incentive from any government entity such as credits, grants, investment allowances, value-added-tax exemption certificate or remission of duty, and zero otherwise. I expect INCENT to be negatively related to the probabilities of having any and multiple banking relationships.

The industry dummy variables, γ_i, are included into the equations to control for the possible effects of the sectors within which a firm operates. Industries are classified according to the grouping used by the Public Disclosure Platform (PDP). Firms in the sample are from eight main industries: education, health, sport and other social services;

electricity, gas and water; manufacturing; construction and prosperity; mining; technology; wholesalers, retailers, hotels and restaurants; and transportation, communication and storage. In addition to these industry dummy variables, I control for time effects by including year dummy variables, δ_t. There are nine calendar year dummy variables for the sample period 2003-2011.

Table 2 summarizes the expected signs of the coefficients of the explanatory variables in the models explaining the probabilities of any and multiple banking relationships.

3.1.2. Model for Banking Relationships

As Degryse and Ongena (2001), Fok et al. (2004), Montoriol-Garriga (2006) and Yu et al. (2007) suggest, there can be simultaneity (endogeneity) problem in estimating banking relationship and firm performance models by using the ordinary least square (OLS) model. In order to determine which model, the OLS or 2SLS,should be used in the estimations, the Hausman test is employed. The test results presented in the Appendix Table B favor the 2SLS estimation model (the coefficient of the banking relationship equation's residuals is significant at 1% level in the firm performance equation). Therefore, the 2SLS model is used in the estimations. The following banking relationship equation is estimated simultaneously with the firm performance equation, which is explained in detail in the next part.

$$\begin{aligned}\mathrm{NUMBERB_{it}} = {} & \alpha_0 + \beta_1 \mathrm{ROA_{it}} + \beta_2 \mathrm{AGE_{it}} + \beta_3 \mathrm{SIZE_{it}} + \beta_4 \mathrm{INNOVA_{it}} + \beta_5 \mathrm{LEVERAGE_{it}} \\ & + \beta_6 \mathrm{NONFIN_{it}} + \beta_7 \mathrm{GROUP_{it}} + \beta_8 \mathrm{BMEMBER_{it}} + \beta_9 \mathrm{STATE}_{\mathrm{it}} \\ & + \beta_{10} \mathrm{MNC_{it}} + \beta_{11} \mathrm{INCENT_{it}} + \gamma_i + \delta_t + \varepsilon_{it}\end{aligned}$$

The banking relationship variable, NUMBERB, indicates the total number of all banking relationships that a firm maintains at the end of the year. Ongena and Şendeniz-Yüncü (2011) argue that bank characteristics, such as size, nationality, ownership structure and orientation, determine attractiveness of a bank to a firm. They find that young, large, multiple-bank, and industry-diversified firms that are located in or close to Istanbul have a relationship with foreign banks. They also show that Islamic banks mainly deal with young, multiple-bank, industry-focused and transparent firms. To examine how firm characteristics affect the number of banking relationships for different bank types, banks are classified into five groups based on their nationality, ownership structure and orientation as state-owned, foreign, private domestic and participation (Islamic) banks. The model is estimated for these different types of banks. Therefore, in addition to the variable NUMBERB, following banking relationship variables are used in the model as dependent variables:

- NUMBERF=the number of foreign banks
- NUMBERS=the number of state-owned banks
- NUMBERP=the number of private domestic banks
- NUMBERI=the number of participation (Islamic) banks

Each banking relationship variable indicates the number of banks that a firm has a relationship at the end of each year.

In 2003, there were two domestic banks that are under the control of Savings Deposit Insurance Funds[1] (SDIF)in the Turkish banking system. For the rest of the sample period, there was only one bank under such control. Therefore, 90% of the total observations do not have any relationship with these two banks controlled by SDIF and there is not enough observation for an interpretable estimation. As a solution, while categorizing banks, I consider including these two banks into other bank categories. However, these banks cannot be classified as private domestic banks since SDIF had taken their control and they either cannot be state-owned banks since their lending activities occurred when these banks were private. For this reason, through this thesis, although the number of relationship with the banks controlled by SDIF is included into the observations related to the variable NUMBERB, they are not separately analyzed when the factors affecting the number of relationships with different bank types are examined.

In the banking relationship model, the relationship between firm performance and the number of banks is investigated. Therefore, the major explanatory variable of interest is firm performance. In the literature, theoretical models indicate different relationships between firm performance and the number of banks. For example, the studies of Rajan (1992) and von Thadden (1995) show that having multiple number of banking

[1] These are the bankrupted banks that are controlled by SDIF, after the Turkish banking crisis in 2001.

relationships enhances firm performance by reducing holdup costs. On the other hand, Yosha (1995) and Bhattacharya and Chiesa (1995) indicate that having a single banking relationship enhances firm performance by reducing the costs resulting from private information leakage when firms maintain multiple number of banking relationships. Empirical studies also do not provide clear-cut finding about the impact of the number of banking relationship on firm performance. For example, Detragiache et al. (2000) and Tirri (2007) find that there is no relationship between firm profitability, measured by gross operating margin divided by sales, and the number of banking relationships, in Italy. However, Ziane (2003), and Harhoff and Körting (1998a) observe a negative relationship between firm profitability and the number of banks in France and Germany respectively. Therefore, I do not have any a priori expectation about its sign. As a robustness check, I also estimate the model by using Basic Earnings Power Ratio (BEP ratio) as a measure of firm performance. This ratio measures firm profitability without the influence of taxes or financial leverage. BEP ratio is calculated by dividing earnings before interest, taxes, depreciation and amortization (EBITDA) to total assets.

Table 2: Expected Sign of The Explanatory and Control Variables in Their Relation With Banking Relationship Variables

Explanatory & Control Variables	Banking Relationship Variables (Dependent Variables)						
	RELATION=1	MULTIPLE=1	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI
Return on Asset, "Firm Performance"	?	?	?	?	?	?	?
Firm Age, "AGE"	+	-	?	?	-	?	-
Firm Size, "SIZE"	+	+	+	+	+	+	+
Innovativeness of the Firm, "INNOVA"	-	?	?	?	?	?	?
Firm Leverage, "LEVERAGE"	+	?	?	?	?	?	?
Level of liabilities other than bank loans, "NONFIN"	-	-	-	-	-	-	-
Group Membership, "GROUP" (0,1)	-	-	-	-	-	-	-
Firm-Bank Relatedness, "BMEMBER" (0,1)	-	-	-	-	-	-	-
Multinational Firm, "MNC" (0,1)	+	+	?	-	+	-	-
Incentive, "INCENT" (0,1)	-	-	-	-	-	-	-
Belongingness to a Governmental Entity "STATE" (0.1)	-	-	?	+	-	-	-

The sign of the coefficient of the variable is expected to be
+ positive
- negative
? uncertain

The control variables included in the banking relationship model and the rationales behind their inclusions are similar to those in the probit models. As Table 2 summarizes, the expected signs of the coefficient of these control variables in the banking relationship equations are almost the same with the ones in the probit model that uses MULTIPLE as a dependent variable, with few exceptions. I expect that the number of banking relationships increases with firm size and decreases with the level of liabilities other than bank loans, belonging to a group or a holding, related banking and any incentive provided by the government. There is not any a priori expectation for innovativeness and leverage. The expected coefficients on control variables AGE, MNC and STATE are slightly different depending on the dependent variable used in the model.

Unlike the expected negative relationship between firm age and the probability of having multiple banking relationships, the relationship between firm age and the banking relationship variables NUMBERB, NUMBERS and NUMBERP might be either positive or negative. In general, older firms have less need to maintain multiple banking relationships, since they are better known and thereby face fewer information asymmetry problems in the market. However, considering that establishing a banking relationship takes time, older firms may also have more banking relationships than young firms. Therefore, the coefficient of this variable is uncertain in its relationship with the dependent variables NUMBERB, NUMBERS and NUMBERP. Apart from these, following Ongena and Şendeniz-Yüncü (2011), I expect a negative relationship between firm age and the dependent variables NUMBERF and NUMBERI.

The relationship between STATE and number of banking relationships can differ, when banks are differentiated according to their ownership structure as private and state-owned ones. If any government entity is a shareholder of a firm, then it will be easier to establish a banking relationship with a state-owned bank. Thus, such firms may have more relationships with state-owned banks, but less with other types of banks. Such firms may even, in total, have a small number of banking relationships relative to other firms, since they prefer to maintain banking relationships with only state-owned banks. Therefore, I expect STATE to be positively related to the number of state-owned banks, but negatively related to other banking relationship variables.

Similarly, the relationship between MNC and the number of banking relationships can be different, when banks are categorized as domestic and foreign. A multinational firm can maintain more foreign banking relationships while establishing fewer relationships with domestic ones. Therefore, I expect MNC to be positively related to the number of foreign banking relationships and negatively related to the number of domestic banks. Furthermore, if these two opposite effects offset each other's impact, the coefficient of MNC may not be significant in the model for the total number of banking relationships, NUMBERB.

3.1.3. Model for Firm Performance

I examine whether the number of banking relationships has any impact on firm performance using the following model:

$$\text{Firm Performance}_{it} = \alpha_0 + \beta_1(\text{Banking Relationship Variable}_{it}) + \beta_2 \text{AGE}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{INNOVA}_{it} + \beta_5 \text{LEVERAGE}_{it} + \beta_6 \text{BMEMBER}_{it} + \beta_7 \text{LIQUIDITY}_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

The dependent variable, Firm Performance, refers to firm profitability measured with ROA or BEP. The variable of interest, Banking Relationship, is the number of banks that a firm has either cash and/or non-cash credit relationship with at the end of the year. It is

measured with five banking relationship variables. NUMBERB indicates the total number of banking relationships and the others indicate the number of banking relationships depending on banks' nationality, ownership structure and orientation.

I don't have a priori expectation about the sign of the coefficient on all the banking relationship variables, except NUMBERF, because of the conflicting theoretical implications in the literature. Some studies indicates that there would be a positive relationship if multiple bank relationships reduce borrowing costs, incentives for strategic default, liquidity risks associated with the fragility of the banking system in a country or the probability of premature liquidation of a project. On the other hand, other studies suggest that there would also be a negative relationship between the number of banks and firm performance if multiple bank relationships increase monitoring, screening or renegotiation costs arising from information asymmetries between a bank and a firm or increase the risk of private information disclosure about a firm. Fok et al. (2004) show that there is a negative relationship between the number of domestic banks and firm performance but a positive relationship between the number of foreign banks and firm performance. Therefore, it is expected that firm performance increases with the number of foreign banking relationships, NUMBERF. However, this positive relationship may disappear during the crisis periods if foreign banks and firms are too sensitive to the economic and financial deteriorations during the crisis periods.

As an additional control variable, only LIQUIDITY is included in the model in order to solve the identification problem in the 2SLS estimation model. To control for year and

industry effects, industry and calendar year dummy variables, γ_i and δ_t respectively, are included in the model. ε_{it} represents the disturbance term.

The age of a firm, AGE, is included in the model to capture the length of the firm achievement. Because of the nature of business life cycle, investment opportunities may be limited in latter stages and firm performance is expected to diminish as a firm gets older. I expect a negative relationship between firm age and firm performance.

SIZE and performance is expected to be negatively related if the size of a firm causes a decrease in firm performance because of diseconomies or an increase in agency problems. Conversely, this variable can also be positively related to firm performance if the size of a firm enhances it by raising the market power of a firm or making easy to find capital. Therefore, the sign of the coefficient of firm size is ambiguous.

The relationship between the innovativeness of a firm, INNOVA, and firm performance is also uncertain. If a firm invests in a project by increasing its R&D expenditures, its profitability can be low or even negative in early times of the investment. However, a firm may also enjoy high profit in the latter stages of investment, if the project brings higher returns. Therefore, the coefficient of this variable can be positive or negative depending on the stage in the investment project.

The sign of the coefficient of LEVERAGE can be positive or negative because leverage may affect firm performance in different ways under the presence of market imperfections such as agency conflicts or informational asymmetries, etc. (Harris and Raviv, 1991). For example, using an agency conflict model, Chang (1992) predicts a negative relationship between leverage and firm performance, while several other studies argue a positive relationship between leverage and firm value (e.g., Hirshleifer and Thakor, 1992; Stulz, 1990).

In Turkey, almost all of the holding companies own a bank within their group. I expect that if a firm is a member of such an industrial group, then it may more easily obtain funding from that bank. This borrowing relation is called "related lending" in the literature. Therefore, I also add the dummy variable of BMEMBER into the performance model. However, the relationship between firm performance and related lending is ambiguous. On the one hand, according to "informational view" arguments, related banks can more easily access the true quality of the investment projects, and they may force firms to give up bad investments and invest only in good projects. Thus, they may improve firm performance (Rajan, 1992). On the other hand, according to "looting" (Akerlof and Romer, 1993) and "tunneling" (Johnson, La Porta, López-de-Silanes and Shleifer, 2000) arguments, a close relationship between a group bank and a firm may allow insiders to obtain resources from depositors even when a firm is in a bad financial condition. Therefore, the sign of the coefficient of BMEMBER in the firm performance equation is not known a priori.

LIQUIDITY refers the liquidity ratio of a firm and is calculated as current assets divided by current liabilities. I include this variable in the model to solve the identification problem that occurs when firm performance and banking relationship equations are simultaneously estimated. Literature suggests that "rank condition" is the necessary and sufficient condition for identification in a two-equation simultaneous estimation model (Green, 2011). "Rank condition" states that the first model is identified if and only if the second model equation includes at least one exogenous variable with nonzero coefficient which is excluded from the first equation. To satisfy this "rank condition," LIQUIDITY is added to the firm performance model and its coefficient is expected to be non-zero, since the relationship between firm liquidity and profitability is frequently emphasized in the literature. For example, Smith (1980) states that a large increase in profitability level would tend to reduce firm's liquidity and similarly, a large increase in liquidity level would tend to negatively affect the profitability. Eljelly (2004), and Raheman and Nasr (2007) find a significant negative relationship for a sample of Saudi and Pakistani firms, respectively. On the other hand, Garcia-Teruel and Martinez-Solano (2007), and Gill, Biger and Mathur (2010) show that with a correct liquidity management strategy, managers can create profit for their firms in Spain and US, respectively. Thus, I do not have a priori expectation about the sign of the coefficient of LIQUIDITY.

3.2. Data

The models are estimated for a sample of firms that are publicly traded in the National market of the BIST over the period2003-2011. Firms traded on the Secondary national, watch-list and emerging companies markets are not included in the sample. There are a total of358 firms traded on the national market during the sample period. 136 financial firms and holding companies are excluded from the sample. The financial years of some companies, e.g., sport clubs, ends in other months of the year, are not in December. Thus, seven firms that do not have compatible financial statements are omitted from the sample. Since I cannot get the number of banking relationships for one foreign company, Do&Co Restaurants and Catering A.G., I also omit it from the sample. Lastly, because I cannot acquire financial statements of one bankrupt company, Anadolu Gıda Dağıtım A.Ş., I also remove it from the sample. The final sample consists of 212 publicly traded firms and 1663 firm-year observations. The data is an unbalanced panel since the number of firms changes by year as the new firms started to be traded or the existing ones become delisted. I do not use a balanced one in order to avoid survivorship bias.

