MUSTAFA AKAY USE OF CURRENCY HEDGING INSTRUMENTS Bilkent University 2018

USE OF CURRENCY HEDGING INSTRUMENTS BY NON-FINANCIAL TURKISH FIRMS

A Master's Thesis

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USE OF CURRENCY HEDGING INSTRUMENTS BY NON-FINANCIAL TURKISH FIRMS

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ABSTRACT

USE OF CURRENCY HEDGING INSTRUMENTS BY NON-FINANCIAL TURKISH FIRMS

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Having significant exchange rate exposure, Turkish non-financial firms face both operational and financial risk caused by exchange rate movements. Despite not being as deep as in the developed countries, Turkish financial markets offer currency hedge instruments. Although Turkish firms have option for hedging against currency risk, it is observed that use of those instruments is not common for Turkish firms. This thesis aims to examine firm specific factors that affect the use of hedging instruments as well as the degree of hedging. A sample of 178 Turkish non-financial firms listed in Borsa Istanbul is examined for the period between 2007 and 2017. The use of currency derivatives is considered appropriate representation of hedging tendency for Turkish firms, as FX positions of firms arise from derivative contracts are reported accurately in disclosures of financial reports. It is found that firm size and leverage

have a positive effect on the probability of using currency derivatives whereas fixed asset ratio has negative effect. Moreover, liquidity buffer as a substitute for derivative usage is found to reduce the degree of hedging.

Keywords: Currency Derivatives, Foreign Exchange Position, Hedging, Turkish Non-Financial Firms

ÖZET

FİNANSAL KESİM DIŞI TÜRK FİRMALARININ DÖVİZ KURU ÜZERİNE YAZILMIŞ TÜREV ARAÇ KULLANIMI

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Finansal kesim dışı Türk firmaları, yabancı para pozisyonları sebebiyle kurdaki dalgalanmalara karşısında operasyonel ve finansal risklere maruz kalmaktadır. Türk firmaları hem yerel hem de yabancı finansal kurumlarla, döviz kuru üzerine yazılmış türev sözleşmeleri yapabilmektedir. Buna karşın, türev ürün kullanımının Türk firmaları için yaygın olmadığı gözlenmektedir. Bu tezde, firmaların türev ürün kullanma eğilimlerini ve hedge oranlarını etkileyen firma özelindeki değişkenleri incelenmektedir. Bu amaçla, Borsa İstanbul'da işlem gören finansal kesim dışı Türk firmalarından bir örneklem oluşturulup, 2007 ve 2017 arasını kapsayan süreç için ilgili veri finansal tabloların dipnotlarından toplanmıştır. Çalışmada elde edilen sonuçlara göre, firma büyüklüğü ve kaldıraç oranının, firmaların döviz kuru üzerine

yazılmış türev araçlarını kullanma eğilimini arttırdığı gözlenmektedir. Buna karşın, maddi duran varlık oranının ise riskten korunma eğilimini azaltıcı yönde etki yaptığı, firmaların likidite aracılığı ile türev araçlara alternatif riskten korunma stratejisinin, türev araçlar ile sağlanan riskten korunma derecesini azaltıcı yönde etki yaptığı bulunmuştur.

Anahtar kelime: Döviz Kuru Üzerine Yazılmış Türev Araç Kullanımı, Finansal Kesim Dışı Türk Firmaları, Riskten Korunma, Yabancı Para Pozisyonu,

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CHAPTER I

INTRODUCTION

Having significant exchange rate exposure, Turkish non-financial firms face both operational and financial risk caused by exchange rate movements. Despite not being as deep as in the developed countries, Turkish financial markets offer currency hedge instruments. Additionally, firms can engage derivative instruments offered by non-domestic financial agents. Although Turkish firms have option for hedging against currency risk, it is observed that the use of those instruments is not common among Turkish firms. In the previous studies examining the use of derivatives by Turkish non- financial firms, Ayturk et al. (2016) show that 33% of non-financial Turkish firms listed in Borsa Istanbul (BIST) use currency derivatives on average for the period between 2007-2013, whereas Selvi and Turel (2010) report that % 23 of firms listed in the BIST including banks and non-financial firms use these instruments in 2006. This thesis aims to examine firm specific factors that affect the firms' use of hedging instruments and their degree of hedging. In the analysis, a sample of 178 Turkish non-financial firms listed in Borsa Istanbul is employed for the period between 2007 and 2017. The foreign exchange (FX) positions and the use of

currency derivatives of firms are obtained from the disclosures of financial statements.

Currency risk can affect firms through increasing volatility in both realized and expected cash flows, and by changing the values of assets and liabilities reported in the balance sheets. Whether being an exporter or importer, timing and currency mismatches of payments create uncertainty in cash flows of firms and make them susceptible to exchange rate movements. The more complex international linkages, the higher number of exogenous factors that firms need to consider in dealing with uncertainty of cash flows. Larger or operationally diversified firms, such as firms that import intermediate goods to produce final goods and then export them, are exposed to different currencies and payment projections. Uncertainty of cash flows constitutes not only operational concern which managers struggle to meet payment obligations of firms they are responsible for, but also long-term strategical concern that managers need to consider. Investors evaluate value of a firm according to expected cash flows associated with that firm. As uncertainty of cash flows changes, firm value attributed to that firm by investors is going to change. Hence, investors' perception towards firms is influenced by currency risk and it will vary according to the firm's level of currency risk exposure. Currency risk constitutes strategical issues for managers in addition to operational ones by deteriorating uncertainty of cash flows. This issue may be suggested to be common both developed and emerging markets. However, since emerging market currencies are more volatile than developed market currencies, firms operating in emerging markets are more likely to be exposed to currency risk than those in developed markets.

Another channel through which currency risk reveals is balance sheet. Balance sheet effects of exchange rate movements are easier to observe by stakeholders compared

to their cash flow effects. When assets and liabilities of firms mismatch in terms of currency, exchange rate volatility will cause changes in the asset and liability balances such that the differences between the values of assets and liabilities results in the changes in shareholders' equity. This issue constitutes another significant implication of currency risk which is firm profitability. Alterations in the value of shareholders' equity due to exchange rate volatility, apparently, end up with changes in the share capital and the periodic income. Thus, return on invested capital which is used to evaluate a firm's efficiency in capital allocations within the context of profitable investments, as well as other profitability indicators will be susceptible to exchange rate volatility. As a result, in addition to operational efficiency, currency risk also emerges as a significant factor influencing firm profitability, its impact becomes greater as the firms' level of exposure to foreign currency grows. In fact, a firm that is efficient in capital allocation and profitable in operations may become less profitable than its supposed level; nonetheless reverse case where currency volatility leads to increase in profitability is possible depending upon asset/liability composition of firms in terms of currency. Nonetheless, currency risk is significant also in terms of firm profitability through balance sheet effects so that it may alter investor perception regarding profitability of a firm.

Firms in developed markets and firms in emerging markets seem to have different motivations for altering their currency composition rather than holding entirely local currency. Assuming that developed market currencies are less volatile than emerging market currencies, a firm in developed market may invest in emerging countries to obtain high return. The assets of these firms will be susceptible to exchange rate volatility and negative shocks to foreign currency will shrink the value of their assets reducing the value of their equity. On the other hand, a firm in emerging market

prefers to finance itself with foreign currency (less volatile than domestic currency) rather than local currency because borrowing with lower interest rates is likely to be appealing to that firm. Thus, when a negative shock to domestic currency occurs, liabilities of that firm will rise with reduction in the value of their equity.

Abovementioned conditions make currency risk as a significant business concern for Turkish firms. Turkey as an emerging market has been experiencing volatility in local currency, whereas counterparty currencies in both transactions and financing activities are observed to be mostly USD and EUR which exhibit considerably lower volatility compared to TRY. Hence Turkish firms face increasing uncertainty of cash flows stemming from currency risk. Moreover, having significant FX short position on-balance sheet, Turkish firms are susceptible to balance sheet effects of currency risk where negative shocks to local currency results in reduction in firm profitability and shareholder equity. In order to avoid currency risk, derivative contracts offered by financial agents such as forward contracts, options and cross currency swaps may be utilized by firms. These contracts provide complete or partial hedge against currency risk by reducing level of FX exposure of firms. However, instead of being recorded on balance sheet, amounts of FX positions arisen from such contracts are reported in off-balance sheet accounts. Thus, firms' extent of FX hedging can be obtained from off-balance sheet positions. Turkish financial markets have facility for firms to engage in these types of currency derivative contracts, also firms may use derivative contracts offered by foreign financial agents. Although Turkish firms have hedging alternatives, it is observed that most of Turkish firms do not utilize currency derivatives to hedge against currency risk. Having significant currency risk due to both operations and financing activities without hedging considerably, Turkish non-financial firms are worthy of attention. Thus, this thesis investigates firm-specific

factors prompting firms to use currency derivatives and elaborates on determinants of degree of corporate hedging within the scope of non-financial Turkish firms.

Existing literature examining determinants of derivative usage at corporate level evolved in terms of utilized data type. Earlier studies mostly utilized the approach of conducting surveys designed to obtain information about risk management strategies (Block and Gallagher, 1986; Nance et al., 1993; Bodnar et al., 2003). Although surveys are flexible to extract information related to the motivations behind taking positions in derivative contracts, this method suffers from non-response bias (Triki, 2005). Besides, having the issue of sampling bias and low level of representativeness for relevant population, researchers have found publicly available financial documents more appealing rather than survey data. In fact, revisions and advancements in reporting and disclosure standards particularly in developed countries initiated this progress by the available data related to derivative use. Mian (1996), Dolde and Mishra (2002) are among the studies which utilize the hedging information extracted from financial statements. Moreover, some studies have used more private data sets which are constructed specifically to certain industries, but applications and results of such studies seem to be limited to draw general interpretation. (Tufano, 1996).