Financial statements are obtained from the official web sites of BIST and PDP. Market values of firms are taken from *Datastream*. Over the sample period, firms are allowed to report their financial statements in different forms: consolidated and standard. If companies control one or more subsidiaries, they are legally required to prepare a consolidated financial statement. Moreover, before 2005, it was mandatory for firms traded in the BIST to report inflation adjusted financial statements. But after 2005, as the

inflation rate has started to decrease, the rule of preparing inflation adjusted financial statements is nullified. It becomes mandatory for these firms to prepare financial statements using International Financial Reporting Standards (IFRS). In this analysis, the consolidated financial statements are used as a source of financial data, because if a firm has one or more subsidiaries, then it may take out a loan instead of its subsidiaries, increasing the number of banking relationships. However, such relationships will not be observed if a non-consolidated financial statement is used for this firm. Then, there would be an inconsistency between the number of banking relationships and financial statements data. To avoid such an inconsistency, I use consolidated financial statements as first choice. If there is no consolidated financial statement for a firm, then unconsolidated ones are used.

I find the data about the incentives obtained from the government from the official web site of BIST and PDP by searching publicly available archives of "Company Notifications" that are announced over the sample period. While searching "Company Notifications," I use the key words "incentive, investment and subsidy/subsidies." Then, I confirm this data from the footnotes of audited financial statements of companies.

The data about the number of banking relationships are obtained from the BRSA. The availability and reliability of this data determines the beginning of the sample period (2003). This dataset provides the number of banks that a firm has a relationship at the end of the year. Therefore, if a firm has a relationship with a bank during the year but not the end of the year, this relationship is not reported in the dataset.

Table 3: Descriptive Statistics of the Variables Used in the Analysis

	Variables	N	Mean	Median	Std. Dev.	Minimum	Maximum
Banking Relationship Variables	RELATION	1663	0.91	1	0.28	0	1
	MULTIPLE	1515	0.92	0	0.27	0	1
	NUMBERB	1663	5.60	5	4.23	0	23
	NUMBERP	1663	3.39	3	2.43	0	16
	NUMBERF	1663	1.10	1	1.46	0	9
	NUMBERS	1663	0.88	0	1.11	0	4
	NUMBERI	1663	0.13	0	0.50	0	4
	NUMBERT	1663	0.10	0	0.31	0	2
Other Variables	ROA	1663	0.03	0.03	0.11	-1.25	0.58
	BEP ratio	1663	0.05	0.05	0.10	-0.49	0.55
	ROE	1622	-0.01	0.06	0.59	-16.56	6.73
	GROUP	1663	0.71	1	0.45	0	1
	BMEMBER	1663	0.20	0	0.40	0	1
	STATE	1663	0.04	0	0.19	0	1
	INCENT	1663	0.48	0	0.50	0	1
	AGE*	1663	34.40	35	13.57	4	80
	SIZE (MV)**	1663	652.14	113.00	2,100	4.00	28,160
	LEVERAGE	1663	0.47	0.43	0.31	0.02	3.82
	GROWTHOPP	1663	0.01	0.00	0.03	0	0.63
	LIQUIDITY	1663	2.33	1.58	2.86	0.10	70.59
	NONFIN	1663	0.69	0.70	0.24	0.02	1

* Age in years
** SIZE(MV) is measured with market value of a firm at the end of the year(in million TL)

Descriptive statistics of the variables used in the analysis are presented in Table 3.The mean and median numbers are close to each other for all variables, except LIQUIDITY and SIZE. Considering the banking relationship variables, there is a wide variation in the number of banking relationships for Turkish firms. Only 9% of the observations in the sample do not maintain any banking relationships. For those which have any banking relationships, 8% of them maintain a single banking relationship. The remaining 92% of these observations have multiple banking relationships. The median number of banking

relationships is 5 and it is similar to the ones found for Austria (Ongena and Smith, 2000b), France (Refait, 2003), Germany (Elsas and Krahnen, 1998), and Japan (Tsuruta, 2008). When banks are categorized, the most preferable bank types are the private domestic banks with the median number of banks of 3. On average, firms have relationship with 1.1 foreign banks, 0.88 state-owned banks and 0.13 participation banks. These numbers can be partially explained with the number of banks existing by each bank type. As it is shown in Table 4, before 2007, the private domestic banks dominate the market, constituting almost one-half of the total number of banks in Turkey. After 2007, the number of foreign banks increased to more than 20 and they started to dominate the market.

Table 4: Total Number of Banks Operated in Turkey

Bank Type	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
State-owned banks	6	6	6	6	6	6	6	6	6
Domestic banks controlled by SDIF	2	1	1	1	1	1	1	1	1
Private domestic banks	26	26	25	20	17	17	17	17	17
Foreign banks	16	15	15	19	22	21	21	21	20
Participation (Islamic) banks	4	4	4	4	4	4	4	4	4
Total	**54**	**52**	**51**	**50**	**50**	**49**	**49**	**49**	**48**

Source: http://www.tbb.org.tr/en/home

Firm performance, ROA, changes between -1.25 and 0.58, indicating that there are both positively and negatively performed firms in the sample. The mean ROA indicates that on average, firms in the sample perform with 3% profitability ratio over the sample period. The mean and median BEP ratio is 5% which is slightly higher than the mean and median ROA (3%). The mean ROE is negative, whereas the median ROE is 6%.

The mean value of GROUP indicates that 71% of the observations in the sample come from firms that belong to a group or a holding. The mean value of BMEMBER shows that 20% of the observations obtained from firms that have a membership in such a group that owns a bank. This indicates that these firms in the sample can more easily find funds from the bank in their group. On the other hand, only 4% of the sample is related to a governmental entity. Moreover, on average, almost half of the sample gets some kind of incentive from the government entities during the sample period 2003-2011.

The difference between the minimum and maximum values of the other control variables indicates that the firms in the sample have structural differences. For instance, there are both new established and mature companies, with an average age of 34 years. Also, there are both high and low leveraged firms in the sample. The average debt ratio (leverage) is 47%, which is lower than the mean debt ratio (61%) presented in the study of Cakova (2011). The minimum and maximum value of NONFIN indicates that at least one firm uses bank loans to finance 98% of its debt, whereas at least one firm does not use any bank loan. On average, 69% of the all liabilities are borrowed from external sources other than banks.

Table 5 shows how the number of banking relationships changes over the sample period. In general, there is an increase in the mean value of NUMBERB over time. However, this increase cannot be fully explained by the change in the number of banks operating in Turkey, since the total number of banks decreases from 54to 48over time, as Table 4 indicates.

Table 5: Total Number of Banking Relationship over Time

	NUMBERB																		
YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	>15	**Max**	**Mean**	**N**
2003	14	9	23	28	14	15	17	29	11	8	2	5	2	2	2	3	**18**	**5.09**	**184**
2004	14	13	23	18	16	13	27	11	16	13	10	5	2	2	3	4	**19**	**5.47**	**190**
2005	15	14	15	24	19	11	25	17	14	11	8	4	3	5	2	5	**20**	**5.54**	**192**
2006	18	18	11	22	19	18	17	17	12	8	5	4	7	6	1	9	**20**	**5.61**	**192**
2007	17	17	17	21	21	17	20	15	9	6	3	9	4	2	5	6	**23**	**5.35**	**189**
2008	17	14	12	28	14	16	17	8	8	11	4	3	8	5	3	10	**21**	**5.72**	**178**
2009	16	14	11	28	15	19	16	10	7	7	4	8	7	5	3	9	**18**	**5.74**	**179**
2010	18	9	22	23	22	13	14	8	7	6	8	5	3	9	3	11	**19**	**5.71**	**181**
2011	19	12	14	21	13	11	17	10	9	14	4	4	5	4	5	16	**21**	**6.25**	**178**
Total (%)	**8.90**	**7.22**	**8.90**	**12.81**	**9.20**	**8.00**	**10.22**	**7.52**	**5.59**	**5.05**	**2.89**	**2.83**	**2.47**	**2.41**	**1.62**	**4.39**			

In contrast to the general increase in the number of banking relationships, the number of firms with no banking relationship increases over the sample period. Furthermore, as Table 5 shows, there is a decline in the number of banking relationships in 2007 and 2010, compared to the previous years. The number of banking relationships increased in 2008, when the 2008 global financial crisis started to affect the Turkish economic and financial sectors. To investigate whether the mean number of banking relationships varies in crisis and non-crisis years, I separate the sample period into two. Table 6 presents how the mean values of the number of banking relationships change in these two sub-periods based on firm size.

Table 6: The Number of Banking Relationships in Crisis and Non-Crisis Years

	Mean Values						P-values to test the equality of mean values in crisis and non-crisis years using t-statistics		
	CRSIS=0			CRISIS=1					
	Small	Large	Total	Small	Large	Total	Small	Large	Total
NUMBERB	4.9124	6.2229	5.5697	5.2291	6.2360	5.7311	0.3316	0.9726	0.5233
NUMBERS	0.6928	0.9573	0.8254	0.8771	1.2753	1.0756	0.0363	0.0011	0.0002
NUMBERF	0.8433	1.1863	1.0153	1.257	1.6067	1.4314	0.0009	0.0023	<.0001
NUMBERP	3.1562	3.8244	3.4916	2.8833	3.1573	3.0224	0.1799	0.0013	0.0005
NUMBERI	0.1367	0.1237	0.1302	0.1508	0.1292	0.1401	0.7278	0.8983	0.7417

CRISIS=1: firms that operate in crisis years (2008 & 2009), 0: otherwise

Without separating firms as small- and large-sized, it is found that the mean numbers of banking relationships are significantly different in crisis and non-crisis years for only state-owned, foreign and private domestic banks. However, the mean values change in opposite directions. While the mean value of the number of relationship with state-owned and foreign banks increases in crisis years, the mean value of the number of relationship with private domestic banks decreases. These two opposite changes offsetting each other's effects can be the reason why there is no significant difference in the mean values of the total number of banking relationships. When firms are categorized based on their size as small- and large-sized ones, these differences are still significant for both small- and large-sized firms, except small-sized ones that have relationship with private domestic banks. However, the significance levels of these differences are much higher for large-sized firms that have a relationship with state-owned and private domestic banks but lower for large-sized firms that have a relationship with foreign banks.

Table 7showsthe distribution of the number of banking relationships according to the industry within which firms operate. The maximum and mean values of NUMBERB present wide variability among industries. On average, the mean number of banking relationships is highest (7.52) in the transportation, communication and storage sector (SEC8),and lowest (1.45) in the mining sector (SEC5).

Table 7: Distribution of the Total Number of Banking Relationships According to Industries

	NUMBERB																			
MSECTOR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	>15	**Max**	**Mean**	**N**	**Percent (%)**
SEC5	1	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**1.45**	**11**	**0.66**
SEC1	0	11	4	0	2	0	0	0	0	0	0	0	0	0	0	0	**4**	**1.59**	**17**	**1.02**
SEC6	20	10	7	1	5	11	11	9	1	4	3	1	0	2	1	0	**14**	**4.14**	**86**	**5.17**
SEC2	11	1	3	7	2	0	5	1	3	1	0	0	1	0	1	2	**20**	**4.50**	**38**	**2.29**
SEC7	17	12	23	22	8	10	5	4	1	1	1	1	2	1	5	9	**17**	**4.50**	**122**	**7.34**
SEC3	97	81	104	169	131	103	145	107	88	76	42	41	33	31	19	56	**23**	**5.82**	**1323**	**79.56**
SEC4	2	0	0	3	1	2	1	2	0	1	1	2	2	2	0	1	**15**	**7.45**	**20**	**1.20**
SEC8	0	1	1	11	4	7	3	2	0	1	1	2	3	4	1	5	**18**	**7.52**	**46**	**2.77**

SEC1: education, health, sport and other social services; SEC2: electricity, gas and water; SEC3: manufacturing;
SEC4: construction and prosperity; SEC5: mining; SEC6: technology; SEC7: wholesalers, retailers, hotels and restaurants;
SEC8: transportation, communication and storage

The mean number of banking relationships does not depend on the number of firms that operate in that sector. Each sector is not equally represented in the sample. For example, almost 80% of the sample is from the manufacturing sector (SEC3) and the firms in this industry have an average of 5.82 number of banking relationships. On the other hand, the sector of construction and prosperity (SEC4) generates only 1.20% of the sample but the mean number of banking relationships is 7.45 for the firms operating in this sector. This indicates that average number of banking relationships in a sector cannot be explained by

the number of firms operating in that sector, but something unique to that sector or the firms operating in that sector, e.g., average debt ratio etc.

Lastly, Table 8 shows correlation coefficients between all variables used in the analysis. The significantly highest correlation (40%) is between liquidity and leverage. Beside this, there is also a relatively high correlation between SIZE and ROA, NONFIN and LEVERAGE, STATE and GROUP. However, none of the significant correlations are greater than 50%. When the correlations of control variables with the banking relationship variables are examined, it is seen that almost all signs of correlations are compatible with the expectations presented in Table 2.

All the control variables, except BMEMBER, LEVERAGE and MNC, have significant correlations with NUMBERB. However, when banks are differentiated according to their nationalities, ownership structures and orientations, the type and the significance of the correlations between these control variables and the number of relationships with these different bank types changes. For example, while AGE is positively and significantly correlated with all banking relationship variables, except NUMBERI. The correlation coefficient between firm age and the number of relationships with participation banks is negative and significant, suggesting that young firms work with participation banks. The preliminary evidence about the control variables indicates that the determinants of banking relationships may change by bank types.

Table 8 also presents the correlations of control variables with firm performance. Firm performance measure, ROA, is significantly correlated with only the numbers of state-owned and Islamic banks. Although its correlation with the number of state-owned banks is positive, it is negative with the number of Islamic banks. It suggests that firms that are not profitable might get credits from participation banks and profitable ones might get credits from state-owned banks. The correlation coefficients of ROA with the number of other banks are negative but not significant. However, these are correlations without controlling for other factors affecting performance of a firm.

Table 8: Pearson Correlation Coefficients of All Variables in the Models, N = 1663, Prob > |r| under H0: Rho=0

	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI	NUMBERT
NUMBERB	1	0.643***	0.77304***	0.86907***	0.39387***	0.26358***
NUMBERS		1	0.42102***	0.34994***	0.22539***	0.12585***
NUMBERF			1	0.47889***	0.28264***	0.13243***
NUMBERP				1	0.20468***	0.19154***
NUMBERI					1	0.01775
NUMBERT						1

Pearson Correlation Coefficients of All Variables in the Models, N = 1663, Prob > |

BMEMBER	STATE	INCENT	AGE	SIZE	LEVERAGE	INNO
-0.0073	**0.1611*** **	**0.1978*** **	**0.1439*** **	**0.2272*** **	**0.201**	**-0.075**
0.0828***	0.2542***	0.1712***	0.0869***	0.2219***	0.1739***	-0.04
-0.0843***	0.0664***	0.1373***	0.1384***	0.2109***	0.1490***	-0.06
0.0211	0.0927***	0.1845***	0.1427***	0.1493***	0.1438***	-0.069
-0.1131***	0.1323***	-0.014	-0.0476*	0.0576**	0.1274***	-0.0
0.0188	0.0369	0.0198	-0.0391	0.0527**	0.0886***	-0.0
0.1451***	0.0522**	-0.0321	0.0887***	0.3795***	-0.3080***	-0.0
0.2970***	-0.3166***	-0.0162	0.0900***	0.1582***	-0.0599**	0.050
1	-0.0770***	0.1335***	0.0883***	0.3169***	-0.0750***	-0.04
	1	0.0853***	0.0523**	0.1700***	0.0094	0.0
		1	0.034	0.036	0.0287	0.04
			1	0.1929***	-0.0493**	-0.072
				1	-0.1384***	-0.072
					1	-0.076
						1

.0%, respectively

CHAPTER 4

EMPIRICAL RESULTS

4.1. Results of the Probit Model for the Probability of Having a Banking Relationships

In this section, I investigate first the probability of having a banking relationship (RELATION=1) and then the probability of having multiple banking relationships (MULTIPLE=1) for Turkish firms.

The results of these two estimations are presented in Table 9. The first two columns of the table show the results of the estimation for the firm's probability of having a banking relationship where the dependent variable is RELATION. The last two columns show the results of the probit model for the firm's probability of having a single or a multiple banking relationships. The first and third columns present the estimated coefficients

with p-values in parenthesis. Marginal effects on the second level of the response, RELATION=1 and MULTIPLE=1 are also presented in the second and fourth columns, respectively. They are estimated at the mean values of the continuous variables and a single change from 0 to 1 for dummy variables. These marginal effects indicate how much the probability of having a banking relationship changes when the mean value of a control variable changes by one percent or when a dummy variable changes from 0 to 1.

There are 1663 observations used to estimate the probability of having a banking relationship model. There are 148 observations with no banking relationships so, the number of observations declines to 1515 for the estimation of single/multiple relationships. It is found that AGE, SIZE, LEVERAGE, INCENT, NONFIN, GROUP and MNC are significant factors affecting the probability of having a banking relationship. Other firm characteristics, firm performance, innovativeness of a firm, belonging to a group or a holding and state ownership of a firm, are not found to be significant factors at the 10% level. The signs of the coefficients of SIZE, LEVERAGE and AGE are compatible with the expected signs presented in the Table 2, but the sign of the coefficient of INCENT is not. It is found that an increase in size, age, leverage, debt ratio or having any kind of incentive from any governmental entity increases the probability of maintaining a banking relationship. A 1% increase in the mean value of AGE creates the largest change (4.48% increase) in the probability of having a banking relationship. Although the coefficient of ROA is not found to be significant, a 1% increase in ROA and a 1% increase in the size of a firm have almost similar effect on the probability of having a banking relationship.

The coefficients of NONFIN, GROUP and MNC are found to be negative and significant. The level of significance is 1% for GROUP and is 10% for NONFIN and MNC. As expected, the ability of obtaining funding from other external sources and belonging to a group or a holding mitigates the probability of having a banking relationship by about 4%. Interestingly, the sign of the coefficient of MNC is negative. This means that being a multinational company does not increase the probability of having a banking relationship, but reduces it. It seems that multinational firms might have alternative funding resourced rather than maintaining a relationship with a bank in Turkey. Its marginal effect (1.39%) is smaller than the marginal effects of NONFIN and GROUP (2.98% and 4.02% respectively).

Industry and year effects are included in the model and their estimated coefficients are presented in Table 9. Transportation, communication and storage industry (SEC8) and the year 2011 are selected as base industry and base year in the estimations. No significant difference is observed among industries compared to the base industry. When marginal effects of the industry coefficients are examined, it is found that in all industries, except education, health, sport and other social services sector (SEC1), the probability of having a banking relationship is more than 60% lower than in base industry. However, the equality of the coefficients of industry variables is tested and rejected at the 10% significance level. This means that although the coefficients of industry variables are not significantly different from zero, their effects are not equal.

The coefficients of the year variables indicate that in the earlier years of the sample period (2003-2005), firms have a higher probability of having a banking relationship compared 2011. However, the hypothesis about the equality of the coefficients of the year variables to zero is tested but not rejected. This indicates that there is no significant difference among the years in terms of the probability of having a banking relationship.

Table 9: Probit Estimations

	RELATION=1		MULTIPLE=1	
Parameters	Estimation (Pr > |t|)	Meff RELATION=1	Estimation (Pr > |t|)	Meff MULTIPLE=1
Intercept	3.4423 (.9783)	-	1.4491 (.0371)	-
ROA	0.4630 (.3433)	0.0280	0.2414 (.6661)	0.0187
AGE	0.7394 (.0053)	0.0448	-0.0164 (.9576)	-0.0013
SIZE	0.4594 (<.0001)	0.0278	0.4011 (.0003)	0.0310
INNOVA	0.6065 (.6348)	0.0367	0.6872 (.6246)	0.0532
LEVERAGE	0.6822 (.0037)	0.0413	0.4460 (.0663)	0.0345
NONFIN	-0.4929 (.042)	-0.0298	-0.9095 (.0003)	-0.0704
GROUP	-0.6649 (<.0001)	-0.0402	-0.4220 (.0033)	-0.0327
BMEMBER	-0.0912 (.5421)	-0.0055	-0.2738 (.0739)	-0.0212
MNC	-0.2295 (.0682)	-0.0139	-0.1142 (.3807)	-0.0088
INCENT	0.4914 (<.0001)	0.0297	0.2548 (.0244)	0.0197
STATE	-0.1223 (.7484)	-0.0074	4.3850 (.9807)	0.3532

Table 9: Probit Estimations (cont'd)

	RELATION=1		MULTIPLE=1	
Parameters	Estimation (Pr > |t|)	Meff RELATION=1	Estimation (Pr > |t|)	Meff MULTIPLE=1
SEC1	-0.4223	-0.0427	-2.6643	-0.2061
	(.9987)		(<.0001)	
SEC2	-4.5104	-0.6646	-0.2707	-0.0209
	(.9716)		(.676)	
SEC3	-3.8545	-0.6249	-0.1028	-0.0080
	(.9757)		(.826)	
SEC4	-3.7792	-0.6203	4.4050	0.3549
	(.9762)		(.9893)	
SEC5	-3.8711	-0.6259	-1.5280	-0.1182
	(.9756)		(.0133)	
SEC6	-4.4750	-0.6625	-0.8719	-0.0675
	(.9718)		(.0846)	
SEC7	-4.0351	-0.6358	-0.4146	-0.0321
	(.9746)		(.398)	
YEAR03	0.5605	0.0339	0.4405	0.0341
	(.011)		(.075)	
YEAR04	0.4577	0.0277	0.2516	0.0195
	(.0324)		(.2809)	
YEAR05	0.3490	0.0211	0.0879	0.0068
	(.0913)		(.6925)	
YEAR06	0.2040	0.0123	-0.0714	-0.0055
	(.3032)		(.7412)	
YEAR07	0.2245	0.0136	-0.0427	-0.0033
	(.2584)		(.8435)	
YEAR08	0.3133	0.0190	0.1297	0.0100
	(.1278)		(.5721)	
YEAR09	0.2531	0.0153	0.0374	0.0029
	(.2128)		(.8675)	
YEAR10	0.0322	0.0019	0.2154	0.0167
	(.87)		(.3732)	
Likelihood Ratio Test	165.94		131.34	
	(<.0001)		(<.0001)	

** Ho: SEC1=...=SEC7=0 is tested. It is rejected at 10% significance level, in the first estimation (Chi-square value=12.48) and at 1% significance level, in the second estimation (Chi-square value=12.48)

** Ho: YEAR1=…=YEAR8=0 is tested and cannot be rejected in both estimations.

P-values are reported in parenthesis.

In estimating the probability of having a single or multiple banking relationships, the firms with zero banking relationship are excluded from the sample, resulting in 1515 observations. There are 120 observations with a single banking relationship and the rest maintains multiple banking relationships. The variables SIZE, LEVERAGE, NONFIN, GROUP, BMEMBER and INCENT are found to be significant in the model for the probability of having multiple banking relationships. The coefficients of obtaining incentives from the government, firm size and leverage are positive. This indicates that as size and leverage of a firm increase or a firm obtains an incentive from the government, the probability of having multiple banking relationships increases significantly. However, the size of these increases is different. For example, while the probability of having multiple relationships is expected to increase 3% when there is a 1% increase in the mean size and leverage values, it is expected to increase about 2% when a firm obtains an incentive from the government.

Like the results of the model for having a banking relationship, the coefficients of NONFIN and GROUP are found to be negative and significant at the 1% level. These findings suggest that firms that have an ability of obtaining funds from other external sources or a group or a holding are likely to have a single banking relationship rather than multiple banking relationships. Marginal effect values in the last column shows that a 1% increase in the mean values of NONFIN decreases the probability of having more than one banking relationship by 7.04%. Similarly, the probability of having multiple banking relationships decreases by 3.27%, if a firm is a member of a group or a holding.

As in the first probit estimation, firm performance, innovativeness and state ownership in a firm are not found to be significantly affecting the probability of having multiple banking relationships. Moreover, the factors of firm age and being a multinational company surprisingly lose their significance. This indicates that while AGE and MNC affect the probability of having a banking relationship, they do not affect the probability of maintaining multiple banking relationships significantly.

Similarly, industry and year effects are included in this model and results are presented in Table 9. Controlling for firm characteristics and year effects, it is found that firms operating in sectors of education, health, sport and other social services (SEC1), mining (SEC5) and technology (SEC6) have a significantly lower probability of having multiple banking relationships, comparing to firms in the base sector (SEC8). It is expected that industries with high R&D expenditures such as technology or health will be more affected from information leakage, and therefore firms operating in these industries prefer to have a single banking relationship. My findings support this expectation. The hypothesis that the coefficients of the industry dummy variables equal to zero is rejected at the 1% significance level. So, it is found that the probability of having multiple banking relationships differs for firms operating in different industries. With respect to the year effect, I fail to reject the hypothesis of the equality of the coefficients of the year variables. The significant coefficient is found for year 2003. In 2003, the probability of having multiple banking relationships is 3.4%, which is more than the probability in 2011. This finding may be explained by the existence of size more banks in 2003 than in 2007.

There are some similarities and differences between the findings for Turkish firms and findings for other countries. For example, although profitability is found to affect the probability of having multiple banking relationships in Italy and France (Detragiache et al., 2000; Tirri, 2007; Dietsch and Golitin-Boubakari, 2002), no significant effect of profitability is found for Turkey. On the other side, the insignificant relationship between firm age and the probability of having multiple banking relationships for Turkish firms is similar to the findings of Detragiache et al. (2000), and Tirri (2007), but not to the results of Cosci and Meliciani (2002) for Italian firms. Cosci and Meliciani (2002) show that the probability of having multiple banking relationships increases as firms get older. In addition to this, the findings related to the positive effect of leverage on the probability of having multiple banking relationships for Turkish firms is compatible with the findings of Tirri (2007) for Italy; and Roberts and Siddiqi (2004) for the U.S. All these studies find that the probability of having more than two banking relationships increases with an increase in leverage. Lastly, the negative effect of the ability of Turkish firms to obtain funding from external sources other than bank loans on the probability of having multiple banking relationships is compatible with the results of Sterken and Tokutsu (2002) for Japan, but not with the results of Cosci and Meliciani(2002) for Italy. Cosci and Meliciani (2002) find that the ratio of debts other than bank loans to all debts positively affects the probability of having multiple banking relationships in Italy.

To sum up, as firm size and its leverage ratio increase, both the probabilities of having a banking relationship and maintaining multiple banking relationships are found to increase

significantly for Turkish firms. Interestingly, getting some kind of financial incentive from a government agency also increases these two probabilities. There should be some mechanism in getting incentive from a governmental entity that creates such an increase in these probabilities. For example, the government might provide these incentives through banks, such as investment and development banks. This area needs further investigation. Moreover, as firms' ability to obtain funding from external sources other than bank loans increases, both the probabilities of having a banking relationship and maintaining multiple relationships decreases, as expected. Membership to a group or a holding also has a negative effect on these probabilities. Since firms can get funding from their parent companies rather than a bank, being in a group that owns a bank creates a negative effect only on the probability of having multiple banking relationships. Although it is found that older firms are more likely to have a banking relationship but multinational firms are less likely to have a banking relationship in Turkey. Lastly, profitability and innovativeness of a firm are not found to significantly affect these two probabilities.

4.2. Results of Banking Relationship Model

In analyzing the factors affecting the number of banking relationship, 2SLS model is used and banking relationship equation is simultaneously estimated with the firm performance equation. Table 10 presents the results for the banking relationship estimations. The dependent variable in these estimations is the number of banking relationships that a firm

i has at the end of a year *t*. Each row in Table 10 shows the estimated coefficients and associated p-values for a model with one of the five banking relationship measures, i.e., the total number of banking relationships, $NUMBERB_{it}$, the number of relationships with state-owned banks, $NUMBERS_{it}$, the number of relationships with foreign banks, $NUMBERF_{it}$, the number of relationships with private domestic banks, $NUMBERP_{it}$ and the number of relationships with Islamic banks, $NUMBERI_{it}$,. For all estimations, there are 1663 observations. The model explains more than 15% of variability in the number of banking relationship.

In Table 10, the first row represents the estimations for the total number of banking relationships, NUMBERB. It is found that the coefficient of ROA is negative and significant at the 1% level. This suggests that as the profitability of a firm increases, the firm has a relationship with a smaller number of banks, controlling for other factors affecting the number of banking relationship. This finding is similar to the empirical findings of Ziane (2003), and Harhoff and Körting (1998a). Measuring firm profitability with the ratio of net income to interest payments, Harhoff and Körting (1998a) find such a negative relation between firm performance and the number of banking relationships in Germany. Measuring firm profitability with the ratio of operating profitability to turnover, Ziane (2003) finds the same result in France.

All of the firm characteristics, except INNOVA and LEVERAGE, are found to be significant, controlling for industry and year effects. And the sign of the coefficients, except the ones for INCENT and STATE, are consistent with the expectations in Table 2.

The variables AGE and SIZE are found to be positively related to NUMBERB, indicating that the number of banking relationships increases significantly as firms get older and larger. These findings are consistent with many studies that report a positive relationship between age and size of a firm and the number of banking relationships (e.g., Detragiache et al., 2000; Cosci and Meliciani, 2002; Degryse et al., 2004; Harhoff and Körting,1998a). These results support the idea that larger and older firms need more banking relationships in order to diversify their credit risks.

The coefficients of NONFIN, GROUP, BMEMBER and MNC are found to be negative and significant. These negative relationships indicate that firms belonging to a group, or being in a group that owns a bank can easily finance themselves within the group, and thus they do not require more banking relationships. The negative link between NONFIN and NUMBERB supports this view. Similarly, the number of banking relationships is found to decrease with the ability of obtaining funding from external sources other than bank loans. This result is similar to the empirical findings of Sterken and Tokutsu (2002) for listed Japanese firms. However, they are not consistent with the findings of Yu et al. (2007). They find that when accessing public debt as an external financing source, firms experience more banking relationships in Taiwan. The insignificant coefficients of INNOVA and LEVERAGE suggest that neither innovativeness nor debt level of a firm are related to the number of banking relationships in Turkey.