The data about FX positions of non-financial firms listed in the BIST are extracted from annual financial statements. In the footnotes of financial reports, information about the risks related to financial instruments are disclosed including credit risk, liquidity risk and currency risk. Since IFRS 7 requires companies to disclose information about the degree and the nature of risks originated from the use of financial instruments, the use of currency derivatives can be captured via examining financial reports. As for Turkish firms, Ayturk et al. (2016) used similar data

regarding use of derivatives and they investigated firm value effect of derivative use. They found that limited evidence for the contribution of the use of derivatives to the market values of non-financial Turkish firms. They explain that these findings are obtained because derivative instruments are not mere tools for corporate risk management. In fact, operational hedge and natural hedge are pointed out as some alternatives to use of derivatives. This paper contributes by examining what determines the use of currency derivative instruments as well as the degree of hedging for Turkish non-financial firms. Moreover, it employs an alternative measure of the degree of hedging, which is intended to represent currency derivative usage amount with respect to relevant risk exposure. Total derivative usage scaled by total assets is widely used in the literature to measure extent of hedging, whereas this study also investigates derivative usage scaled by FX position which is considered as the proxy of relevant currency risk exposure.

Pursuing the motivation of this study further, it tries to explain whether there are firm-specific factors that encourage firms to use currency derivatives or not. In addition, it investigates that how those characteristics of firms related to the extent of derivative usage. To this end, firm size, cost of financial distress and growth opportunities are investigated whether they play any role in the firm's use of derivative instruments as well as the degree of hedging. Furthermore, geographical diversification in operations is one of the primary reasons why firms are exposed exchange rate movements. Thus, effects of export sales portion in total sales are investigated within the same context. Last but not least, effects of substitute strategies for using derivative instruments are also examined. In fact, firms may utilize other strategies rather than derivative usage for risk management such as holding liquidity buffer or paying less dividends.

According to data collected for the course of this study, slightly less than 25% of sample firms are using currency derivatives as of 2017. Over the sample period, 15% of firms are found to be user of currency derivative contracts. It is found that firm size has a significant and positive effect on both the use of currency derivatives and the degree of hedging. One possible explanation for this result is that employing risk management is a costly procedure such that as firm size grows, the use of derivatives becomes an efficient strategy with scale benefits. On the other hand, present value of growth opportunities is found to be a negative and significant factor in explaining the use of currency derivatives, but this result contradicts with theoretical literature of corporate hedging which will be reviewed in the next chapter. . Cost of bankruptcy explanation of derivative usage is valid for Turkish non-financial firms since results indicate significant and negative relationship between measures of cost of financial distress and decision of currency derivative usage. For the degree of hedging, only fixed asset ratio is found to be negative and significant, but this result is evident only when the degree of hedging defined as in the literature. As for substitute strategies, they are found to be insignificant for decision of currency derivative usage, but liquidity buffer is found to be significant and negative in explaining the degree of hedging. Therefore, as firms have larger liquidity buffer, they tend to hedge less compared to their foreign exchange (FX) exposure. Finally, there is limited evidence for ratio of export sales because its effect disappears once industry effects are included in the models.

This thesis is organized as follows: Chapter II reviews both theoretical and empirical literature relevant for this study. Chapter III presents sample construction and methodology will be employed to test hypothesizes for this study. Chapter IV

presents descriptive results obtained from sample data. Chapter V provides empirical results of the study and lastly, Chapter VI concludes.

CHAPTER II

LITERATURE REVIEW

Empirical studies about derivative usage employ firm specific financial and operational variables. However, those variables generally proxy one type of perspective regarding corporate use of derivative that explains incentive to utilize hedging. These perspectives are managerial risk aversion, problem of underinvestment and cost of financial distress. Since empirical studies justify their proxy variables according to theoretical studies explaining how hedging contributes firm value, theoretical literature will be presented firstly; and then empirical literature will be reviewed.

2.1 Theoretical Literature

Corporate finance literature has covered the determinants of hedging practices and derivative use in detail. Despite the fact that no financial contract is known to affect the firm value under the assumptions of Modigliani and Miller (1958), succeeding theoretical studies argue that risk management can add value to a firm if there are capital market imperfections. Hence, the efforts related to alleviating the costs arising

from such deviations from the original assumptions of Modigliani and Miller (1958) are considered as possible determinants of derivative use.

One aspect of theoretical literature discusses hedging decision existence of managerial risk aversion. Based on the agency theory, Smith and Stulz (1985) show that when a risk-averse manager owns a significant amount of shares of the firm (or they have a significant amount of wealth invested in the firm through salary, bonus or stock options), then their wealth becomes a function of the variance of the firm's expected profits. Since managers are not fully diversified, they have an incentive to hedge the risks inherent in their position. One other rationale about hedging decision is that risk averse managers engage in corporate risk management if they find that the cost of hedging on their own account is higher than the cost of hedging at the corporate level. They also point out that if the utility derived from the managers' end of period wealth happens to be a concave function of firm value, then it is optimal to engage in complete corporate hedging. On the other hand, in the case of a convex function, optimal strategy is undertaking minimal corporate hedging. Latter occurs, for instance, if the managers have unexercised stock options. Smith and Stulz (1985) and Stulz (1984) argue that the incorporation of option-based compensation increases the incentives for managers to take risk because greater risk and higher price volatility can boost the value of their stock options. As a result, firms that rely heavily on contingent compensation may hedge less than firms that mainly rely on salary and other non-contingent methods of payment.

Cost of financial distress is another reason for corporate use of derivatives that leads to the value-improving nature of hedging activities. In other words, benefits of hedging increase when firms face higher costs of financial distress. As stated in Glaum (2002), by reducing the volatility of the firm's cash flows through hedging,

management can reduce the probability of running into default and, thereby, the present value of the costs of bankruptcy. More specifically, since expected cost of financial distress is a function of probability of extreme realizations in the firm value, hedging can alleviate costs by decreasing the likelihood of being in left-tail realizations (Raposo, 1999). Assuming that the cost of implementing the risk management practices is lower than the present value of the costs of bankruptcy, risk management will lead to an increase in firm value. In addition to the direct costs of bankruptcy such as expenses of legal processes and administrative fees, there are also indirect costs that arise when a firm encounters financial distress such as inefficiency in supply-buyer relations, damage in the reputation and risk premium reflected in the employee and management compensation (Aretz and Bartram, 2010). Given this function of corporate risk management, firms with higher probability of going bankrupt in the form of larger debt to equity ratios or higher financial distress costs would be more likely to use derivatives. In this regard, literature considers firm size as an important proxy for the benefit of alleviating the cost of financial distress. As mentioned by Berkman and Bradbury (1996), indirect costs might be larger than direct costs of financial distress. Considering the fact that there might be scale effects for indirect costs of bankruptcy and markets for derivatives show significant scale economies in the structure of transaction costs, firm size emerges as an important determinant of corporate hedging decision. In other words, large firms are likely to enjoy greater economies of scale in hedging, and upfront fixed costs set high threshold for small companies to initiate hedging programs. Large firms with established risk management programs, talents equipped with knowledge about financial engineering and closer network to capital markets find it easier to implement cost-efficient hedging strategies (Bodnar et al., 1998; Wang and Fan,

2011). Berkman and Bradbury (1996) also claim that larger firms have more sophisticated financial management practices and are therefore more likely to use derivatives.

In connection with financial distress argument, some studies in the literature consider firm profitability as an important determinant of corporate hedging policy. Aretz and Bartram (2010) argue that companies with low performance in terms of profitability would be likely to face higher risk of insolvency given the difficulties in meeting payment obligations. Thus, such firms are expected to hedge more compared to sufficiently profitable firms.

Underinvestment issue is another incentive related to the hedging tendencies. Froot et al. (1993) argue that without proper hedging, firms would be likely to pursue suboptimal investments. Capital market imperfections may cause higher marginal cost of raising external financing in the form of debt and equity. Corporate risk management can contribute to the coordination of investment and financing policies (Bartram, 2017). Hence, the risk of not being able to convert growth opportunities into assets appears to be a determinant of corporate hedging. Derivatives use potentially mitigates the underinvestment problem when cash flow stream of a firm is volatile and access to external financing is costly. Bessembinder (1991) claims that corporate hedging reduces the incentives to underinvest by increasing the number of future states in which equityholders are the residual claimholders. Furthermore, Froot et al. (1993) indicate that hedging can mitigate the underinvestment issue as it secures the availability of more internal funds to undertake investment opportunities. Nguyen and Faff (2002) state that hedging can add value if two conditions hold: firms must have growth opportunities and they must be so financially constrained that those investment projects will not be undertaken. In short, it is predicted that

firms with valuable growth options are more likely to be affected by the underinvestment problem so they are more likely to use derivatives. Aretz and Bartram (2010) argue that underinvestment problem is more relevant to the firms with higher growth opportunities as firm values in these cases will be more contingent on failing to benefit from positive net present value (NPV) projects. Hence, such firms would be more likely to face with the states of nature in which agency problems will be observed. As a result, high growth opportunities should prompt firms to carry out corporate hedging policy.

Corporate finance and risk management literature argue that firms can engage in other activities to achieve the similar goals with optimal hedging. Strategic choices made by firms to take actions in line with the hedging substitutes are found to be significant determinants affecting derivative use. These substitutes include risk management through financing and operating activities as well as carrying liquidity buffers (Triki, 2005). In terms of financial activities, firms are capable of coping with the possible conflict between shareholders and bondholders and alleviate the agency costs not only by hedging but also through issuing quasi-equity instruments such as convertible bonds or preferred stock (Nance et al., 1993). Moreover, dividend policies emerge as another substitute for hedging. In the case of lower dividends paid, funds will be more available to pay the fixed claimholders in turn decreasing the agency conflict. On the other hand, if a firm chooses a high dividend payout policy, it is argued that it will effectively be under liquidity constraints and thus is predicted to hedge more. Lastly, holding liquid assets can be classified as an alternative to hedging activities which will affect the derivatives use. It can be inferred that firms with relatively large holdings of liquid assets are less likely to face financial distress and consequently possess a smaller incentive to hedge.