Table 10: Determinants of the Number of Banking Relationships

Dependent Variable	Intercept	ROA	AGE	SIZE	INNOVA	LEVERAGE	NONFIN	GROUP	BMEMBER	MNC	INCENT	STATE
NUMBERB	0.487	-23.897	1.325	3.096	-5.5037	0.330	-2.634	-0.829	-0.896	-0.509	1.057	1.442
F-Stat.: 15.33*	(.7318)	(.0033)	(.0328)	(<.0001)	(.1881)	(.6453)	(<.0001)	(.0034)	(.0056)	(.065)	(<.0001)	(.0307)
Adj R-Sq: 0.18316												
NUMBERS	0.850	2.160	-0.414	0.206	1.1368	0.671	-0.983	-0.225	0.149	-0.047	0.275	1.499
F-Stat.: 22.94*	(.007)	(.23)	(.0026)	(.0566)	(.2195)	(<.0001)	(<.0001)	(.0003)	(.0369)	(.4441)	(<.0001)	(<.0001)
Adj R-Sq: 0.25555												
NUMBERF	-0.938	-6.275	0.362	0.838	-1.5849	0.014	-0.681	0.070	-0.611	0.003	0.379	0.270
F-Stat.: 14.86*	(.0445)	(.0188)	(.076)	(<.0001)	(.2484)	(.9525)	(.0012)	(.4523)	(<.0001)	(.9704)	(<.0001)	(.2173)
Adj R-Sq: 0.17816												
NUMBERP	-0.120	-17.963	1.580	1.868	-4.8087	-0.480	-0.932	-0.529	-0.367	-0.446	0.421	-0.521
F-Stat.: 11.18*	(.8936)	(.0005)	(<.0001)	(<.0001)	(.0687)	(.2889)	(.021)	(.0031)	(.0722)	(.0105)	(.0069)	(.2165)
Adj R-Sq: 0.13737												
NUMBERI	0.983	-1.068	-0.184	0.078	0.3376	0.089	-0.031	-0.146	-0.046	-0.041	-0.016	0.219
F-Stat.: 11.08*	(<.0001)	(.2279)	(.0065)	(.1428)	(.4587)	(.255)	(.6527)	(<.0001)	(.1955)	(.1714)	(.557)	(.0027)
Adj R-Sq: 0.13625												

Table 10 (cont'd)	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5	YEAR6	YEAR7	YEAR8
	-6.317	-2.663	-0.409	-1.201	-1.963	-0.789	-2.075	0.261	0.282	-0.315	0.040	0.000	-0.081	-0.401	-0.845
	(<.0001)	(.0163)	(.5858)	(.4354)	(.231)	(.3559)	(.0284)	(.5949)	(.5537)	(.4963)	(.9314)	(.9999)	(.8662)	(.3948)	(.0711)
	-0.639	0.134	0.864	0.499	0.315	0.257	0.571	-0.574	-0.566	-0.455	-0.414	-0.424	-0.077	0.020	-0.080
	(.0225)	(.5856)	(<.0001)	(.1432)	(.3856)	(.1753)	(.0065)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(.4663)	(.8489)	(.4413)
	-0.660	-0.211	0.289	0.947	-0.314	0.014	0.188	-0.335	-0.376	-0.369	0.134	0.537	0.375	0.117	-0.113
	(.1122)	(.5625)	(.2416)	(.0612)	(.5594)	(.9609)	(.5462)	(.0375)	(.0161)	(.0156)	(.3772)	(.0007)	(.0173)	(.4489)	(.4608)
	-4.425	-2.606	-1.365	-2.514	-1.731	-0.856	-2.513	1.331	1.467	0.819	0.606	0.156	-0.092	-0.302	-0.537
	(<.0001)	(.0002)	(.004)	(.0098)	(.0946)	(.113)	(<.0001)	(<.0001)	(<.0001)	(.0052)	(.0386)	(.6091)	(.7621)	(.3095)	(.0695)
	-0.590	-0.205	-0.323	-0.592	-0.367	-0.560	-0.366	-0.396	-0.382	-0.375	-0.344	-0.308	-0.319	-0.246	-0.116
	(<.0001)	(.0892)	(<.0001)	(.0004)	(.0399)	(<.0001)	(.0004)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(.0231)

* Significant at 1% level.
P-values are reported in parenthesis.

When the number of banking relationships is redefined with respect to bank nationality, ownership structure and orientations, there are some changes in the findings. For example, it is found that although profitability decreases significantly the number of foreign bank relationships and the number of private bank relationships, it does not have any significant effect on the number of state-owned and Islamic bank relationships. These findings suggest that the negative relationship between the number of banking relationships and profitability might be driven by the negative relationship between profitability and the number of relationships with foreign and private domestic banks.

The age of a firm affects significantly the number of banking relationships of all types of banks but in a different way, as expected. The sign of its coefficient turns out to be negative in the models with state-owned and Islamic banks. This shows that as firms get older, they maintain fewer relationships with state-owned and participation banks, but more relationships with foreign and private domestic banks. The negative relationship with Islamic banks is consistent with the findings of Ongena and Şendeniz-Yüncü (2011). They also find that Islamic banks in Turkey mainly deal with young firms.

The coefficients of SIZE and NONFIN are significant in all of the banking relationship estimations, except NUMBERI, as they are in the model estimating the total number of banking relationships. The positive coefficient of the variable SIZE indicates that as the size of a firm increases, the number of all types of banking relationships increases. Furthermore, there is a negative relationship between the availability of non-bank funding and the number of banks, in all estimations. The coefficient of GROUP loses its

significance only in the model that uses NUMBERF as the dependent variable and sustains its significance in other models. This implies that membership to a group or a holding is negatively related to the number of domestic banks, while it is not related to the number of relationships with foreign banks. Interestingly, firms that are associated with a group that owns a bank have a significantly lower number of relationships with foreign or domestic banks, but have a significantly higher number of relationships with state-owned banks.

Interestingly, the coefficient of LEVERAGE is found to be significant only in the model for the number of state-owned banking relationship. This finding can be explained by the government policy of lending credits especially to leveraged firms in order to support the economy. Besides, this finding shows that if a firm is highly levered, then it might prefer to continue to borrow from their existing private and domestic banks rather than searching for new ones. The level of innovativeness of a firm is found to be negatively related to the number of private domestic banks. It is significant only at the 10% level.

The state-owned listed companies are found to have significantly more relationships with state-owned and participation banks relative to other listed firms. However, no significant coefficient of STATE is observed for other types of banking relationships. Although the positive relationship between state-owned banks and state-owned firms is expected, the positive relationship with Islamic banks might be explained by the policy of the government to increase the importance of the participation banks in the economy.

The base industry in these estimations is the sector of transportation, communication and storage (SEC8). The coefficients of industry variables should be interpreted relative to this industry. It is found that firms operating in all other industries have a relationship with a smaller number of banks than those operating in TCS. However, only sectors of education, health, sport and other social services (SEC1), and electricity, gas and water (SEC2) are found to be significantly lower. When the estimations are performed with respect to bank types, some differences among industries are found. For example, firms in the sector of education, health, sport and other social services (SEC1) have smaller number of relationships with state-owned banks, but those in the sector of manufacturing (SEC3) have a larger number of relationships with state-owned banks. Firms in other sectors have a smaller number of private domestic banking relationships, except firms in technology industry (SEC3). Moreover, firms in all sectors have a significantly lower number of relationships with participant banks, than firms in SEC8. Lastly, firms in the sector of construction and prosperity (SEC4) have a larger number of relationships with foreign banks than those in SEC8.

The base year in the model is 2011. It is found that there is no significant difference in the total number of banking relationships among years but in 2010, there is significantly lower number of relationships than in 2011. However, there are some significant differences among years when the relationship with different bank types are examined. Over the period 2003-2007, firms maintain significantly a smaller number of relationships with state-owned banks, with a significance level of 1%. Similarly, the number of relationships with Islamic banks is significantly lower in all years than in

2011. In contrast, I find that the number of relationship with private domestic banks is higher in period 2003-2006 but lower in 2010 than in 2011. The coefficient of the year 2010 is only significant at the 10% level. A more interesting result is found when having a relationship with foreign banks is examined. Firms have significantly fewer relationships with foreign banks in 2003-2005, but more in 2007 and 2008, just before the 2008 global crisis. There can be two explanations for this finding. First, it may be explained by the increase in the number of foreign banks in the later period, as Table 4 shows. Second, firms might switch from state-owned and Islamic banks to foreign banks and these switches may be the explanation for the insignificant year effects when total number of banking relationship is estimated.

In order to investigate whether there is U-shaped relationship between firm innovativeness and number of banking relationships, a new model by including the squared value of innovativeness, INNOVA2, is estimated, as in von Rheinbaben and Ruckes (2004). I also include interaction variables, GSEC1-GSEC8, between firm innovativeness and sectors instead of the industry dummy variables to examine whether the effect of innovativeness on the number of banking relationship changes by industry. Results are shown in the Appendix Table C. Since there is no change in the value or the significance level of the coefficients of other variables, only the results related with the INNOVA2 and the interaction variables are presented. The coefficient of INNOVA2 is not found to be significant, indicating that there is no significant relationship between firm innovativeness and the number of banking relationships, regardless of bank types. However, for the sector of electricity, gas and water (SEC2), a significant relationship

between INNOVA and NUMBERB is found. Moreover, the number of relationships with state-owned banks decreases with the level of innovativeness for firms operating in sectors of electricity, gas and water (SEC2), manufacturing (SEC3) and construction and prosperity (SEC4) whereas the number of relationships with private domestic banks increases as the level of innovativeness increases for firms operating in sectors of electricity, gas and water (SEC2), and manufacturing (SEC3). These findings indicate that the relationship between the level of innovativeness and the number of banking relationships changes with both bank types and industries.

In conclusion, without making any categorization between banks, I find that profitability of a firm and all other firm characteristics, except firm innovativeness and leverage, significantly affect the number of banking relationships. The significant factors affecting the number of banking relationships are found to be different according to bank types. It is found that there is a negative and significant relationship between firm profitability and the number of foreign and private domestic banks. However, no significant relationship is found between firm profitability and the number of state-owned and participation banks. These results may be explained by the similarities in the lending policies of banks.

4.3. Relationship between Firm Performance and the Number of Banks

Table 11 reports the estimated coefficients of the firm performance model simultaneously estimated with the banking relationship model 2SLS. As it is in the previous section, I

differentiate banks and analyze relationships of different types of banks with firm performances in five models. There are 1663 number of observations in each model. The adjustedR^2sshow that all of these five models explain almost one-fourth of the variation in firm profitability. F-statistics indicate that the models are significant at 1% level.

It is found that the coefficients of all of the banking relationship variables are negative and significant at the 1% level, except the coefficient of the number of relationships with Islamic banks which is significant only at the 10% level. These findings suggest that the more banking relationship a firm has, the lower will be its profitability. This negative link between the number of banking relationships and firm performance is consistent with the empirical findings of Degryse and Ongena (2001); Castelli et al. (2012);Yu et al. (2007); Montoriol-Garriga (2006). This finding can be explained with the theoretical models which argue the negative effect of the costs of having multiple banking relationships such as monitoring, screening and borrowing costs, on firm performance (Diamond, 1984; Ramakrishna and Thakor, 1984; Boyd and Prescott, 1986). Furthermore, in contrast to the study of Fok et al. (2004), no difference is observed with respect to the effect of maintaining a relationship with foreign or domestic banks. That is, profitability of a firm decreases with the number of both foreign and domestic banks. Fok et al. (2004) find that firm performance is negatively related with the number of domestic banks, but positively related with the number of foreign banks in Taiwan, considering the effect of the Asian financial crisis around 1997.The reason for this conflict might be the effect of the 2008 financial crisis. The results with the effect of the 2008 financial crisis presented in part 4.4.2 may shed more light to this issue. Another explanation is that there may be no

actual or perceived difference between the implementations of foreign and domestic banks in the Turkish market.

The coefficients of all firm characteristics, except AGE, are found to be similar regardless of the banking relationship variable used in the model. For example, the coefficient of SIZE is positive and significant at the 1% level. This shows that larger firms perform significantly better than smaller firms, controlling for their age. The coefficient of INNOVA is found to be negatively related to firm performance and its coefficient is significant at the 1% level, as it is expected. The coefficient of LEVERAGE is found to be negative and significant at the 1% level in all estimations. This result is compatible with the theoretical implications of Chang (1992)and empirical findings of Fok et al. (2004) and Yu et al. (2007). Chang (1992) argue that in the presence of agency conflict between investors and managers, leverage decreases firm profitability. Fok et al. (2004) and Yu et al. (2007)find that profitability is significantly negatively related to leverage.

Table 11: Relationship between Firm Performance and the Number of Banks
(Dependent Variable is *Firm Performance*, measured with ROA)

Dependent Variable	Intercept	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI	AGE	SIZE	INNOVA	LEVERAGE	LIQUIDITY	BMEMBER
ROA	-0.0676	-0.0083	-	-	-	-	0.0219	0.0703	-0.2195	-0.0468	0.0042	-0.0047
F-Stat.: 24.63*	(.0157)	(.0001)					(.1185)	(<.0001)	(.0108)	(<.0001)	(<.0001)	(.5212)
Adj R-Sq: 0.23823												
F-Stat.: 24.99*	-0.0720	-	-0.0231	-	-	-	0.0076	0.0649	-0.2107	-0.0502	0.0057	0.0068
Adj R-Sq: 0.24099	(.0094)		(.0005)				(.5831)	(<.0001)	(.0133)	(<.0001)	(<.0001)	(.3189)
F-Stat.: 22.86*	-0.1003	-	-	-0.0322	-	-	0.0232	0.0723	-0.1993	-0.0478	0.0043	-0.0126
Adj R-Sq: 0.22443	(.0009)			(.0002)			(.111)	(<.0001)	(.0256)	(<.0001)	(.0001)	(.1364)
F-Stat.:24.09*	-0.0617	-	-	-	-0.0159	-	0.0323	0.0680	-0.2263	-0.0535	0.0039	-0.0040
Adj R-Sq: 0.23410	(.0294)				(.0006)		(.0312)	(<.0001)	(.0093)	(<.0001)	(.001)	(.5901)
F-Stat.: 24.79*	-0.0135	-	-	-	-	-0.0568	0.0028	0.0568	-0.1986	-0.0588	0.0055	-0.0018
Adj R-Sq: 0.23947	(.739)					(.0507)	(.8498)	(<.0001)	(.0193)	(<.0001)	(<.0001)	(.8095)

Table 11 (cont'd):	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5	YEAR6	YEAR7	YEAR8
	-0.0645	-0.0832	-0.0248	-0.0960	0.0391	-0.0002	-0.0590	0.0136	0.0105	-0.0059	0.0058	0.0150	-0.0103	-0.0117	-0.0148
	(.0381)	(.0002)	(.1185)	(.0004)	(.2644)	(.9916)	(.0013)	(.2185)	(.3351)	(.5773)	(.5825)	(.1603)	(.3465)	(.2756)	(.1688)
	-0.0379	-0.0812	-0.0126	-0.1048	0.0724	0.0148	-0.0443	0.0030	-0.0019	-0.0148	-0.0023	0.0101	-0.0136	-0.0100	-0.0122
	(.1916)	(.0003)	(.4331)	(.0001)	(.0337)	(.4502)	(.0117)	(.7896)	(.8644)	(.1766)	(.8353)	(.3507)	(.2061)	(.345)	(.2477)
	-0.0327	-0.0621	-0.0087	-0.0510	0.0518	0.0048	-0.0332	0.0011	-0.0035	-0.0147	0.0103	0.0328	0.0032	-0.0043	-0.0115
	(.2784)	(.0085)	(.6081)	(.0982)	(.1488)	(.8137)	(.0743)	(.9288)	(.7636)	(.1966)	(.3532)	(.0046)	(.7872)	(.6995)	(.3019)
	-0.0773	-0.0931	-0.0369	-0.1108	0.0248	-0.0074	-0.0719	0.0299	0.0294	0.0096	0.0141	0.0155	-0.0109	-0.0125	-0.0154
	(.0218)	(<.0001)	(.0248)	(<.0001)	(.4991)	(.7181)	(.0003)	(.0141)	(.0188)	(.4064)	(.1991)	(.1484)	(.3196)	(.2483)	(.157)
	-0.0537	-0.0886	-0.0459	-0.1325	0.0335	-0.0214	-0.0661	-0.0093	-0.0132	-0.0258	-0.0137	0.0002	-0.0299	-0.0233	-0.0159
	(.1096)	(.0002)	(.0176)	(<.0001)	(.374)	(.3923)	(.002)	(.5593)	(.3939)	(.0868)	(.3495)	(.9887)	(.0326)	(.0651)	(.1479)

* Significant at 1% level.
P-values are reported in parenthesis.