Lastly, tax motivations of risk management practices are considered as important determinant of corporate hedging policy. The argument associating the taxation to hedging practices was initially brought forward by Smith and Stulz (1985). Given that firms face with the convex tax function arising from progressive marginal tax rates and the existence of tax shields such as tax carryforwards, hedging can reduce the expected tax liabilities by decreasing the dispersion in taxable income (Rawls and Smithson, 1989). In other words, firms are more inclined to hedge if more of the firms' taxable income is in the convex region of the tax function. To sum up, corporate hedging policy is taught to be value improving for firms taking managerial risk aversion, cost of financial distress, and underinvestment issue and tax motivations into account. In addition to these conditions, it is argued that FX exposure of firms and practices that can be considered substitute policy for hedging are also suggested as possible determinants of corporate hedging decision.

2.2 Empirical Literature

To which extent derivative contracts are used by firms is also thought to be related to the level of FX exposure. In their analysis for US firms, Geczy et al. (1997) find that foreign exposure measured by the ratio of foreign sales to total sales and the ratio of foreign assets to total assets is significant factor contributing the derivatives use. Similarly, Allayannis and Ofek (1997) include foreign income and foreign assets as controls for exchange rate exposure in their probit model. In the study of Howton and Perfect (1998), instead of a continuous variable, the level of foreign exposure is defined as a foreign income dummy variable in the specification.

Existing literature related to corporate use of derivatives propose that the use of derivative instruments offers certain positive outcomes. To begin with, hedging

activities may absorb effects of asymmetric information to certain extent. Stakeholders obtain necessary information about a firm's management practices by following operational performance, nonetheless hedging activities is proposed to facilitate this process with reducing uncertainty level arising from exogenous risk factors, namely macroeconomic and global, which are not subject to firm-level actions (DeMarzo and Duffie, 1995; Breeden and Viswanathan, 1998). Precisely, valuation techniques are based on developing projections of cash flows and earning regarding subject firm, thus hedging practices may alleviate the noise associated with valuation metrics by reducing volatility in expected cash flows and earnings. Furthermore, Dadalt et al. (2002) examined the effects of corporate use of derivative instruments on information asymmetry and found an inverse relation in between. According to their study, measures of asymmetric information were found to diminish over time as firms begin to use hedging instruments. In addition to alleviating asymmetric information, firms using derivative contracts show low level of sensitivity of investments to pre-hedging cash flows (Allayannis and Mozumdar, 2004).

Secondly, using derivative contracts firms are able to alleviate their sensitivity against FX risks. One form of FX risk that firms encounter arises from transaction exposure. Transaction exposure represents that in a volatile exchange rate state forming fixed contract results in volatility in cash flows at short term, as well. Other form of FX risk arises from economic exposure which constitutes how much of firm value is susceptible to volatility in exchange rates through foreign currency balances in expected cash flows, items of income statements and balance sheets. Allayannis and Ofek (1997) find that there exists a positive and statistically significant relationship between derivative use and the level of FX exposure. Moreover, positive

relation between derivative use and firm value for Turkish firms is also evident to some extent in a recent study of Ayturk et al. (2016) according to their Tobin's Q ratio analysis with system GMM estimators. Using non-financial Turkish firms for the period between 2007 and 2013, they find that hedging increases firm value with respect to wider class of derivative contracts including currencies, interest rate and commodities. Firm value enhancive benefit of derivative use is also shown by Allayannis and Weston (2001), Bartram et al. (2011) and Panaretos and Shackleton (2013) both in county-specific and cross-country studies.

Thirdly, in different states of conditions, firms might fail to meet commitments they made. Probability of aforementioned case may prompt managers to engage in risk-shifting. However, use of currency derivatives restricts probability of failing to meet commitments so that firms and managers will less likely engage in risk-shifting (Campbell and Kracaw, 1990; Bessembinder, 1991). Hence, firms will have opportunity to improve contract terms when they negotiate for obtaining loans from their lenders. To elaborate, since firms using derivatives are perceived to have lower probability of experiencing agency conflict, such firms may access to credit facilities with notably lower interest rates and restrictive terms. Campello et al. (2010) concretize this argument with their empirical study. They find that firms pay lower interest rate spreads and less likely to have covenants restricting their investments in private credit agreements after hedging programs are put in place. Likewise, Chen and King (2014) investigate whether corporate hedging policy has an effect on cost of debt using US firms with sample period of 1994-2009. They used yield spreads of corporate bonds as the proxy for cost of debt and their results point out that yield spreads of hedgers are significantly lower than those of non-hedgers. This effect is

found to be similar across industry groups and under different controls in econometric estimations.

Many studies in corporate finance and risk management literature about use of derivatives are seen to examine single country or single industry in terms of determinants of corporate hedging. Howton and Perfect (1998) analyze the use of derivatives for US firms which are listed in S&P 500 and Fortune 500 with tobit model. According to their results, R&D to total sales ratio, cash flows, interest coverage ratio, leverage and tax considerations came out to be significant drivers of hedging behavior. Nguyen and Faff (2002) investigate the derivative use for the context of Australian companies and the sample period of between 1999 and 2000. Leverage, firm size, growth opportunities and liquidity are found as important factors via tobit estimations. Among the further examples of individual-country studies, Ameer (2010) examine the impact of firm-specific factors on the use of FX and interest rate derivatives for Malaysian non-financial firms. According to the results, Malaysian firms with higher level of foreign sales and growth opportunities appear to be active users of FX derivatives, whereas firms with higher quick ratios are found not to use these instruments excessively. Clark and Judge (2006) investigate corporate hedging dynamics for the case of 441 UK non-financial firms with ordered logit estimations. They found that as financial distress, growth opportunities and foreign sales are positively related to the derivatives use, liquidity is negatively related to hedging practices. Sivakumar and Sarkar (2008) try to explain the hedging motivations for the case of Indian firms. Their empirical quest yields the conclusion that firm size, leverage, liquidity and profitability are important factors explaining use of derivatives. Afza and Alam (2011) study the firm-based factors affecting hedging policies of 105 non-financial firms in Pakistan for the period 2004-2008.

According to their multivariate results, firm size, market-to-book ratio, FX exposure and financial constraints are found to be influential in hedging decisions. Glaum (2002) investigated the determinants of hedging for the case of 154 German non-financial corporations through survey data on risk management strategies. Using logit regressions, profitability, leverage and growth opportunities were identified as significant determinants of corporate hedging decision. Klimczak (2008) tried to assess the validity of corporate hedging theories for the case of a sample of 150 companies listed in Warsaw Stock Exchange from 2001 to 2005. Logit estimation results of that study were in line with the view that foreign exposure, market-to-book ratio and firm size are significant determinants of corporate hedging decision. In addition to these, albeit at few numbers, there are cross-country studies with relatively larger data sets. Recently, Bartram (2017) has tested the traditional theories of hedging by utilizing a sample comprising 6896 firms from 47 countries. OLS and IV regressions documented that firms use the derivatives for hedging purposes. Some other studies, nevertheless, choose to focus on only specific sectors such as hedge funds industry (Chen, 2011), mining industry (Tufano, 1996) and insurance industry (Colquitt and Hoyt, 1997) across different countries.

In addition to the coverage of sample, sources of data and the way of which hedging tendencies are defined also constitutes an important part of empirical studies and discussed extensively in the literature. Hence, creating a proper measure for corporate hedging appears to be an essential input for testing the risk management theories. In this regard, common practice is creating a dummy variable, which represents whether subject firm is hedging or not, to be used as the dependent variable. To this end, studies like Nance at al. (1993), Fok et al. (1997), Geczy et al. (1997) and Bartram et al. (2009) have all introduced hedging dummy which takes the

value of 1 if derivatives are used and 0 otherwise. Thereby the empirical setting becomes suitable for estimation of the likelihood of using derivative contracts through discrete choice models. In addition to such analyses, continuous measures of corporate hedging are also preferred to make the inferences about the extent of derivative use. In order to represent the extent of derivative use, defining dependent variable by gross or net notional value of derivative positions scaled by the firm size is commonly applied (Knopf et al., 2002; Rogers, 2002; Graham and Rogers, 2002, Nguyen and Faff, 2003). In addition to the binary variable representing the choice of derivatives use, measuring the degree of hedging enables one to compare and contrast the determinants for the decision to hedge and the extent of hedging (Aretz and Bartram, 2010). Another way to construct dependent variable with ability to measure the extent of hedging is delta percentage which can be identified as the delta of risk management portfolio held by the firm normalized by expected production (Tufano, 1996; Dionne and Garand, 2003; Dionne and Triki, 2005). However, detailed data required to compute the delta percentage cannot be acquired from the publicly available financial reports for the case of this study. Hence, this paper relies on the data extracted from financial statements and disclosures to measure the degree of hedging and extent of derivative use.

CHAPTER III

DATA & METHODOLOGY

Having analyzed theoretical and empirical literature regarding corporate use of derivatives, the hypotheses that will be tested in this thesis are presented as follows:

I. As firm size grows likelihood of currency derivative use and extent of hedging increases.

II. As present value of growth opportunities grows likelihood of currency derivative use and extent of hedging increases.

III. As cost of bankruptcy grows likelihood of currency derivative use and extent of hedging increases.

IV. As firms use substitute strategies (liquidity buffer and dividend policy) for hedging instruments more, likelihood of currency derivative use and extent of hedging decreases.

V. As portion of export sales in total sales grows likelihood of currency derivative use and extent of hedging increases.