Table 12: Descriptive Statistics of the Number of Cash and Non-Cash Credit Relationships

	Variables	N	Mean	Median	Std. Dev.	Minimum	Maximum
Panel A: Cash Credit Relationships							
Banking Relationship Variables	RELATION	1663	0.80	1	0.40	0	1
	MULTIPLE	1331	0.82	0	0.38	0	1
	NUMBERB	1663	3.70	3	3.55	0	17
	NUMBERP	1663	2.24	2	2.13	0	12
	NUMBERF	1663	0.70	0	1.14	0	7
	NUMBERS	1663	0.67	0	1.00	0	4
	NUMBERI	1663	0.06	0	0.37	0	4
	NUMBERT	1663	0.02	0	0.14	0	2
Panel B: Non-Cash Credit Relationships							
Banking Relationship Variables	RELATION	1663	0.87	1	0.33	0	1
	MULTIPLE	1454	0.82	0	0.38	0	1
	NUMBERB	1663	3.60	3	3.26	0	23
	NUMBERP	1663	2.37	2	2.01	0	15
	NUMBERF	1663	0.64	0	1.10	0	9
	NUMBERS	1663	0.41	0	0.72	0	4
	NUMBERI	1663	0.10	0	0.40	0	4
	NUMBERT	1663	0.08	0	0.28	0	2

The mean values of the variable RELATION in Panel A and B indicates that 80% of the observations have a relationship with a bank for cash credits, whereas 87% of these have a relationship with a bank for non-cash credits. This means that some firms maintain at least one banking relationship for non-cash credits even though they do not have any cash credit relationship. Similarly, the mean values of the variable MULTIPLE indicates that a larger number of firms have multiple banking relationships for non-cash credits. However, on average, firms have more banking relationships for cash credits (3.70) than for non-cash credits (3.60) even though there is a greater variation in the total number of

banking relationships for non-cash credits. Firms have a maximum of 23 number of banking relationships for non-cash credits while 17 number of banking relationships for cash credits. When banks are categorized according to their nationality, ownership structure and orientation, the order of preference does not change for credit types, comparing to the order that Table 3 presents for all credit relationships. The most preferable bank types are the private domestic banks with the median number of 2.24 for cash-credits and 2.37 for non-cash credits.

Table 13 presents the results of the banking relationship equations. Panel A shows the results for the cash credit relationships and Panel B shows the estimation of a non-cash credit relationship. F-statistics of all models are significant at the 1% level. The adjusted R^2s in Panel A are higher than the ones in Panel B, indicating that the model explains the variability in the number of cash relationships more than the variability in a non-cash relationship.

The variables SIZE, LEVERAGE, BMEMBER and INCENT are found to affect both the total number of cash and non-cash credit relationships in a similar way. It is also found that an increase in profitability reduces the number of both cash and non-cash credit relationships significantly. However, the variables NONFIN, GROUP and MNC are found to be significantly and negatively associated with only the number of cash credit relationships whereas AGE and STATE are significant and positive only for the number of non-cash credit relationships. Furthermore, the coefficient of firm innovativeness is found to be significant in only the cash credit relationship estimation model. Significant

and positive relationship between firm innovativeness and the number of cash credits is compatible with the general expectation that when a firm is growing and has more R&D expenditures, then it has generally have more number of cash credit relationships but not non-cash credit relationships.

Table 13: Determinants of the Number of Banking Relationships for Different Credit Types

Panel A: Cash	Intercept	ROA	AGE	SIZE	INNOVA	LEVERAGE	NONFIN	GROUP	BMEMBER	MNC	INCENT	STATE	Fixed Effect	Year Effect
NUMBERB	5.343	-12.153	0.514	1.040	5.296	0.557	-4.181	-0.658	-0.432	-0.404	0.788	-0.226	Yes	Yes
F-Stat.: 16.18*	(<.0001)	(.0512)	(.2799)	(.0054)	(.0987)	(.3104)	(<.0001)	(.0025)	(.0815)	(.0562)	(<.0001)	(.6586)		
Adj R-Sq: 0.19191														
NUMBERS	1.546	2.429	-0.345	0.001	2.507	0.572	-1.126	-0.188	0.181	0.003	0.218	0.327	Yes	Yes
F-Stat.: 15.96*	(<.0001)	(.1529)	(.0079)	(.9898)	(.0042)	(.0001)	(<.0001)	(.0015)	(.0076)	(.9645)	(<.0001)	(.019)		
Adj R-Sq: 0.18968														
NUMBERF	0.434	-2.478	0.352	0.247	0.772	0.115	-1.053	-0.078	-0.332	-0.006	0.304	-0.185	Yes	Yes
F-Stat.: 12.31*	(.2134)	(.2134)	(.0206)	(.0391)	(.4514)	(.5135)	(<.0001)	(.2611)	(<.0001)	(.9345)	(<.0001)	(.2566)		
Adj R-Sq: 0.15031														
NUMBERP	2.481	-11.949	0.792	0.789	1.565	-0.195	-1.851	-0.296	-0.247	-0.383	0.263	-0.517	Yes	Yes
F-Stat.: 10.91*	(.0006)	(.0037)	(.0118)	(.0014)	(.46)	(.591)	(<.0001)	(.0387)	(.132)	(.0061)	(.0355)	(.1261)		
Adj R-Sq: 0.13426														
NUMBERI	0.753	-0.328	-0.207	0.006	0.342	0.055	-0.094	-0.102	0.003	-0.018	0.008	0.154	Yes	Yes
F-Stat.: 8.99*	(<.0001)	(.6187)	(<.0001)	(.8799)	(.3134)	(.3481)	(.0696)	(<.0001)	(.9138)	(.4199)	(.7049)	(.0044)		
Adj R-Sq: 0.11110														
Panel B: Non-cash														
NUMBERB	-3.414	-13.709	1.177	2.258	-5.035	0.574	0.502	-0.108	-0.477	-0.270	0.822	1.350	Yes	Yes
F-Stat.: 12.74*	(.0013)	(.0233)	(.0108)	(<.0001)	(.1054)	(.2816)	(.2905)	(.6069)	(.0472)	(.1879)	(<.0001)	(.0065)		
Adj R-Sq: 0.15520														
NUMBERS	0.162	1.442	-0.258	0.059	-0.647	0.399	-0.083	-0.032	0.063	-0.010	0.182	0.766	Yes	Yes
F-Stat.: 9.64*	(.4653)	(.2564)	(.0078)	(.4386)	(.3228)	(.0004)	(.4053)	(.4641)	(.2137)	(.8229)	(<.0001)	(<.0001)		
Adj R-Sq: 0.11908														
NUMBERF	-1.267	-3.568	0.030	0.596	-1.120	0.118	0.182	0.175	-0.408	0.006	0.221	0.408	Yes	Yes
F-Stat.: 13.31*	(.0002)	(.0699)	(.8401)	(<.0001)	(.2687)	(.4961)	(.2399)	(.0107)	(<.0001)	(.9255)	(.0002)	(.0117)		
Adj R-Sq: 0.16149														
NUMBERP	-2.630	-10.552	1.553	1.482	-3.030	-0.150	0.336	-0.188	-0.092	-0.269	0.428	-0.037	Yes	Yes
F-Stat.: 12.26*	(<.0001)	(.0062)	(<.0001)	(<.0001)	(.1267)	(.6594)	(.2678)	(.1615)	(.5476)	(.0397)	(.0003)	(.907)		
Adj R-Sq: 0.14977														
NUMBERI	0.629	-0.372	-0.145	0.043	0.286	0.150	0.000	-0.067	-0.058	-0.035	-0.016	0.209	Yes	Yes
F-Stat.: 8.75*	(<.0001)	(.5949)	(.0067)	(.3069)	(.4275)	(.0154)	(.9958)	(.0059)	(.0373)	(.1445)	(.4538)	(.0003)		
Adj R-Sq: 0.10815														

* Significant at 1% level.
P-values are reported in parenthesis.

When the number of banking relationships is measured with respect to different bank types, I find that the differences and similarities between the determinants of credit types vary. For example, an increase in profitability of a firm decreases the number of cash credit relationships with private banks and the number of non-cash credits with both private domestic and foreign banks. However, firm profitability does not affect the number of relationships with other banks. The negative relationship between firm profitability and the number of relationship with foreign banks for non-cash credits may be driven by the commercial letter of credits obtained from foreign countries. Exporters in foreign countries generally request commercial letter of credits obtained from international banks in order protect themselves against the financial risk of the importers in host countries. Moreover, if an exporter in a foreign country believes that profitability of the importer is low and importer has difficulty in repayment, it might request commercial letter of credits obtained from banks established in their countries. Therefore, the negative relationship between firm performance and the number of relationships with foreign banks for non-cash credits might be explained by the commercial letter of credits obtained from foreign banks.

Multinational firms are found to be negatively related to the number of only private domestic banks for both credit types. Although the numbers of cash credit relationships with state-owned, private domestic and participation banks are significantly lower for firms belonging to a group or a holding, these firms have a significantly higher number of relationships with foreign banks for non-cash credits, but not for cash credits. Moreover, the number of cash credit relationship significantly decreases with an increase in

obtaining funding from external sources other than bank loans, for all bank types. As expected, this variable does not have any significant effect on the number of non-cash credits for all bank types.

These findings are slightly different from the previous evidences in the literature. Ongena and Smith (2000b) also examine different banking services, such as liquidity, lending, cash management or investment related services, in their cross-country study but do not report any difference between lending and non-lending relationships. Unlike them, this study suggests that the factors affecting the cash and non-cash credit relationships are slightly different for Turkish firms. Therefore, if a study from other countries combines various banking services under one title to examine the determinants of the number of banking relationships, it can be suitable to check whether findings still hold for different types of banking services. Different results may be obtained if various banking services are combined and the number of banking relationships is examined.

Second, I re-estimate firm performance equations to investigate possible changes in the relationship between firm performance and the number of cash and non-cash credits. Results are presented in Table 14.Panels A and B show results from the estimation of cash credits and non-cash credits, respectively. All F-statistics are significant at the 1% level. Without categorizing banks, I find that there is not any change in the negative link between firm performance and the number of cash and non-cash credits. Firm performance decreases as the number of banking relationships increases regardless of having cash or non-cash relationships.

When the banking relationship variables are measured according to different bank types, I find that the association between firm performance and non-cash credit relationship disappears for only Islamic banks. For other types of banks, there is still a negative relationship between firm performance and the number of both cash and non-cash credits. However, coefficients of the non-cash credit relationships are less significant than the ones of the cash credit relationships, even though the estimated coefficients are similar. This indicates that even if firm performance decreases in number of non-cash credits relationships, their significance are less than ones in case of cash credit relationships.

Other firm characteristics are found to affect profitability in similar ways, when the numbers of cash and non-cash credit relationships are included in the model.

Table 14: Relationship between Firm Performance and the Number of Banks for Different Credit Types

Panel A: Cash	Intercept	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI	AGE	SIZE	INNOVA	LEVERAGE	LIQUIDITY	BMEMBER	Fixed Effect	Year Effect
ROA	-0.0453	-0.0078	-	-	-	-	0.0151	0.0576	-0.1491	-0.0499	0.0048	0.0020	Yes	Yes
F-Stat.: 25.67*	(.1084)	(.0002)					(.2645)	(<.0001)	(.0807)	(<.0001)	(<.0001)	(.7673)		
Adj R-Sq: 0.24619														
ROA	-0.0497	-	-0.0376	-	-	-	0.0024	0.0609	-0.1471	-0.0426	0.0057	0.0132	Yes	Yes
F-Stat.: 23.63*	(.0875)		(.0001)				(.8656)	(<.0001)	(.0987)	(.0002)	(<.0001)	(.0713)		
Adj R-Sq: 0.23054														
ROA	-0.0738	-	-	-0.0303	-	-	0.0222	0.0584	-0.1609	-0.0517	0.0049	-0.0025	Yes	Yes
F-Stat.: 24.70*	(.0082)			(.0002)			(.1119)	(<.0001)	(.0629)	(<.0001)	(<.0001)	(.7292)		
Adj R-Sq: 0.23878														
ROA	-0.0419	-	-	-	-0.0142	-	0.0205	0.0561	-0.1483	-0.0538	0.0044	0.0009	Yes	Yes
F-Stat.: 25.49*	(.145)				(.0009)		(.1353)	(<.0001)	(.084)	(<.0001)	(<.0001)	(.8993)		
Adj R-Sq: 0.24481														
ROA	0.0077	-	-	-	-	-0.1132	-0.0095	0.0545	-0.1933	-0.0571	0.0054	0.0008	Yes	Yes
F-Stat.: 22.52*	(.8527)					(.0084)	(.5723)	(<.0001)	(.0306)	(<.0001)	(<.0001)	(.9108)		
Adj R-Sq: 0.22168														
Panel B: Non-cash														
ROA	-0.0918	-0.0108	-	-	-	-	0.0252	0.0730	-0.2230	-0.0525	0.0050	-0.0023	Yes	Yes
F-Stat.: 23.87*	(.0017)	(.0092)					(.0849)	(<.0001)	(.0104)	(<.0001)	(<.0001)	(.7578)		
Adj R-Sq: 0.23237														
ROA	-0.0708	-	-0.0359	-	-	-	0.0076	0.0626	-0.2451	-0.0558	0.0061	0.0061	Yes	Yes
F-Stat.: 24.29*	(.0113)		(.0176)				(.5878)	(<.0001)	(.0051)	(<.0001)	(<.0001)	(.3738)		
Adj R-Sq: 0.23564														
ROA	-0.0985	-	-	-0.0330	-	-	0.0146	0.0704	-0.1988	-0.0566	0.0053	-0.0079	Yes	Yes
F-Stat.: 23.68*	(.0016)			(.0381)			(.2962)	(<.0001)	(.0222)	(<.0001)	(<.0001)	(.3946)		
Adj R-Sq: 0.23089														
ROA	-0.1026	-	-	-	-0.0208	-	0.0417	0.0741	-0.2141	-0.0578	0.0046	0.0002	Yes	Yes
F-Stat.: 23.16*	(.0011)				(.0127)		(.0213)	(<.0001)	(.0151)	(<.0001)	(<.0001)	(.9815)		
Adj R-Sq: 0.22683														
ROA	-0.0351	-	-	-	-	-0.0563	0.0058	0.0573	-0.1983	-0.0584	0.0058	-0.0010	Yes	Yes
F-Stat.: 25.19	(.3735)					(.2045)	(.6953)	(<.0001)	(.0184)	(<.0001)	(<.0001)	(.9036)		
Adj R-Sq: 0.24257														

* Significant at 1% level.
P-values are reported in parenthesis.

4.3.1. Effects of the 2008 Global Financial Crisis

In order to investigate whether the 2008 global financial crisis affected the relationship between profitability and the number of banking relationships, I divide the whole sample period into two sub-periods. The global crisis is assumed to affect the Turkish economic and financial systems in 2008 and 2009, following the studies by Claessens et al. (2010), and Alp and Elekdağ (2011). Based on this assumption, I create the dummy variable, CRISIS, which equals to one for the crisis years2008 and 2009, and zero for all the other years in the sample period. Furthermore, I do not control year effect, since banking relationship models are estimated by the dummy variable CRISIS and no significant differences is found among years. Results from this estimation are presented in Table 15. Although the number of observations is smaller in crisis times, the adjusted R^2sarehigher than the one for the non-crisis periods, except the estimation for the number of relationships with state-owned banks.

When the model for the total number of banking relationships is examined, firm size, obtaining funding from external sources other than bank loans, and incentives from the government are found to be significantly related to the total number of banking relationships in both crisis and non-crisis periods. AGE, LEVERAGE and BMEMBER are found to be significantly related to the number of banks only during the crisis period whereas the variables ROA, GROUP and STATE are significantly related to the number of banking relationships in non-crisis period.