This chapter consists of three sub-sections. Firstly, the nature and sources of the data, transformation processes and descriptive statistics of the sample data is presented. Secondly, the variables for the determinants of derivative usage are provided and lastly, empirical models and the methodology employed in this paper are introduced.

3.1 Data

With the object of testing firm-specific factors leading use of currency derivatives and degree of hedging, a sample of non-financial firms listed in BIST is constructed. Firms in the sample consist of real and service sector firms, and industrial conglomerates which are exposed to exchange rate movements in terms of operations or financing activities. There are firms adopting different functional currencies than TL, which alter some aspects in reporting of financial statement especially concerning disclosures. Although some of those companies report TL equivalent financial statements, TL assets are regarded as foreign currency assets and foreign but functional currency based assets, such as USD assets, treated as domestic currency assets within the FX position (currency risk chapter) stated in disclosers of financial statements. Thus, to ensure consistency within the sample, firms with different functional currencies are excluded. Likewise, firms that have missing observation within sample period are excluded.

In order to conduct tests, variables reflecting use of currency derivatives, degree of hedging, extent of currency derivative use for dependent side and firm-specific factors for explanatory side are identified. Within this scope, data of FX positions considering both balance sheet and off-balance sheet is collected from FX position tables under currency risk chapter in disclosures of year-end consolidated-annual financial statements which are available at KAP (Public Disclosure Platform) for the

period since 2009 and Borsa Istanbul Archive of Financial Statements for the period until 2008. Data is collected with breakdowns in accordance with liquidity, denomination of currency and asset/liability. Currency risk chapters present FX positons of both balance sheet and off-balance sheet items in terms of functional currency caused by foreign currency balances. Difference between FX assets and FX liabilities represent on-balance sheet FX position. Off-balance sheet items are recorded as asset when they provide long position in foreign currency, conversely when derivative products cause short position in foreign currency they are reported as liability. Off-balance sheet FX position represent net long/short position caused by derivative products. Sum of those two FX positions represent net FX position of the firm. It must be noted that firms seem hedger only when they use currency derivatives since this study examines use of currency derivatives. However, firms that do not have off-balance sheet FX position might be using other derivative instruments such as interest rate swaps or commodity forwards, but this is not relevant for the course of this study. Hence, collected data does not involve derivative usage other than currency derivatives. In concern with sample period, FX position tables presenting foremost data for the sake of this study started to be regularly available since 2007 in consequence of IFRS 7 which requires companies to report information in disclosures about risks resulting from financial instruments. Thus, sample period is determined as 2007-2017. Applying these identifications to the data, the sample of Turkish non-financial public firms consists of 178 companies which there exist 11 yearly observations for each. As a result, sample of 1958 year-firm observations is employed for this study.

As for firm specific factors representing explanatory variables, relevant data is collected from FINNET database. Using data from financial statements and

disclosures, financial and operational ratios that are proposed by existing literature to be leading factors of derivative use such as liquidity, leverage and profitability, are calculated. Detailed information regarding identification of both dependent and independent variables will be presented in the next chapter. Finally, there seem significant outliers for financial ratios possibly arising from inconsistency of accounting data, hence outlier observations are dropped. For ratios bounded from one side, 0-99% percentile, otherwise 0,5%-99,5% percentile is set as criteria to keep observations in the sample. Correlation matrix of explanatory variables is derived and it is presented in Table 1. It can be said that there is not notable high correlation among variables.

Table 1: Correlation Coefficients Matrix of Independent Variables

	Size	Tangibility	MB	Current Ratio	Leverage	Exposure	Dividend Payout Ratio	ROA
Size								
Tangibility	0.099							
MB	0.020	-0.098						
Current Ratio	-0.245	-0.146	0.078					
Leverage	0.157	0.084	0.169	-0.293				
Exposure	0.062	-0.179	-0.041	-0.083	0.071			
Dividend Payout Ratio	0.209	-0.002	0.179	0.086	-0.062	0.039		
ROA	0.234	-0.183	0.102	0.184	-0.373	0.036	0.242	

3.2 Variable Definitions

The detailed definitions of the firm-specific variables used in the empirical models are provided below. Besides, the expected signs according to the literature are presented in Table 2.

Hedge Dummy: As stated before, the common method to construct a variable tracking the hedging behavior is through dummy variables. In fact, many studies which only focus on the determinants of decision to hedge use binary variables including Nance et al. (1993), Mian (1996) and Geczy et al. (1997). The dummy variable used in this study is denoted as HEDGE and it takes the value of 1 if financial reports of non-financial firms in BIST point out non-zero FX derivative position for the given period and 0 otherwise.

Hedge Ratio: Hedge ratio is calculated as ratio of net off-balance sheet FX position to net on-balance sheet FX position. To have a positive hedge ratio there should be counter FX positions (opposite sign net balances) between on-balance sheet and off-balance sheet, otherwise hedge ratio becomes negative. This variable is not employed for the empirical models, instead it is utilized to exhibit some descriptive results in the next chapter.

The Extent of Hedging: In addition to the decision to hedge, empirical studies also aim to examine the factors impacting to what extent firms engage in corporate hedging activities. One measure is the gross notional value of the off-balance-sheet contracts normalized by the firm size represented by book value or market value of total assets (Berkman and Bradbury, 1996; Gay and Nam, 1998; Allayannis and Ofek, 2001; Knopf et al., 2002). Another measure is net notional value of derivative contracts which takes the long and short positions into account, again normalized by

the firm size (Rogers (2002) and Graham and Rogers (2002)). In line with the previous studies, an alternative extent of hedging variable which can be defined as the ratio of sum of off-balance-sheet assets and liabilities (related to FX derivatives) divided by the absolute value of the net on-balance-sheet FX position is constructed for this study and it is denoted by EXTENT.

Firm Size: In order to represent the firms' extent of operations, some studies utilize the sum of market value of equity and book value of debt (Nguyen and Faff, 2002; Mardsen and Prevost, 2005; Dionne and Garand, 2003). Alternatively, natural logarithm of total sales is widely used in corporate finance studies as a representation of firm size. However, revenues can fluctuate occasionally depending on the business models, industry competition, pricing decisions and sales turnover. Hence, the firm size variable is defined as natural logarithm of inflation adjusted total assets and denoted by SIZE. Inflation adjustment made by dividing total assets by CPI level. December 2007 CPI level set as 100 and total assets are divided by each year's December CPI level accordingly. This measure can be regarded as more stable to capture the trends in firm size (Allayannis and Ofek, 2001; Graham and Rogers, 2002). The size variable is expected to influence the hedging behavior in two main channels. One channel is that larger firms have less incentive to hedge since these firms generally have smaller probability of financial distress. However, the second channel is that larger firms may also benefit from economies of scale in hedging given the transaction costs and they are known to have more sophisticated financial management practices. Thus, the expected sign of the coefficient in this variable will be contingent upon dominance of these effects.

Growth Opportunity: While Nance et al. (1993) and Fok et al. (1997) include the ratio of R&D expenditures to market value of assets in their work to represent the

growth opportunities or investments which can lead to further increases in productivity and efficiency in operations, Rogers (2002) consider the ratio of R&D expenses to total assets to analyze the same factor. However, due to the lack of R&D expenditures data for BIST non-financial firms, another measure for growth opportunities which is the market-to-book ratio is used, given that it is widely available for sample firms and denoted by MB. This ratio is also used in the study of Jalilvand (1999). Growth opportunities are expected to influence the hedging behavior positively, theoretical literature and empirical evidence on this variable also indicates a positive relation.

Tangibility: Cost of financial distress perspective of corporate hedging literature approaches asset tangibility as a determinant of derivative use. In fact, intangible assets are directly linked to cost of financial distress due to being difficult to liquidate immediately in stressful times (Aretz and Bartram, 2010). On the contrary, tangible assets can be valued more accurately and sold more easily compared to intangible assets in case of bankruptcy. Thus, as the proportion of fixed assets a firm has grows, the less cost of bankruptcy will be attributed to that firm. In other words, corporate hedging theory predicts an inverse relation between asset tangibility and corporate hedging decision. In empirical studies, tangible asset scaled by size is used as proxy for asset tangibility (Bartram, Brown and Fehle 2009; Howton and Perfect 1998). Correspondingly, this study employs fixed asset ratio as the proxy for asset tangibility and it is denoted by FIXED.

Substitutes for Hedging: Considering the other methods of implementing risk management practices rather than corporate hedging policy, variables such as CURRENT and DIVIDEND which are defined as the current ratio and dividend payout ratio respectively, are included into specifications. It is hypothesized that the

firms with sufficient liquidity buffers are less likely to engage in hedging practices and results of the empirical works overwhelmingly emphasize the negative relation between liquidity measures and risk management activities. Moreover, dividend policy is also considered in connection with hedging decisions. It is argued that in the case of lower dividends paid, as more funds will be available to pay the fixed claimholders, less agency conflict will be observed. This is expected to decrease hedging tendencies, as stated in Berkman and Bradbury (1996). However, dividend paying firms can be motivated to hedge more since the firms do not tend to change their dividend policy frequently. In other words, they might use hedging tools to avoid changing dividend policy. Empirically, as stated in survey study of Aretz and Bertram (2010), evidence is ambiguous considering the co-existence of statistically significant results in line with the positive and negative relationships.

Leverage: Relevant to the financial distress theory of corporate hedging, LEVERAGE variable as the ratio of financial debt to market value of the equity is introduced. Leverage measures appear to be included in almost all empirical studies related to the determinants of derivatives use. Furthermore, different proxies might also be used such as interest coverage ratio (Nance et al., 1993; Howton and Perfect, 1998; Gay and Nam, 1998). The levered firms are expected to engage in more hedging activity since they are more exposed to financial stress. The empirical results in previous studies also indicate a positive relationship between indebtedness and hedging.

Exposure: Another determinant of corporate risk management practices stands as the degree to which firms are exposed to the underlying risks specific to the derivative instruments used. For instance, Howton and Perfect (1998) and Jalilvand (1999) incorporate the risks derived from the foreign income and foreign operations

via dummy variables. Furthermore, Rajgopal and Shevlin (2002) consider sector-specific commodity risks with respect to oil and gold respectively. Since the topic of this study is related to FX risk and use of currency derivatives, FX exposure of non-financial firms is measured. To this end, EXPOSURE variable which is defined as the ratio of foreign sales to total sales is constructed. In the general sense, a positive association is expected between exposure levels and hedging.

Profitability: Profitability is also another firm specific factor discussed in the literature, namely whether how much profitable a firm is plays an important role in corporate hedging policy is investigated. This issue addressed by cost of financial distress perspective of corporate hedging. Frankly, less profitable firms are thought to have more difficulties in meeting obligations, so they face higher risk of insolvency (Aretz and Bartram, 2010). Therefore, theory expects that less profitable firms more likely to employ risk management practices to reduce risk of insolvency and cost of financial distress. Empirical studies often proxy firm profitability with return on assets (Bartram, Brown and Fehle 2009; Rogers 2002, Graham and Rogers 2002, Allayanis and Ofek 2001, Guay 1999). However, there are studies employ gross margin ratio as the proxy for firm profitability, as well (Bartram, Brown and Fehle 2009; Dionne and Triki 2004). In fact, there are only a few studies implying predicted relationship between profitability and use of derivatives. For this study, the proxy for firm profitability is determined to be the return on asset ratio and denoted by PROFIT.

Table 2: Definition of Independent Variables		
Independent Variable	**Variable Derivation**	**Predicted Sign**
Firm Size	Natural logarithm of total assets	+, -
Growth Opportunity	Ratio of market value of equity to book value of equity	+
Tangibility	Ratio of fixed assets to total assets	-
Liquidity	Current ratio	-
Dividend Policy	Dividend payout ratio	+,-
Leverage	Ratio of financial debt to market value of equity	+
Exposure	Ratio of export sales to total sales	+
Profitability	Return on asset	-

Table 3: Descriptive Statistics

	Mean	Standard Deviation	Min	Max	First Quartile	Median	Third Quartile
Hedge Dummy	0.154	0.361	0	1	0	0	0
Extent of Hedging*	1.292	2.040	-0.233	10.715	0.135	0.549	1.222
Size	19.691	1.710	15.058	24.812	18.472	19.554	20.849
Tangibility	0.511	0.206	0.005	0.968	0.351	0.510	0.675
MB	1.867	2.361	-6.627	23.226	0.758	1.310	2.190
Current Ratio	2.140	2.261	0.002	19.116	0.999	1.476	2.307
Leverage	0.618	0.925	0	7.827	0.028	0.300	0.811
Exposure	0.195	0.216	0	0.847	0.001	0.114	0.319
Dividend Payout Ratio	0.151	0.315	0	2.102	0	0	0.124
ROA	0.030	0.109	-0.551	0.458	-0.017	0.031	0.086

*Descriptive statistics for extent of hedging are presented for only whose hedge dummy variable takes 1.

3.3 Methodology

Since first dependent variable HEDGE is a dichotomous series by construction, a discrete choice model is employed to model it. To this end, the probability of FX hedging by firms is estimated using multivariate logit technique. In this context, probability of a firm to be a FX hedger can be represented as a function of explanatory variables:

$$\Pr(HEDGE_{it} = 1|X_{it}) = \frac{e^{\beta' X_{it}}}{1 + e^{\beta' X_{it}}} \tag{1}$$

$$\Pr(HEDGE_{it} = 1|X_{it}) = F(\beta' X_{it}) \tag{2}$$

where $F(.)$ denotes the logistic cumulative distribution function, X_{it} is a matrix of explanatory variables for firm i at time t and β is a vector of unknown coefficients. The methodology for logit estimation involves multi-step procedure under six different specifications. The first specification relates the hedging decision to only balance sheet explanatory variables, size, tangibility, growth opportunity, liquidity and leverage. In the second model, industry-level heterogeneity in hedging behavior is controlled by including industry dummies. In the third specification, income statement related explanatory variables are included to the model. Fourth model is most general in the sense that it is constructed with all covariates coupled with industry controls. Last two models also include yearly exchange rate change measured by average annual change in real effective exchange rate and year fixed effects.

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \varepsilon_{it} \quad (3)$$

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 IND_{it} + \varepsilon_{it} \quad (4)$$

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \varepsilon_{it} \quad (5)$$

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \beta_9 IND_{it} + \varepsilon_{it} \quad (6)$$

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \beta_9 IND_{it} + \beta_{10} \triangle_{(REER)it} + \varepsilon_{it} \quad (7)$$

$$HEDGE_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \beta_9 IND_{it} + \beta_{10} YEAR + \varepsilon_{it} \quad (8)$$

Another question to be addressed by the study is what determines the extent of hedging behavior. In this regard, the second dependent variable, the extent of hedging, is modeled using pooled OLS regressions, only on the firm/year observations with off-balance-sheet activities, given the continuous nature of the explained variable and limited size of the sample. Same six specifications employed for previous step is used for the extent of hedging, as well.

$$EXTENT_{it} = \alpha + \theta_1 SIZE_{it} + \theta_2 FIXED_{it} + \theta_3 MB_{it} + \theta_4 CURRENT_{it} + \theta_5 LEVERAGE_{it} + \varepsilon_{it} \quad (9)$$

$$EXTENT_{it} = \alpha + \theta_1 SIZE_{it} + \theta_2 FIXED_{it} + \theta_3 MB_{it} + \theta_4 CURRENT_{it} + \theta_5 LEVERAGE_{it} + \theta_6 IND_{it} + \varepsilon_{it} \quad (10)$$

$$EXTENT_{it} = \alpha + \theta_1 SIZE_{it} + \theta_2 FIXED_{it} + \theta_3 MB_{it} + \theta_4 CURRENT_{it} + \theta_5 LEVERAGE_{it} + \theta_6 EXPOSURE_{it} + \theta_7 DIVIDEND_{it} + \theta_8 PROFIT_{it} + \varepsilon_{it} \quad (11)$$

$$EXTENT_{it} = \alpha + \theta_1 SIZE_{it} + \theta_2 FIXED_{it} + \theta_3 MB_{it} + \theta_4 CURRENT_{it} + \theta_5 LEVERAGE_{it} + \theta_6 EXPOSURE_{it} + \theta_7 DIVIDEND_{it} + \theta_8 PROFIT_{it} + \theta_9 IND_{it} + \varepsilon_{it} \quad (12)$$

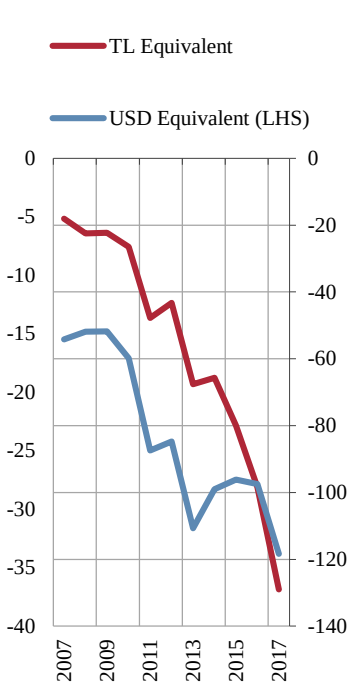
$$EXTENT_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \beta_9 IND_{it} + \beta_{10} \triangle_{(REER)it} + \varepsilon_{it} \quad (13)$$

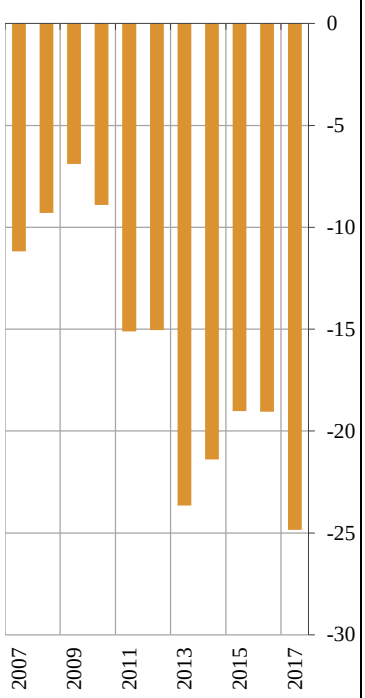
$$EXTENT_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 FIXED_{it} + \beta_3 MB_{it} + \beta_4 CURRENT_{it} + \beta_5 LEVERAGE_{it} + \beta_6 EXPOSURE_{it} + \beta_7 DIVIDEND_{it} + \beta_8 PROFIT_{it} + \beta_9 IND_{it} + \beta_{10} YEAR + \varepsilon_{it} \quad (14)$$

CHAPTER IV

FX POSITIONS AND OFF-BALANCE SHEET ACTIVITIES OF SAMPLE FIRMS

The on-balance sheet FX short position of the firms in the sample has been rising significantly throughout the sample period and it has reached 129 billion TL or 34 billion USD in 2017 (Figure 1). The firms seem to increase their FX short position after the Global Financial Crisis period. The currency composition of FX short position indicates that USD and EUR denominated FX short on-balance sheet position represents more than 90% of FX balance for each year in the sample and most of FX on-balance sheet short position is USD denominated. Besides that, it is observed that net FX short on-balance sheet position has been rising not only in absolute terms but also relative to firms' market value of equity (Figure 4). Especially after 2013, the deterioration in the FX short position to market value of equity becomes apparent due to the sharp depreciation of Turkish Lira against USD and EUR.