Without separating sample period, no significant relationship is found between belonging to a group that owns a bank and the total number of banking relationships. However, when sample period is divided as crisis and non-crisis years, it is found a significant and negative relationship between belonging to a group that owns a bank and the total number of banking relationships in only crisis years. This might indicate that since a firm belonging to a group that owns a bank can more easily find funding from that bank rather than other banks in crisis years, the number of banking relationships decreases for this firm in crisis years. This finding may be interpreted as an evidence for the argument of "related lending" in crisis years in Turkey.

When the number of banking relationships by bank types is examined, I find that with a few exceptions, firm characteristics generally lose their significance in crisis periods, but the characteristics that lose significance vary across bank types. Firm profitability is found to be negatively related only to the number of private domestic banks in non-crisis years. There is no significant relationship between firm profitability and the number of relationships with other bank types. These results indicate that the negative relationship between firm performance and the total number of banks in non-crisis years is driven by just the negative relationship between firm profitability and the number of private domestic banks.

Table 15: Determinants of Banking Relationships for Crisis and Non-Crisis Years

	NUMBERB		NUMBERS		NUMBERF		NUMBERP		NUMBERI	
	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1
Intercept	0.5249	-0.3043	0.2608	0.1536	-0.8179	-2.3441	0.7977	1.1724	0.3819	1.0231
	(.754)	(.8977)	(.4388)	(.8365)	(.0862)	(.0143)	(.4959)	(.3429)	(.0269)	(.0007)
ROA	-30.4880	-2.5287	1.2228	7.7686	-4.9759	-2.5926	-24.5547	-6.1888	-0.8240	-1.0143
	(.0056)	(.8684)	(.5805)	(.1062)	(.112)	(.673)	(.0014)	(.4372)	(.4669)	(.5981)
LOGAGE	0.9896	2.2802	-0.3690	0.0230	0.1853	1.3500	1.3104	1.1689	-0.0651	-0.3171
	(.1831)	(.0639)	(.0137)	(.9526)	(.381)	(.0066)	(.0118)	(.0687)	(.3948)	(.0411)
SIZE	3.4064	1.5416	0.3591	-0.0547	0.8716	0.5290	1.9425	0.9055	0.1321	0.0958
	(<.0001)	(.0745)	(.0045)	(.8402)	(<.0001)	(.1281)	(<.0001)	(.0448)	(.041)	(.3787)
INNOVA	-4.0447	-3.4478	1.8796	1.8725	0.0459	-2.2827	-6.0384	-2.4576	0.8020	-0.0055
	(.4616)	(.649)	(.0892)	(.4319)	(.9766)	(.4541)	(.1163)	(.5341)	(.1564)	(.9954)
LEVERAGE	-0.2288	4.2918	0.6509	1.2988	0.0283	1.3184	-1.0099	1.4635	0.1138	0.1805
	(.7901)	(.0672)	(.0002)	(.0781)	(.908)	(.1619)	(.0931)	(.2309)	(.1986)	(.5405)
NONFIN	-2.6491	-2.6766	-0.9518	-1.5737	-0.7754	-0.6252	-0.8447	-0.5351	-0.0793	0.0052
	(.0005)	(.0664)	(<.0001)	(.0006)	(.0003)	(.2859)	(.1121)	(.4809)	(.3105)	(.9775)
GROUP	-0.9182	-0.3121	-0.2617	-0.2545	-0.0141	0.3668	-0.4711	-0.3334	-0.1786	-0.1259
	(.0084)	(.5753)	(.0002)	(.1469)	(.8871)	(.1024)	(.0531)	(.2518)	(<.0001)	(.0736)
BMEMBER	-0.4657	-1.9144	0.0744	0.0283	-0.6327	-1.0898	0.1499	-0.6481	-0.0955	-0.1510
	(.2335)	(.0043)	(.3441)	(.8923)	(<.0001)	(<.0001)	(.5835)	(.0627)	(.0178)	(.0726)
MNC	-0.4821	-0.2812	-0.0815	0.1244	0.0879	-0.1110	-0.4617	-0.2969	-0.0496	-0.0191
	(.1494)	(.6167)	(.2253)	(.4813)	(.3554)	(.6235)	(.0484)	(.3115)	(.1494)	(.7874)
INCENT	0.7481	1.8618	0.1851	0.4045	0.2579	0.8018	0.3559	0.6433	-0.0377	-0.0256
	(.0204)	(<.0001)	(.0044)	(.0044)	(.005)	(<.0001)	(.1145)	(.0062)	(.2565)	(.6507)
STATE	1.8337	0.9338	1.3932	1.5479	0.2836	0.0059	-0.0661	-0.6034	0.2073	-0.0306
	(.0215)	(.478)	(<.0001)	(.0002)	(.2109)	(.9911)	(.9056)	(.3797)	(.0116)	(.8536)
Ind. Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat.	14.13*	7.82*	23.03*	5.07*	13.37*	6.24*	6.98*	5.84*	7.83*	2.74*
Adj R-Sq	0.153	0.256	0.233	0.171	0.146	0.209	0.076	0.197	0.081	0.081
# of obs.	1306	357	1306	357	1306	357	1306	357	1306	357

* Significant at 1% level.
P-values are reported in parenthesis.

While firm age is not related to the number of foreign and Islamic banks during the non-crisis times, it is found to be significantly related to the number of these banks during the crisis times but in opposite directions. Older firms have significantly more number of relationships with foreign banks whereas younger firms have significantly more number of relationships with Islamic banks during the crisis periods. On the other hand, the reverse relationship is observed with state-owned banks. Firm age is found to be negatively and significantly related to the number of state-owned banks during the non-crisis times whereas it is not during the crisis times. Moreover, the number of private domestic banks increases in firm age for both sub-periods.

Interestingly, in contrast to the expectation, the number of relationships with state-owned banks increases significantly with firm leverage in both sub-periods. However, there is no such relationship with other bank types. This result indicates that Turkish firms with higher leverage ratios maintain more relationships with state-owned banks, but not with other bank types, in the both periods. This finding might be explained with the differences in management policies of different banks. State-owned banks may continue to provide credits but other banks might reduce their relationship during crisis years. These results show that the 2008 financial crisis creates differences in the determinants of the number of banking relationships, and these differences also vary across different bank types.

I re-investigate the firm performance equations in order to examine whether there is any difference in the relationship between firm performance and the number of banks in times

of crisis. Results are presented in Table 16.Although the number of observations is smaller in the crisis period, the adjusted R^2s are higher. This indicates that the model explains the variability in firm profitability in the crisis period more than in the non-crisis period. Table 16 shows that the significant negative relationship between firm performance and the number of banking relationships disappears in the time of the 2008 global crisis. This finding is observed for all bank types, except Islamic banks. The relationship between firm performance and the number of relationships with Islamic banks is not found to be significant in neither crisis nor non-crisis periods. These results indicate that in the time of the 2008 global financial crisis, performances of Turkish firms does not significantly change with the number of banking relationships, but with other variables such as firm size or leverage. This result may be explained by the switches occurred from private banks to foreign and state-owned banks during the crisis years. By switching from private banks to foreign and state-owned banks during crisis years, firms might prevent the negative effect of having relationships with private banks on firm performance which is found as an empirical result only in non-crisis years. In this context, Turkish firms differ from Taiwanese firms. Distinguishing domestic and foreign banking relationships, Fok et al. (2004) find that performances of Taiwanese firms are negatively related with the number of domestic banking relationships only in times of the Asian financial crisis, but positively related with the number of foreign banking relationships in pre- and post-crisis periods.

The other factors, firm size, leverage and liquidity, are found to be significantly related to the performance of a firm in both crisis and non-crisis periods, regardless of the number of banking relationship controlled in the model.

Table 16: Relationship between Firm Performance and the Number of Banks for Crisis and Non-Crisis Years (Dependent Variable is Firm Performance, measured with ROA)

	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1	CRISIS=0	CRISIS=1
Intercept	-0.0624	-0.0183	-0.0799	-0.0292	-0.1077	-0.0049	-0.0374	-0.0058	-0.0562	0.1328
	(.0331)	(.7267)	(.0062)	(.5858)	(.0013)	(.9323)	(.2309)	(.9135)	(.0621)	(.2835)
NUMBERB	-0.0082	-0.0030	-	-	-	-	-	-	-	-
	(.0007)	(.4851)								
NUMBERS	-	-	-0.0220	-0.0154	-	-	-	-	-	-
			(.0058)	(.1885)						
NUMBERF	-	-	-	-	-0.0392	0.0030	-	-	-	-
					(.0006)	(.7862)				
NUMBERP	-	-	-	-	-	-	-0.0162	-0.0075	-	-
							(.0012)	(.5393)		
NUMBERI	-	-	-	-	-	-	-	-	-0.0366	-0.1457
									(.2162)	(.165)
AGE	0.0181	0.0057	0.0074	0.0016	0.0192	-0.0046	0.0273	0.0069	0.0102	-0.0457
	(.247)	(.8451)	(.6353)	(.9533)	(.2537)	(.8821)	(.0975)	(.8219)	(.5047)	(.3423)
SIZE	0.0681	0.0583	0.0640	0.0608	0.0781	0.0525	0.0628	0.0577	0.0570	0.0582
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
GROWTHOPP	-0.1835	-0.2765	-0.1636	-0.2845	-0.1391	-0.2752	-0.2100	-0.2741	-0.1588	-0.2652
	(.0968)	(.0267)	(.1345)	(.0239)	(.2424)	(.0258)	(.0632)	(.0295)	(.1387)	(.0972)
LEVERAGE	-0.0440	-0.1085	-0.0447	-0.1104	-0.0414	-0.1334	-0.0514	-0.1076	-0.0554	-0.0826
	(<.0001)	(.0028)	(<.0001)	(<.0001)	(.0006)	(<.0001)	(<.0001)	(.0077)	(<.0001)	(.0656)
LIQUIDITY	0.0035	0.0061	0.0050	0.0067	0.0038	0.0065	0.0029	0.0060	0.0051	0.0054
	(.0045)	(.0037)	(<.0001)	(.0015)	(.0034)	(.0018)	(.0371)	(.0075)	(<.0001)	(.0496)
BMEMBER	0.0008	-0.0027	0.0083	0.0037	-0.0148	0.0052	0.0053	-0.0027	0.0018	-0.0266
	(.922)	(.8627)	(.2645)	(.793)	(.1582)	(.7604)	(.4918)	(.8688)	(.8424)	(.3338)
Ind. Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat.	27.38*	12.77*	27.63*	12.67*	23.83*	13.01*	26.42*	12.53*	28.40*	7.87*
Adj R-Sq	0.221	0.316	0.222	0.315	0.197	0.321	0.214	0.312	0.227	0.213
# of obs.	1306	357	1306	357	1306	357	1306	357	1306	357

* Significant at 1% level.
P-values are reported in parenthesis.

4.3.2. Size Effect

In the literature, many theoretical models that explain the optimum number of banking relationships are valid for small-sized firms rather than large-sized firms mainly for two reasons. First, since raising funds by issuing stocks or bonds is too costly and more difficult for small- and medium-sized firms, these firms rely more on bank loans than large-sized firms. Second, small-sized firms generally consist of newly established or young firms which do not have enough credit history. Thus, these firms are more likely to suffer from asymmetric information problems which can be solved through close banking relationships. The first reasoning is not valid for our sample since all firms in the sample are listed in the BIST. In addition to theoretical predictions, many empirical studies also find that the relationship between firms and banks differ according to firm size in various countries. I also find that there is a positive and significant relationship between the number of banking relationships and size of a firm. As size increases, the number of banking relationships increases controlling for other firm characteristics. This is also observed in other countries. For instance, Cesarini (1994) find that small-sized firms maintain on average two number of banking relationships, whereas large-sized firms maintain on average 33 number of banking relationships in Italy. In order to examine whether results change by firm size in Turkey, I divide the whole sample into two, as small- and large-sized ones using the dummy variable, DSIZE, for every year. The dummy variable DSIZE equals to one if firm size is larger than the median size value measured with market value, and to zero, otherwise.

Table 17: The Mean Values of the Banking Relationship Variables for Small- and Large-Sized Firms

DSIZE	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI	N
0	4.98	0.73	0.93	3.10	0.14	830
1	6.23	1.03	1.28	3.68	0.12	833

DSIZE=1: firms whose size is greater than the median of size value, DSIZE=0: otherwise

Table 17 shows how the mean values of the numbers of banking relationships change for different firm sizes. Results indicate that on average, larger firms maintain more banking relationships for all bank types, except Islamic banks.

Table 18 presents the estimation results of the banking relationship models for small- and large-sized firms. For the total number of banking relationships, the significant factors in determining the number of banking relationships, except SIZE, are found to be totally different for small- and large-sized firms. Interestingly, the negative association between firm profitability and the number of banks becomes insignificant for both types of firms. As size of a firm increases, the total number of banking relationships also increases significantly for both small- and large-sized firms. Age of a firms and obtaining funding from external sources other than bank loans are found to be significantly related to the total number of banking relationships for only smaller firms. The variables, INNOVA, LEVERAGE, BMEMBER, INCENT and STATE, are found to be significantly related to the total number of banking relationships, for only large-sized firms.

Table 18: Determinants of the Number of Banking Relationships for Small- and Large-Sized Firms

	NUMBERB		NUMBERS		NUMBERF		NUMBERP		NUMBERI	
	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1
Intercept	-7.9673	-4.7440	0.1066	0.0457	-2.0903	-2.4290	-6.8869	-2.4394	1.4666	0.1925
	(.3869)	(.0112)	(.9414)	(.9245)	(.3641)	(.0004)	(.281)	(.0193)	(.0657)	(.3844)
ROA	-45.1766	-1.4950	-1.3618	2.5560	-8.3525	-1.0177	-32.6949	-2.9654	-1.7188	-0.1623
	(.2372)	(.8151)	(.821)	(.122)	(.3822)	(.6619)	(.2175)	(.4056)	(.603)	(.8305)
AGE	4.0353	-0.1521	-0.1173	-0.5970	1.2907	-0.2015	2.8885	0.9024	-0.2407	-0.0570
	(.0079)	(.8333)	(.6232)	(.0014)	(.0007)	(.4437)	(.0061)	(.0254)	(.0665)	(.5064)
SIZE	7.3084	1.9531	0.7756	0.1586	1.3421	0.6228	4.7853	1.0919	0.2550	0.0112
	(.0707)	(<.0001)	(.2233)	(.1364)	(.1843)	(<.0001)	(.088)	(<.0001)	(.4657)	(.8194)
INNOVA	-3.2860	-22.4876	1.0667	-10.1515	-0.6646	-8.1421	-3.7106	-3.7089	0.4087	-2.1217
	(.6077)	(.1399)	(.2903)	(.01)	(.678)	(.1421)	(.4034)	(.6623)	(.4604)	(.2402)
LEVERAGE	-1.0055	8.1790	0.5050	1.4794	-0.3443	2.0994	-1.2271	3.9623	0.0530	0.5103
	(.4653)	(<.0001)	(.0201)	(.0002)	(.3176)	(.0001)	(.1991)	(<.0001)	(.6562)	(.0046)
NONFIN	-3.0853	-0.8926	-1.0143	-0.5712	-0.9325	-0.2042	-1.0384	-0.2322	-0.0787	0.1340
	(.0697)	(.216)	(.0002)	(.0022)	(.0285)	(.4368)	(.3785)	(.5638)	(.5925)	(.1173)
GROUP	-2.5782	1.4861	-0.4010	0.0344	-0.4094	0.8455	-1.5055	0.5495	-0.2285	0.0234
	(<.0001)	(.0005)	(<.0001)	(.7535)	(.0028)	(<.0001)	(<.0001)	(.0205)	(<.0001)	(.6425)
BMEMBER	0.5812	-1.9774	0.4851	0.0167	-0.2934	-0.9724	0.3125	-0.8637	0.0752	-0.1161
	(.6335)	(<.0001)	(.0117)	(.8545)	(.3359)	(<.0001)	(.7117)	(<.0001)	(.4758)	(.0056)
MNC	-0.1147	0.4971	-0.2222	0.0922	-0.0382	0.3614	0.1151	-0.0316	-0.0271	0.0096
	(.9079)	(.1492)	(.1548)	(.3005)	(.8776)	(.004)	(.8669)	(.8694)	(.7517)	(.8143)
INCENT	0.4615	1.3883	0.2844	0.2452	0.1195	0.6088	0.0950	0.5432	-0.0103	-0.0285
	(.506)	(<.0001)	(.0094)	(.0009)	(.4912)	(<.0001)	(.8436)	(.0006)	(.8632)	(.3974)
STATE	-0.7886	3.7423	0.9591	1.8616	-0.0087	0.9076	-1.4959	0.4886	-0.0694	0.4931
	(.7242)	(<.0001)	(.0066)	(<.0001)	(.9875)	(.0006)	(.3346)	(.2287)	(.7195)	(<.0001)
Ind. Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat.	4.84*	14.41*	11.70*	13.25*	5.79*	14.25*	3.21*	13.30*	6.63*	7.57*
Adj R-Sq	0.107	0.295	0.251	0.277	0.131	0.293	0.065	0.278	0.150	0.170
# of obs.	830	833	830	833	830	833	830	833	830	833

* Significant at 1% level. P-values are reported in parenthesis.