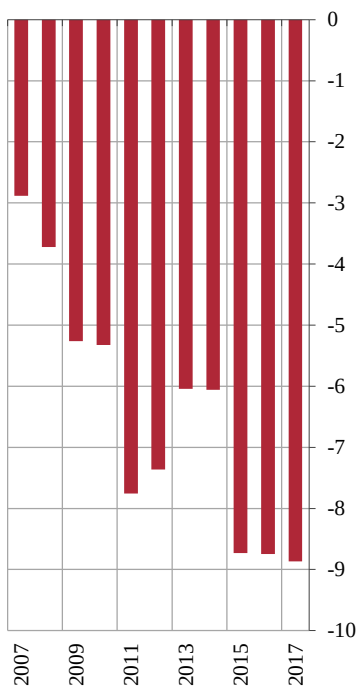


Figure 1: Total Balance Sheet FX Position of Sample Firms (Billions)	**Figure 2: Total Balance Sheet USD Position of Sample Firms** (Billion USD)	**Figure 3: Total Balance Sheet EUR Position of Sample Firms** (Billion EUR)

Source: KAP, BIST, Author's Calculations.

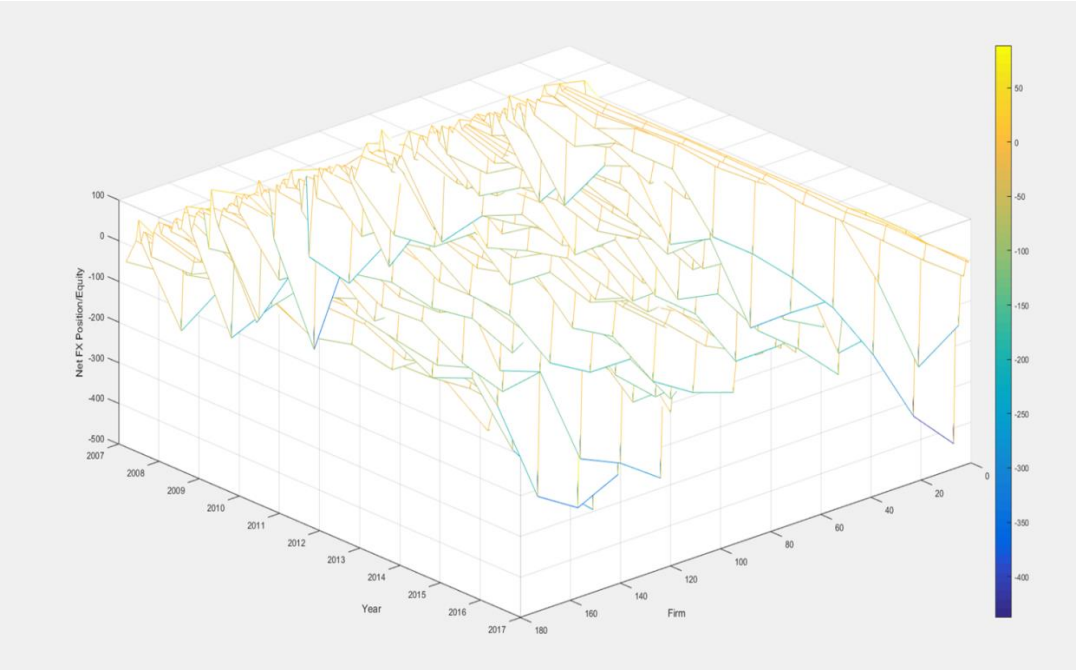


Figure 4: Net FX Position/Equity at Firm Level throughout Sample Period

Source: KAP, BIST, Author's Calculations.

However, off-balance sheet FX position of the firms shows that the firms have 55 billion TL worth of net FX long position in 2017 from off-balance sheet items. The ratio of off-balance sheet FX long position to the on-balance sheet FX short position indicates a 40% hedge overall the sample (Figure 5). Pursuing hedging statistics further at firm level, as of 2017 there are 41 firms out of 178 having non-zero off-balance sheet balance to manage currency risk (Figure 6). Moreover, in the whole sample, there are 315 observations out of 1958 having non-zero off-balance sheet balance. Lastly, the observations reveal not only rising overall hedge ratio but also increase in number of firms using currency derivative instruments throughout the sample period.

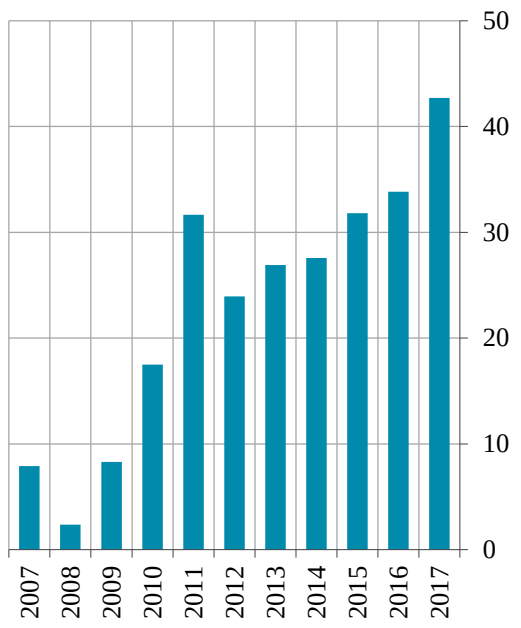


Figure 5: Hedge Ratio of Overall Sample (Percentage)

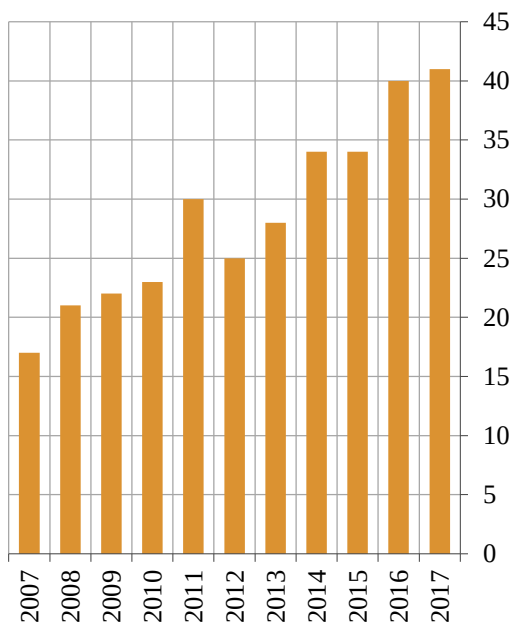


Figure 6: Number of Firms Using Currency Derivatives

Source: KAP, BIST, Author's Calculations.

Overall descriptive results presented so far provide significant insight about the FX hedging behavior of firms. If the hedging behavior is examined at firm level, there is striking heterogeneity among the firms in the sample. As of 2017, 26 firms have on

balance sheet FX short position and off-balance sheet FX long position, which forms the majority of the firms using currency derivatives. Besides these firms, 3 firms have both on-balance sheet and off-balance sheet FX long position. There are 52 firms having on-balance sheet FX long position in 2017 and 3 of them have FX short position in derivative instruments in 2017. Lastly, some of the firms have both FX short positions in on/off balance sheet position (Table 4).

Table 4: Distribution of Firms According to FX Position in 2017

		On-Balance Sheet FX Position	
		Long	Short
Off-Balance Sheet FX Position	No Balance	46	91
	Long	3	26
	Short	3	9

Source: KAP, BIST.

Besides, there are firms which have FX long position from currency derivatives, but they may have long position in one foreign currency and short position in another foreign currency concurrently. In this regard, the extent of derivative, which is the ratio of sum of off-balance-sheet assets and liabilities (related to FX derivatives) divided by the absolute value of the net on-balance-sheet FX position, might provide better information about the currency derivative usage. The extent of derivative usage seems to peak in 2012, and then it suddenly drops mainly due to the sharp reduction in off-balance sheet liability position (Figure 7). On the contrary, after performing slighter decline in 2013, off-balance sheet FX assets have kept rising significantly.

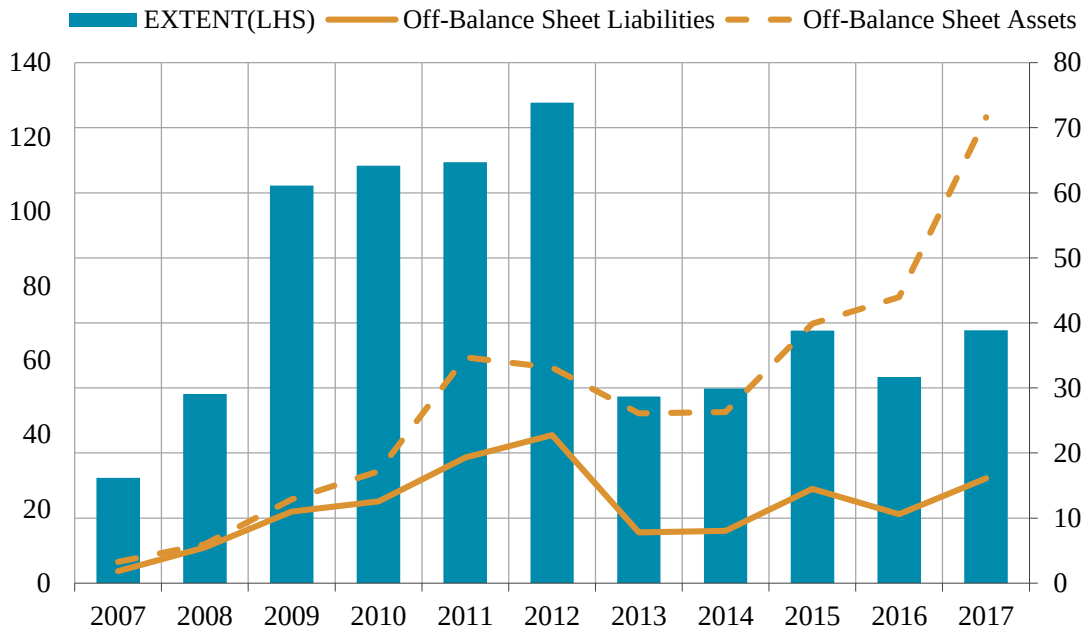


Figure 7: Extent of Hedging and Off-Balance Sheet FX positions (Percentage, TL Equivalent, Billion TL)

Source: KAP, BIST, Author's Calculations.