Although GROUP is found to be significantly related to the number of banking relationships for both small- and large-sized companies, the signs of the coefficients of GROUP are surprisingly opposite of each other: if a firm is small and belongs to a group, then it has a lower number of banking relationships whereas if a firm is large and belongs to a group or a holding, then it has higher number of banking relationships. However, the negative relationship between the number of banks and belonging to a group that owns a bank is found for large-sized firms. This finding indicates that large-sized firms obtain funding from their group banks rather than other banks and other firms in the group.

After categorizing the number of banking relationships by bank types, it is found that the significant factors explaining the number of banking relationships of small and large firms change according to bank types. LEVERAGE, NONFIN, INCENT and STATE are found to be the significant factors affecting the number of state-owned banks regardless the size of the firms. On the other hand, small-sized firms that belong to a group have lower number of relationships with state-owned banks whereas these small-sized firms belonging to a group that owns a bank have higher number of relationships with state-owned banks. The determinants of the number of relationships with foreign, private domestic and Islamic banks are found to be generally different for small and large firms. The coefficient of GROUP variable is found to the interesting. Results indicate that the number of relationships with foreign and private domestic banks is significantly lower for small-sized firms belonging to a group or a holding but the number of relationships with foreign and private domestic banks is significantly higher for large-sized firms belonging to a group or a holding. Similar contradicting results are found in the relationships

between firm leverage and the number of relationships with foreign and private domestic banks for small- and large-sized firms. Although it is found that as leverage ratio of a large-sized firm increases, the numbers of relationships with private domestic and foreign banks also increase significantly, the relationships between firm leverage and the number of relationships with foreign and private domestic banks for small-sized firms is not significant. These findings support the theoretical implications that the factors affecting the number of banking relationships can be different for firms with different sizes.

The negative and significant relationship between firm profitability and the number of relationships with foreign and private domestic banks presented in Table 10 become insignificant when firms are categorized by firm size. However, in general, the coefficient of firm profitability is found to be negative for both small and large-sized firms.

When the estimations of firm performance are examined (Table 19), all coefficients of the banking relationship variables are found to be negative and significant in explaining firm profitability for small-sized firms, but not for the large-sized firms. It suggests that the negative relationships between firm profitability and the number of different bank types presented in Table 11 are driven by only small-sized firms. This finding is compatible with the results of many theoretical models that argue the differences in the financial structures of small- and large-sized firms. Comparing large-sized firms, small-sized firms obtain funding by mainly using bank loans and thereby banking relationship

variables are found to be significantly affecting firm profitability for only small-sized firms.

Table 19: Relationship Between the Number of Banks and Performances of Small- and Large-Size Firms (Dependent Variable is Firm Performance, measured with ROA)

	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1	DSIZE=0	DSIZE=1
Intercept	-0.1871	0.0366	-0.1983	0.0409	-0.2148	0.0325	-0.1892	0.0484	-0.1440	0.0418
	(.0004)	(.3232)	(.0002)	(.2455)	(.0001)	(.384)	(.0004)	(.2244)	(.1115)	(.241)
NUMBERB	-0.0053	-0.0013	-	-	-	-	-	-	-	-
	(.0212)	(.6537)								
NUMBERS	-	-	-0.0271	-0.0030	-	-	-	-	-	-
			(.0066)	(.6608)						
NUMBERF	-	-	-	-	-0.0281	-0.0053	-	-	-	-
					(.0097)	(.4631)				
NUMBERP	-	-	-	-	-	-	-0.0093	0.0029	-	-
							(.0401)	(.7399)		
NUMBERI	-	-	-	-	-	-	-	-	-0.0260	0.0005
									(.4845)	(.9837)
AGE	0.0317	-0.0164	0.0158	-0.0179	0.0475	-0.0173	0.0345	-0.0189	0.0095	-0.0163
	(.1651)	(.2732)	(.4766)	(.2438)	(.0639)	(.2486)	(.142)	(.2581)	(.7025)	(.273)
SIZE	0.1109	0.0493	0.1149	0.0480	0.1116	0.0496	0.1099	0.0439	0.1004	0.0466
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
INNOVA	-0.1512	0.1358	-0.1273	0.1287	-0.1488	0.1297	-0.1589	0.1547	-0.1297	0.1529
	(.1148)	(.6688)	(.1856)	(.6871)	(.1355)	(.6818)	(.1001)	(.6208)	(.1714)	(.6283)
LEVERAGE	-0.0278	-0.1346	-0.0143	-0.1422	-0.0302	-0.1327	-0.0328	-0.1599	-0.0300	-0.1468
	(.0126)	(<.0001)	(.2703)	(<.0001)	(.0084)	(<.0001)	(.0028)	(.0003)	(.0096)	(<.0001)
LIQUIDITY	0.0015	0.0135	0.0018	0.0136	0.0014	0.0135	0.0015	0.0137	0.0022	0.0136
	(.264)	(<.0001)	(.1714)	(<.0001)	(.3137)	(<.0001)	(.2913)	(<.0001)	(.0934)	(<.0001)
BMEMBER	0.0192	0.0047	0.0342	0.0065	0.0092	0.0034	0.0174	0.0084	0.0240	0.0067
	(.1819)	(.5407)	(.0198)	(.3138)	(.5656)	(.6626)	(.2364)	(.3195)	(.0901)	(.3875)
Ind. Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat.	7.09*	22.49*	7.08*	22.53*	6.62*	22.57*	7.01*	22.89*	6.69*	22.78*
Adj R-Sq	0.139	0.362	0.139	0.363	0.130	0.363	0.138	0.367	0.137	0.365
# of obs.	830	833	830	833	830	833	830	833	830	833

* Significant at 1% level.
P-values are reported in parenthesis

Table 19 also shows that firm age, innovativeness and state-ownership are not significant factors affecting firm profitability for any types of firms. However, firm size are found to be positively and significantly related to firm profitability regardless of the size of a firm. It is fount that firm profitability increases as size of a firm increases for both types of firms. On the other hand, firm leverage is found to be a significant factor affecting firm profitability for both firm types. This indicates that as leverage of a firm increases, firm profitability decreases significantly for both types of firms. Liquidity of a firm affects only large-sized firms' profitability. Similar results are found when the numbers of relationships with other bank types are included in the model.

4.3.3. Robustness Check with Basic Earning Power Ratio

As a robustness check, banking relationships and firm performance models are re-estimated by defining firm performance with BEP ratio instead of ROA. I analyze whether main results related to the relationship between firm performance and the number of banks are driven by the proxy used to measure firm performance or by the inner relationship between firm performance and the number of banks. Table 20 presents the results. In Panel A, the results from the banking relationship estimation are shown. Both F-statistics and the adjusted R^2sare found to be less than the ones presented in Table 20. This means that the explanatory power of the banking relationship model declines when BEP Ratio is used instead of ROA as a measure of firm performance. It is found that the coefficients of the all firm characteristics, except STATE, presented in Table 20

are consistent with the ones presented in Table 3. This result holds even after categorizing the number of banking relationships by bank types. These findings indicates that firm profitability is found to be a significant factor affecting the number of relationships with foreign banks, and relationships decrease not because of the proxy used to measure firm profitability, but because of the inherent relationship between firm performance and the number of banks.

Panel B shows the results from the firm performance estimation. There is not any major difference in the F-statistics and the adjusted R^2s presented in Table 11 and in Table 20. It indicates that the explanatory power of the firm performance model does not change when firm profitability is measured with BEP ratio, instead of ROA. It is found that the negative relationship between firm performance and the number of banking relationships still holds when firm performance is measured with BEP ratio. This result is valid for all bank types, except Islamic banks. The number of relationships with Islamic banks is not found to be significantly related to the firm performance, when BEP ratio used as a proxy. These results provide supporting evidences for the findings presented in Table 11. Apart from this, the coefficients of other firm characteristics, SIZE, INNOVA, LEVERAGE and LIQUIDITY are found to be significantly related to firm performances, regardless of the banking relationship variables used in the estimation. This finding is also consistent with the previous findings presented in Table 11.

These results from the robustness check estimations are consistent with the main findings found in the earlier estimations of the banking relationship and firm performance models.

Table 20: Robustness Check Results for all Credit Relationships

Panel A: Determinants of Banking Relationship

Dependent Variable	Intercept	BEP Ratio	AGE	SIZE	INNOVA	LEVERAGE	NONFIN	GROUP	BMEMBER	MNC	INCENT	STATE
NUMBERB	0.554	-40.168	1.448	4.027	-11.2683	0.208	-2.025	-1.000	-0.872	-0.665	1.008	0.883
F-Stat.: 10.85*	(.7368)	(.0125)	(.0531)	(<.0001)	(.0726)	(.8169)	(.0222)	(.0024)	(.0234)	(.0557)	(.0009)	(.3125)
Adj R-Sq: 0.13349												
NUMBERS	0.828	3.641	-0.423	0.123	1.6620	0.687	-1.026	-0.211	0.149	-0.033	0.281	1.544
F-Stat.: 21.39*	(.0095)	(.2418)	(.0035)	(.494)	(.1712)	(<.0001)	(<.0001)	(.0009)	(.046)	(.6245)	(<.0001)	(<.0001)
Adj R-Sq: 0.24183												
NUMBERF	-0.943	-10.654	0.396	1.088	-3.1359	-0.017	-0.495	0.025	-0.602	-0.040	0.366	0.117
F-Stat.: 11.47*	(.0686)	(.0349)	(.0922)	(.0002)	(.1116)	(.9519)	(.0747)	(.8085)	(<.0001)	(.7134)	(.0001)	(.6704)
Adj R-Sq: 0.14076												
NUMBERP	-0.036	-30.106	1.669	2.561	-9.1116	-0.576	-0.507	-0.656	-0.352	-0.561	0.383	-0.930
F-Stat.: 7.15*	(.9741)	(.0049)	(.0008)	(<.0001)	(.029)	(.3341)	(.3882)	(.0028)	(.1685)	(.0152)	(.0564)	(.1097)
Adj R-Sq: 0.08772												
NUMBERI	0.988	-1.794	-0.179	0.119	0.0803	0.083	-0.005	-0.154	-0.045	-0.048	-0.018	0.194
F-Stat.: 10.10*	(<.0001)	(.2458)	(.013)	(.1809)	(.8941)	(.3357)	(.9504)	(<.0001)	(.2272)	(.1509)	(.5333)	(.0211)
Adj R-Sq: 0.12467												

Panel B: Relation Between Number of Banks and Firm Performance

Dependent Variable	Intercept	NUMBERB	NUMBERS	NUMBERF	NUMBERP	NUMBERI	LOGAGE	SIZE	INNOVA	LEVERAGE	LIQUIDITY	BMEMBER
BEP Ratio	-0.0261	-0.0067	-	-	-	-	0.0156	0.0668	-0.2777	-0.0306	0.0024	-0.0066
F-Stat.: 23.70*	(.3111)	(.0007)					(.2241)	(<.0001)	(.0005)	(.0016)	(.0178)	(.3243)
Adj R-Sq: 0.23107												
BEP Ratio	-0.0296	-	-0.0198	-	-	-	0.0038	0.0629	-0.2710	-0.0324	0.0035	0.0027
F-Stat.: 24.22*	(.2439)		(.0012)				(.7624)	(<.0001)	(.0005)	(.0006)	(<.0001)	(.6623)
Adj R-Sq: 0.23510												
BEP Ratio	-0.0543	-	-	-0.0281	-	-	0.0174	0.0694	-0.2611	-0.0301	0.0023	-0.0141
F-Stat.: 21.79*	(.0511)			(.0005)			(.1977)	(<.0001)	(.0016)	(.0027)	(.0267)	(.0729)
Adj R-Sq: 0.21579												
BEP Ratio	-0.0219	-	-	-	-0.0118	-	0.0229	0.0642	-0.2818	-0.0369	0.0022	-0.0055
F-Stat.: 23.55*	(.3966)				(.0055)		(.0942)	(<.0001)	(.0004)	(<.0001)	(.0418)	(.4153)
Adj R-Sq: 0.22989												
BEP Ratio	0.0082	-	-	-	-	-0.0365	0.0020	0.0558	-0.2618	-0.0418	0.0034	-0.0032
F-Stat.: 23.83*	(.8256)					(.1732)	(.8808)	(<.0001)	(.0008)	(<.0001)	(.0002)	(.6459)
Adj R-Sq: 0.23205												

* Significant at 1% level.

P-values are reported in parenthesis.

CHAPTER 5

CONCLUSION

In this thesis, I examine the relationship between firm performance and the number of banking relationships. Banking relationship is defined as having both short- and long-term credit relationships. Firm performance is measured with firm profitability, proxied with ROA and BEP ratio. In the analysis, banks are classified into four groups according to their nationality, ownership structure and orientations. Banking relationships are also categorized as cash and non-cash credit relationships. The possible impacts of the 2008 global crisis and size effect are also investigated.

Descriptive statistics shows that approximately %90 of the sample have at least one banking relationship and Turkish firms maintain on average 5.60 number of banking relationships over the sample period 2003-2011. It is also found that on average, Turkish

firms first prefer to have a relationship with private domestic banks, and then with foreign, state-owned and Islamic banks.

The results of the probit model show that the factors of firm size, leverage ratio and obtaining incentives from the government increase the probabilities of having a banking relationship and maintaining multiple banking relationships. However, obtaining funding from external sources other than bank loans or belonging to a group mitigate these two probabilities. Although age of a firm and being a multinational company significantly affect only the probability of having a banking relationship, belonging to a group that owns a bank significantly affects only the probabilities of having multiple banking relationships. However, firm profitability and innovativeness are not found to significantly affect these two probabilities. In general, these results are consistent with my a priori expectations, except the positive effect of obtaining incentives from the government on the probabilities of having any banking relationship and maintaining multiple banking relationships.

Generally, the findings of the probit model for Turkey are consistent with the results from other countries. For example, the insignificant relationship between firm age and the probability of having multiple banking relationships for Turkish firms is similar to the findings of Detragiache et al. (2000) and Tirri (2007) for Italian firms. The negative effect of obtaining funding from external sources except bank loans on the probability of having multiple banking relationships is compatible with the results of Sterken and Tokutsu (2002) for Japan, but not with the results of Cosci and Meliciani (2002) for Italy.