FX position data collected for sample firms also incorporates breakdowns of FX position in accordance with current/non-current, denomination of currency and asset/liability. There are some striking observations overall the sample related to elaboration of FX position. First, at least 80% of on-balance sheet FX assets appear to be current for each year in the period and this composition has been steady so far. Likewise, similar portion of on-balance sheet FX liabilities places on the short-term side (Appendix A). However, it should be noted that portion of long-term liabilities has been gradually rising to 30% as of 2017. Secondly, USD balances in balance sheet for both assets and liabilities significantly outweighs EUR balances in whole sample period. TL equivalent of USD balances are recorded as 1.5-2.4 times of TL equivalent of EUR balances for overall the sample in the whole sample period (Appendix B). Last but not least, while off-balance sheet net EUR position had been rising till 2011, it has declined close to zero and hovered around it since then. On the

contrary, off-balance sheet net USD position which appeared to be negative (short) as of 2010, has risen notably for the same period (Figure 8).

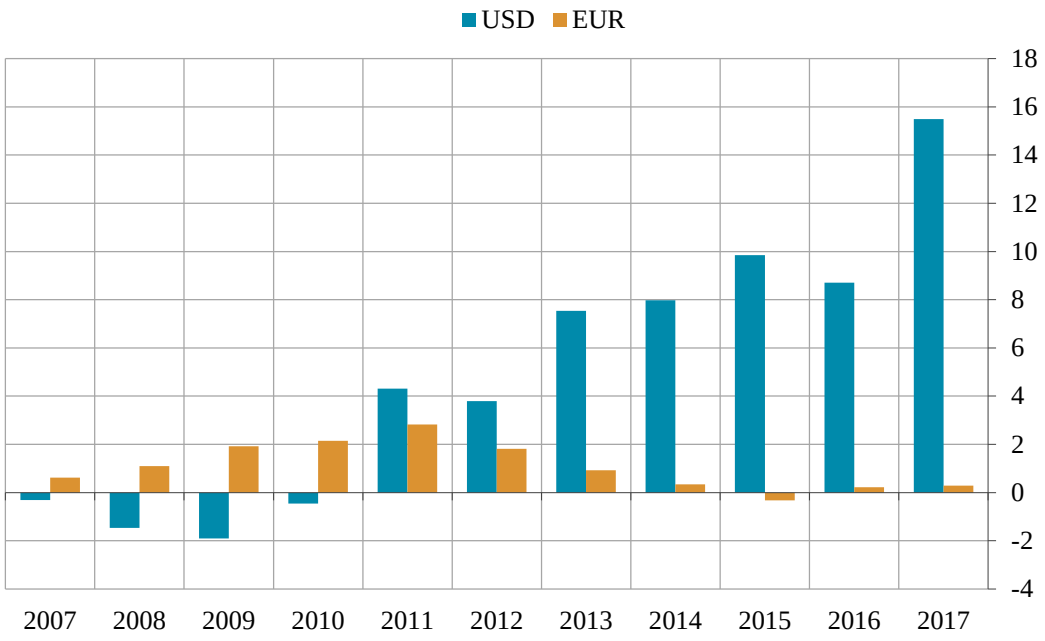


Figure 8: Total Off-Balance Sheet Net FX positions of Sample Firms According to Denomination of Currency (Billions)

Source: : KAP, BIST, Author's Calculations.

One of the critical aspects of FX hedging behavior might be related to industry specific factors. In this regard, the study groups all firms according to their own industry and provides descriptive statistics about the industry FX hedging behavior. According to 2017 year-end data, industries having highest on-balance sheet FX short positions to their assets appear to be Electricity Gas and Water, Transportation Communication and Storage, and Basic Metal Industry (Figure 9). Nonetheless, once industrial hedge ratios are concerned, Industrial Conglomerate and Transportation Communication and Storage seem to be leading industries; whereas hedge ratio of Electricity Gas and Water industry is observed as close to zero (Figure 10).

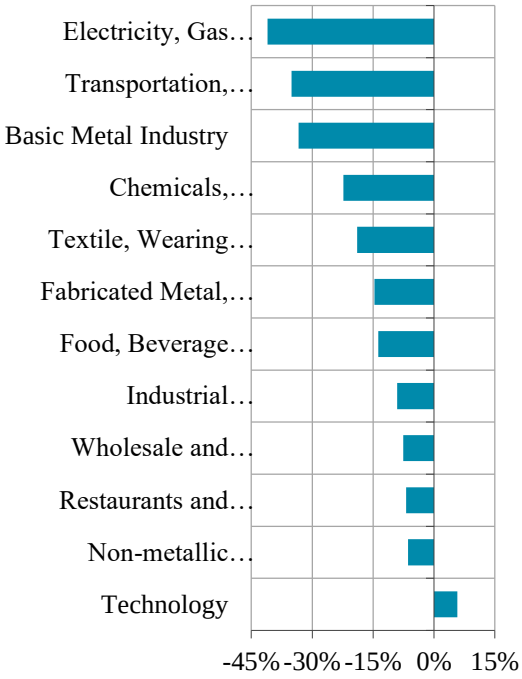


Figure 9: Balance Sheet FX Position to Total Assets as of 2017
(Industry, Percentage)

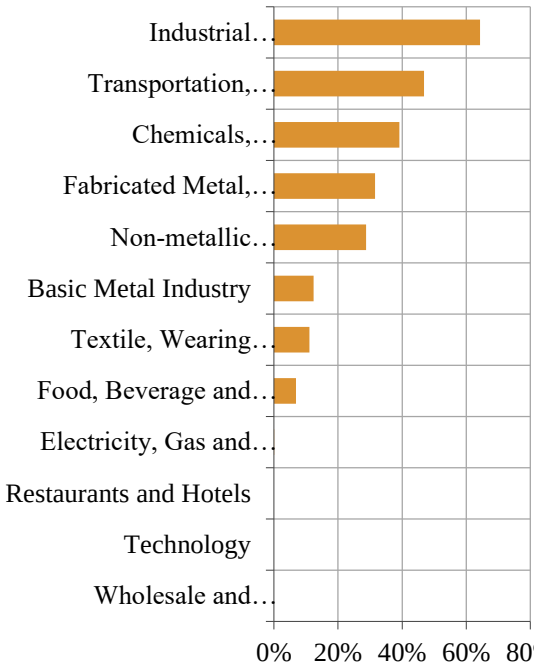


Figure 10: Hedge Ratios as of 2017
(Industry, Percentage)

Source: KAP, BIST, Author's Calculations.

Moreover, differentiation in financial and operational characteristics among industries can be noticed when industry averages are concerned. Table 5 below presents industry means of relevant ratios for the whole sample period. According to industry means, firstly, some industries seem to be associated with higher growth opportunities by investors resulting in notably higher market premiums on average. For instance, as average P/B ratio of Transportation Communication and Storage industry is being noted as slightly higher than 3, which mainly arising from communication firms; average P/B ratio of industrial conglomerates observed to be close to 1. Secondly, there are industries having relatively low leverage ratios, whereas some industries are observed to be highly levered so that attaching greater financial distress to those industries would be reasonable. In relation to this, high financial debt to market equity ratios of Electricity Gas and Water and

Transportation Communication and Storage industries draw attention. Finally, significant variation among industries can be inferred in exposure to currency risk in terms of operations captured with ratio of export sales to total sales. While sales of some industries are being concentrated to domestic market, there are industries whose more than 30% total sales are export on average.

Table 5: Industry Averages (Means) of Independent Variables

	Size	Tangibility	MB	Current Ratio	Leverage	Exposure
Non-Metallic Mineral Products	19.71	0.58	1.98	2.71	0.25	0.17
Food, Beverage and Tobacco	19.37	0.49	1.97	1.75	0.68	0.25
Industrial Conglomerates	20.90	0.58	1.07	1.83	0.56	0.13
Electricity, Gas and Water	20.61	0.85	1.54	2.48	1.90	0.01
Chemicals, Petroleum Rubber and Plastic Products	20.43	0.49	1.66	1.67	0.51	0.19
Transportation, Communication and Storage	21.93	0.66	3.03	1.28	1.49	0.11
Basic Metal Industry	19.04	0.41	1.60	1.94	0.69	0.31
Fabricated Metal Products, Machinery and Equipment	19.77	0.38	2.37	2.11	0.69	0.38
Wholesale and Retail Trade	20.61	0.44	2.80	1.36	0.50	0.01
Restaurants and Hotels	17.91	0.70	1.91	3.14	0.63	0.00
Technology	18.54	0.46	2.16	3.78	0.27	0.05
Textile, Wearing Apparel and Leather	19.12	0.51	1.02	2.07	0.83	0.31

CHAPTER V

EMPIRICAL RESULTS

This section first presents the results of univariate analysis to compare and contrast the characteristics of FX hedgers and non-hedgers with respect to the possible determinants of risk management policies. Second, detailed results of the logit estimations for the decision to hedge are provided. Lastly, for only firms with positions in FX derivative contracts, the results of OLS models that investigate the determinants of extent of FX hedging are presented.

5.1 Univariate Results

Table 6 presents the summary statistics of the firm characteristics of both hedgers and non-hedgers. The results of test statistics (t statistics for t-test and Z statistic for Wilcoxon rank sum test), are also provided to test whether there exists statistically significant difference in means and medians of hedgers and non-hedgers. The initial findings suggest that, on average, currency derivative users appear to be larger firms and hold lower level of tangible assets than non-hedgers. Both results are statistically significant. Univariate test results point out that two groups are not significantly

different from each other in terms of growth opportunities represented by market-to-book ratio. In addition, currency derivatives users' liquidity positions indicated by current ratios tend to be lower than those of non-users. Furthermore, debt ratios and FX exposure levels of hedgers are found to be statistically much higher than those of non-hedgers. Lastly, univariate analyses indicate that firms with positions placed on FX derivative contracts have higher dividend payout ratios and they are more profitable than non-hedgers.