These results should be interpreted with caution, because having any banking relationship or a multiple banking relationships might be driven not only by the preferences of firms but it might be the choices of banks. In the literature, many studies explain the choice of having any banking relationship as a decision of a firm considering the effect of different factors, such as holdup costs or the effect of exogenous liquidity shocks in the banking sectors credits. However, in Turkey, the requirements of BRSA about the banking law No.5411(Section 3, Article 54) and the policies applied by several banks force firm to have multiple banking relationships. According to this law, banks are not allowed to provide loans more than 25% of their shareholders' equity. Moreover, a manager of one Turkish bank stated that although the amount of credit demanded by firms are below the limits, banks do not want to take the total risk by themselves and prefer to share the credit risk with other banks, especially after the 2001 Turkish banking crisis. For this reason, in order to obtain funding for the unsatisfied part of the required credit amount, Turkish firms might borrow credits from other banks.

In the second part of the analysis, the factors affecting the number of banking relationships are examined. Banking relationship equations are simultaneously estimated with the firm performance equations by using 2SLS. Without categorizing banks, firm profitability and other firm characteristics, except firm innovativeness and leverage, are found to be significant factors affecting the total number of banking relationships. Results indicate that as profitability of a firm increases, the total number of banking relationships decreases, as reported by the studies of Ziane (2003), and Harhoff and Körting (1998a).Moreover, the positive coefficients of firm age and size in the model are

consistent with the findings of Detragiache et al. (2000), Cosci and Meliciani (2002), Degryse et al. (2004), and Harhoff and Körting (1998a).

When banking relationships are classified by bank types, it is found that factors affecting the number of banking relationship change according to bank types. Results show that the negative relationship between profitability of a firm and the number of banking relationships is driven only by the negative relationship between firm profitability and the number of relationship with foreign and private domestic banks. This finding might be explained by the similarities in the credit offering policies of foreign and private banks. It can also be argue that state-owned and Islamic banks might follow other similar policies in credit offerings that do not create any significant relationship between firm profitability and the number of relationship with these banks. In addition to this, as firms obtain funding from other external sources rather than bank loans, only the number of relationships with private domestic banks decreases significantly. No significant relationship is observed between the factor of obtaining funding from other sources and the number of relationships with other bank types. Furthermore, it is found that the factor of belonging to a group that owns a bank is negatively and significantly related to the number of relationships with foreign and private domestic banks but positively and significantly to the number of relationships with state-owned banks.

Results from the firm performance equation show that there is a negative and significant relationship between firm performance and the number of banks, regardless of bank types. This means that more profitable firms maintain fewer banking relationships,

controlling for debt ratio and other firm characteristics. This finding suggests that the theoretical implications that argue the negative effects of having multiple banking relationships on firm performances (Diamond, 1984, Ramakrishna and Thakor, 1984, Boyd and Prescott, 1986, Yosha, 1995, and Bhattacharya and Chiesa, 1995)are also valid for Turkish firms. This finding is also consistent with the empirical findings of other countries, Norway, Italy, Taiwan and Spain (Degryse and Ongena, 2001, Castelli et al., 2012, Yu and Hsieh, 2003, and Montoriol-Garriga, 2006).

When the types of lending relationships are examined, it is found that some factors affecting the number of banking relationships change for cash and non-cash credits. For example, firm age and state-ownership are found to be significantly related to the total number of banks for only non-cash credit relationships. However, firm innovativeness, obtaining funding from external sources other than bank loans, belonging to a group or a holding and being a multinational company are found to be significant factors affecting the total number of cash credit relationships. On the other hand, the negative relationship between firm profitability and the total number of banks holds for both cash and non-cash credits. For example, firm profitability is found to negatively affect the number of cash credit relationships with only private domestic banks and the number of non-cash credit relationship with both private domestic and foreign banks. Although, Ongena and Smith (2000b)do not find any difference between the results of credit and non-credit relationships, the findings from Turkish firms show that there are some differences in the determinants of banking relationships for different types of credit relationships in Turkey. Therefore, combining different banking services may not be appropriate while

investigating the determinants of banking relationships. On the other hand, firm performances are found to decrease with the number of both cash and non-cash relationship with all bank types, except Islamic banks.

On average, Turkish firms are fount to maintain significantly more number of relationships with state-owned and foreign banks, but smaller number of relationships with private domestic banks in crisis years, compared to non-crisis years. These findings might be explained by the possible switches from private domestic banks to foreign and state-owned banks in crisis years. These switches might occur since Turkish firms might think that foreign and state-owned banks will not fail during crisis years. In addition, private domestic banks might also force Turkish firms to switch to foreign and state-owned banks by not lending credits during the crisis years. These results are not consistent with the findings of Fok et al. (2004). They find that Taiwanese firms establish new banking relationships with domestic banks and end current relationships with foreign banks during the Asian financial crisis. Thus, the behavior of firms might be different in different countries or might change with the characteristics of crisis.

In the banking relationship model, a negative and significant relationship between firm performance and the total number of banks is observed for only non-crisis years and this negative relationship can be explained with the negative relationship between firm profitability and the number of relationships with private domestic banks. Interestingly, it is found that as debt ratio of Turkish firms' increases, the number of relationships with state-owned banks increases in crisis periods. This finding can be explained by either the

firms' choices or by the policies adopted by banks in crisis years. Firms with a high leverage ratio might prefer to have a relationship with state-owned banks in crisis times, since they believed that these banks are less fragile to the effects of the global financial crisis compared to the foreign and private domestic banks. State-owned banks might offer more favorable credit terms with the support of the government during the crisis period.

Infirm performance model, the negative coefficient of the number of banking relationships is found to be significant for only non-crisis years, and for all bank types, except Islamic banks. The number of banking relationships seems to affect Turkish firms' profitability in a different way than Taiwanese firms since Fok et al. (2004) find that performances of Taiwanese firms are negatively related with the number of domestic banking relationships only in times of the Asian financial crisis, but positively related with the number of foreign banking relationships in pre- and post-crisis periods.

The factors affecting the number of banking relationships are found to be different for small- and large-sized firms. It is observed that on average, larger firms have larger number of relationships with all types of banks, except Islamic banks, compared to small-sized firms. This finding supports the theoretical implication that small-sized firms maintain few but close banking relationships since they are more likely to suffer from the asymmetric information problem, compared to large-sized firms. It is also consistent with the empirical evidences from various countries. The factors of firm age and obtaining funds from external sources except bank loans are found to be significantly related to the total number of banking relationships for just small-sized firms. The total number of

banking relationships is significantly affected from firm innovativeness, leverage, related lending, obtaining incentives from the government and state-ownership for only large-sized firms. Firms belonging to a group or a holding are found to be significantly related to the number of banking relationships regardless of their size. However, the signs of the coefficients are surprisingly found to be opposite for small- and large-sized firms. The total number of banking relationships is lower for small-sized firms belonging to a group or a holding, whereas it is higher for large-sized firms belonging to a group or a holding. When banking relationships are classified by bank types, it is found that the differences in the factors affecting the number of banking relationships for small- and large-sized firms also vary across bank types.

Firm profitability is found to decrease with the number of banking relationships for only small-sized firms. Furthermore, this relationship is observed for all bank types, except Islamic banks. This finding is compatible with the theoretical models that argue the validity of the banking relationships theories for small-sized firms rather than larger-sized ones. These studies suggest that small-sized firms are more likely to suffer from informational asymmetry problems since they generally consist of newly establishes or young firms which do not have enough credit history.

5.1. Limitation and Further Research Areas

In this study, the number of banking relationships is determined at the end of the year because of the availability of data. Unfortunately, any banking relationship that a firm might have during a year but terminate before the end of the year is not included in the analysis. The unavailability of data during the year might result in the underestimation of the number of banking relationships that a firm might have. This limitation can be solved by using semi-annual or quarterly data in the analysis, if data become available.

In the analysis, how the relationship between the number of banks and firm performance changes during the crisis periods. Two years, 2008 and 2009, are taken as crisis years. However, Claessens et al. (2010) indicate that Turkey was affected from the 2008 global financial crisis in the second quarter of the year 2008 and Alp and Elekdağ(2011) indicate that the negative effect of the 2008 global financial crisis on the Turkish economic and financial sectors was observed until the third quarter of 2009. The crisis period might be defined on a quarterly basis if data become available.

The sample used in the analysis consists of firms that are listed in the BIST. These firms do not only depend on banks for funding but can more easily raise equity compared to other small and middle-sized firms that are not publicly traded. Hence, the number of banking relationships might be lower for these public firms. Moreover, in the literature, many theoretical models that analyze the optimum number of banking relationships discuss validity of their findings especially for small-sized firms rather than the large-

sized ones. Therefore, when the data become available, the models can be tested for small- and medium-sized firms that are not publicly traded since we observe same difference for the small- and large-sized publicly traded firms in the BIST.

In the literature, many studies analyze the impact of the banking relationship on firm performance focusing on other characteristics of banking relationship such as duration and scope as well as characteristics of loans borrowed such as cost of credits, collateral requirements, or loan maturity. Due to the data constraints, in this thesis I can only analyze the relationship between the number of banks and firm profitability. If data become available, it would be interesting to examine the relationship between firm performance and these other characteristics of banking relationship and loan characteristics.

A positive relationship between the number of banks and the incentives obtained from the government is observed. This result might be observed, if these incentives are transferred to the firms through investment and development banks. I argue that positive relationship between obtaining incentives from the government and the number of relationships with state-owned and private domestic banks may be driven by the categorization of the development and investment banks. Over the sample period, except 2003, there were thirteen investment and development banks. This provides enough number of observations for a further research in which investment and development banks can also be separately categorized and models can be test for this type of banks.

In the analysis, I find that with few differences, the factors affecting the number of relationships with foreign and private domestic banks are almost the same, whereas the factors affecting the number of relationships with state-owned and Islamic banks are similar to each other. This finding suggests that these banks might have different policies in granting credits as Aydoğan and Booth (1996) indicate. They report that in Turkey, compared to private banks, state-owned banks exhibited lower interest margins and longer maturities, which might be consequences of differences in portfolio constraints and the management style of these banks. In this context, further studies are needed to investigate the reasons behind the similarities in the findings for different bank groups.

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APPENDIX A

Table A: Gross Domestic Product Results

Years	Quarter	GDP Current Prices (million TL)	Growth Rate (%)	GDP Constant Prices (million TL)	Growth Rate (%)
2007	I	187,951	17.4	22,844	8.1
	II	203,280	10.7	24,581	3.8
	III	232,257	8.9	27,772	3.2
	IV	219,691	9.1	26,057	4.2
	Annual	**843,178**	**11.2**	**101,255**	**4.7**
2008	I	215,606	14.7	24,446	7.0
	II	239,363	17.8	25,226	2.6
	III	262,392	13.0	28,010	0.9
	IV	233,173	6.1	24,240	-7.0
	Annual	**950,534**	**12.7**	**101,922**	**0.7**
2009	I	207,926	-3.6	20,843	-14.7
	II	228,572	-4.5	23,267	-7.8
	III	261,710	-0.3	27,233	-2.8
	IV	254,350	9.1	25,660	5.9
	Annual	**952,559**	**0.2**	**97,003**	**-4.8**
2010	I	241,026	15.9	23,467	12.6
	II	265,997	16.4	25,692	10.4
	III	295,996	13.1	28,670	5.3
	IV	295,781	16.3	28,056	9.3
	Annual	**1,098,799**	**15.4**	**105,886**	**9.2**
2011	I	287,991	19.5	26,251	11.9
	II	315,493	18.6	28,021	9.1
	III	351,654	18.8	31,087	8.4
	IV	339,755	14.9	29,515	5.2
	Annual	**1,294,893**	**17.8**	**114,874**	**8.5**

Source: www.treasury.gov.tr

APPENDIX B

Table B: Results of the Hausman Test
(Dependent Variable is Firm Performance, measured with ROA)

	ROA	ROA	ROA	ROA	ROA
Intercept	-0.0484 (.0674)	-0.0404 (.1292)	-0.0939 0.0007	-0.0439 (.0927)	0.1454 (.0001)
NUMBERB	-0.0109 (<.0001)	-	-	-	-
NUMBERS	-	(.0129) (.0458)	-	-	-
NUMBERF	-	-	-0.0448 (<.0001)	-	-
NUMBERP	-	-	-	-(.0325) (<.0001)	-
NUMBERI	-	-	-	-	-(.1923) (<.0001)
Residual Values	0.0109 (<.0001)	-0.0129 (.0631)	0.0448 (<.0001)	0.0325 (<.0001)	0.1923 (<.0001)
LOGAGE	0.0256 (.0557)	0.0187 (.1656)	0.0281 0.036	0.0524 (.0002)	-0.0216 (.1281)
SIZE	0.0735 (<.0001)	0.0485 (<.0001)	0.0773 (<.0001)	0.0801 (<.0001)	0.0577 (<.0001)
GROWTHOPP	-0.2152 (.0092)	-0.1859 (.0254)	-0.1883 0.0222	-0.2451 (.0028)	-0.1739 (.034)
LEVERAGE	-0.0540 (<.0001)	-0.1010 (<.0001)	-0.0536 (<.0001)	-0.0444 (<.0001)	-0.0531 (<.0001)
BMEMBER	-0.0083 (.2319)	0.0029 (.6581)	-0.0200 0.0091	-0.0135 (.0487)	-0.0185 (.011)
Industry Effect	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes
F-Stat.	25.68*	23.98*	25.93*	27.79*	26.70*
Adj R-Sq	0.246	0.233	0.248	0.262	0.254
# of observation	1663	1663	1663	1663	1663

* Significant at 1% level.
P-values are reported in parenthesis.

APPENDIX C

Table C: Relationship between the Number of Banking Relationships and Firm Innovativeness

	INNOVA2	GSEC2	GSEC3	GSEC4	GSEC5	GSEC6	GSEC8
NUMBERB	-18.1226	-3137.83	2.409291	309.534	51.70329	2.335725	-129.454
F-Stat.: 16.77*	0.3757	0.0413	0.8766	0.9855	0.625	0.788	0.897
Adj R-Sq: 0.18551							
NUMBERS	-1.39256	-940.306	3.800739	-36.8473	-46.0706	0.112166	-21.2371
F-Stat.: 20.73*	0.7767	0.0109	0.3077	0.9928	0.0697	0.9571	0.9295
Adj R-Sq: 0.22178							
NUMBERF	-6.81806	-811.699	-3.50138	-2257.07	57.91894	0.243328	-153.589
F-Stat.: 12.72*	0.3879	0.1714	0.5589	0.7322	0.1562	0.9421	0.6906
Adj R-Sq: 0.14447							
NUMBERP	0.267355	-1174.56	0.334689	-879.311	34.86581	1.479578	499.8699
F-Stat.: 14.57*	0.368	0.1756	0.9695	0.9273	0.559	0.7627	0.3754
Adj R-Sq: 0.16381							
NUMBERI	1.819459	-136.491	2.239619	-350.291	-3.83257	-1.13507	-354.921
F-Stat.: 10.03*	0.4427	0.4434	0.213	0.8595	0.7545	0.2594	0.0022
Adj R-Sq: 0.11539							

* Significant at 1% level.
The variables GSEC*i* are the interaction variables between INNOVA and each SEC*i*, where *i*=1,…,8. Since firms operating in SEC1 and SEC7 have no R&D expenditure, the values of the variable INNOVA are zero for these firms. Therefore, model does not provide any estimation for the interaction variables GSEC1 and GSEC7.
P-values are reported in parenthesis.