Table 6: Comparison between Hedgers and Non-Hedgers: t-test and Wilcoxon Rank Sum Test Results

	Hedgers (n=297)		**Non-Hedgers (n=1621)**			
Variable	Mean	Median	Mean	Median	t-statistic	Z-statistic
SIZE	21.2529	21.3133	19.4328	19.3488	-17.673***	-15.136***
FIXED	0.4690	0.4673	0.5193	0.5203	3.906***	3.717***
MB	1.7030	1.3169	1.8806	1.2925	0.573	-1.021
CURRENT	1.5223	1.3428	2.2411	1.5437	5.194***	3.594***
LEVERAGE	0.9596	0.7472	0.5610	0.2257	-6.836***	-11.256***
EXPOSURE	0.2767	0.2563	0.1804	0.0922	-7.122***	-7.764***
DIVIDEND	0.2098	0.0000	0.1391	0.0000	-3.551***	-5.413***
PROFIT	0.0828	0.1064	0.0315	0.0529	-3.069***	-4.427***

*,**,*** represents statistical significance at 10%, 5% and 1% levels respectively.

5.2 Multivariate Results

Although univariate results provide an insight about the relation between FX hedging and firm characteristics, multivariate results allow us to interpret the effect of one variable on FX hedging decisions by controlling the effect of other variables. In this regard, as the first part of multivariate analysis, logit estimations are employed under five specifications. Table 7 presents the results of logit estimations of a dichotomous variable representing the derivative usage. Under the first specification in which only balance sheet covariates are utilized, firm size is found to have a positive and statistically significant coefficient implying that larger firms are more inclined to currency hedging. This finding might be explained with the fact that large firms can benefit from economies of scale in risk management activities, they may lower transaction costs and have sophisticated know-how in hedging practices. The variable representing the tangibility is found to be negatively related to the probability of hedging. Furthermore, market-to-book ratio representing the growth opportunities appears to have a significant and negative coefficient. However, this finding seems to contradict with the theoretical expectation that firms with larger set of growth opportunities are more likely to face with underinvestment costs and, hence, are more likely to engage in corporate hedging. These findings suggest that Turkish firms hold liquid assets as a substitute instead of hedging since current ratio is found to be significant. The negative coefficient of this variable indicates that non-financial firms with more liquidity buffers tend to utilize hedging practices less. Furthermore, the results of the multivariate analysis support the cost of financial distress hypothesis because financial debt-to-equity ratio is significantly and positively related to the probability of hedging.

Since industries have different tendencies for hedging as presented in Chapter IV, as a next step, industry dummies are included into the model. Industries such as basic metals, chemicals and fabricated metal products/machinery are identified as having larger hedging propensities. It turns out that results for the abovementioned factors are robust for the inclusion of industry-specific effects as the statistical significance and signs of coefficients stay same. There are slight changes in the magnitude of coefficients.

In the third specification, variables from income statements are included in the model. While dividend payout ratio and profitability are not found to be significant, FX exposure level represented by the foreign sales to total sales is found to have positive and statistically significant impact, which is consistent with the previous empirical evidence in the literature. Firm size, tangibility, growth opportunities, liquidity and leverage remain as significant determinants of the probability of hedging in this specification. When industry-level effects are added to the model in the fourth specification, it is found that size of the firm; liquidity and leverage have significant impacts on hedging probability, in line with hypothesized signs, whereas non-financial firms with higher tangibility and market-to-book ratio are still found to hedge less. In terms of the income statement related variables, FX exposure seems to lose significance when industry effects are controlled. Lastly, when the change in real exchange rate (REER) is controlled in the model with year fixed effects change, which also covers the time effect and yearly fixed effects included into model or yearly fixed effects are included in the model, results remain similar to the previous specifications.

Table 7: Logit Results						
Dependent Variable: Hedge Dummy	**1**	**2**	**3**	**4**	**5**	**6**
SIZE	0.732***	0.864***	0.726***	0.893***	0.890***	0.886***
	(0.051)	(0.063)	(0.050)	(0.069)	(0.069)	(0.068)
FIXED	-3.352***	-2.614***	-3.107***	-2.814***	-2.779***	-2.777***
	(0.412)	(0.451)	(0.439)	(0.479)	(0.485)	(0.482)
MB	-0.142***	-0.201***	-0.151**	-0.143**	-0.145**	-0.181***
	(0.048)	(0.062)	(0.053)	(0.060)	(0.060)	(0.066)
CURRENT	-0.202**	-0.167**	-0.174*	-0.138	-0.113	-0.105
	(0.081)	(0.081)	(0.083)	(0.083)	(0.084)	(0.084)
LEVERAGE	0.413***	0.412***	0.406***	0.446***	0.377***	0.358***
	(0.080)	(0.086)	(0.076)	(0.094)	(0.090)	(0.093)
EXPOSURE			1.592***	0.327	0.350	0.433
			(0.329)	(0.417)	(0.421)	(0.419)
DIVIDEND			0.170	-0.107	-0.127	-0.112
			(0.244)	(0.252)	(0.254)	(0.256)
PROFIT			0.427	-1.671	-1.642	-1.916*
			(0.904)	(1.067)	(1.067)	(1.107)
Industry Effects	No	Yes	No	Yes	Yes	Yes
Yearly Exchange Rate Change	No	No	No	No	Yes -2.678**	No
Year Fixed Effects	No	No	No	No	No	Yes
Pseudo R2	0.229	0.263	0.247	0.268	0.271	0.279
Log Likelihood	-598.568	-543.198	-565.942	-523.180	-521.087	-515.758
Number of Observations	1844	1844	1565	1565	1565	1565

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively.

Similar to Allayanis and Ofek (2001), Dolde and Mishra (2002), and Nguyen and Faff (2003), this study also examines the determinants of the extent of hedging, in addition to the decision to hedge itself. In this analysis, only the hedgers with off-

balance-sheet activities are analyzed. Table 8 summarizes the results of the OLS estimations under six specifications which are similar to the previous analyses. Extent of hedging variable used in this study is defined as a ratio of off-balance sheet derivative usage volume to absolute value of on-balance sheet FX position. In the literature, the extent of hedging is measured relative to total assets. The alternative measures of hedging are used as well and the results are discussed in the robustness section.

Hedging substitutes in the form of liquidity buffers are found to be a significant factor in explaining the volume of derivative usage with respect to the FX exposure. Fixed asset ratio stands as another explanatory variable for the level of derivative usage to some extent, the estimated coefficients do not indicate strong relationship. Similar to estimations for the use of hedging, FX exposure is also found to be a significant determinant of the extent of hedging. However, controlling for industry effects, yearly REER change and yearly fixed effect, the significance of this variable disappears. On the other hand, unlike results for the use of derivative instruments, firm size, market-to-book ratio and leverage are not found to be significant in explaining the degree of hedging Further analysis may be helpful to clarify ambiguity in these results.

Table 8: OLS Results for the Extent of Hedging

Dependent Variable: Extent of Hedging	**1**	**2**	**3**	**4**	**5**	**6**
SIZE	-0.043 (0.251)	0.088 (0.390)	0.010 (0.307)	0.001 (0.509)	0.001 (0.510)	-0.074 0.334
FIXED	-4.659* (2.642)	-1.653 (4.431)	-4.113* (2.523)	-1.932 (4.309)	-1.933 (4.313)	-5.081* (2.757)
MB	0.568 (0.899)	0.754 (0.977)	0.528 (0.805)	0.601 (0.828)	0.594 (0.825)	0.327 0.753
CURRENT	-0.688** (0.269)	-0.477** (0.216)	-0.461** (0.244)	-0.489* (0.267)	-0.501* (0.276)	-0.638* (0.366)
LEVERAGE	-0.182 (0.470)	-0.534 (0.540)	-0.174 (0.519)	-0.420 (0.527)	-0.431 (0.533)	-0.011 (0.547)
EXPOSURE			2.222** (1.152)	0.376 (1.731)	0.330 (1.746)	1.794 (1.140)
DIVIDEND			2.452 (2.223)	2.526 (2.414)	2.555 (2.434)	3.094 (2.442)
PROFITABILITY			-2.435 (5.387)	-0.134 (4.436)	0.323 (4.449)	-1.541 (5.287)
Industry Effects	No	Yes	No	Yes	Yes	Yes
Yearly Exchange Rate Change	No	No	No	No	Yes -3.488	No
Yearly Fixed Effects	No	No	No	No	No	Yes
R- Squared	0.041	0.099	0.065	0.099	0.100	0.132
Number of Observations	265	265	258	258	258	258

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively.

5.3 Further Analysis and Robustness

In investigating the factors affecting the degree of hedging using derivative instruments, alternative measures of the levels of hedging are used in the analysis. It is expected to capture more information about the extent of hedging because total derivative usage is denominated by balance-sheet FX position. However, to measure the extent of hedging, total derivative usage denominated by total assets is used in the literature. Two additional extent variables are employed in the analysis. One of them is widely used in the literature, it is denominated by total assets. The other one is denominated by total liabilities. OLS results for both extent variables are presented Table 9 (extent variable divided by total assets) and Table 10 (extent variable divided by total liabilities). In addition to substitute of hedging in the form of liquidity buffer, fixed asset ratio is found to be another significant factor in explaining the extent of derivative usage. The significance of both variables increases in explaining the alternatives measures of the extent of hedging. The results of alternative measures of extent variable seem to be similar to the previous findings. However, exposure is not found to be a significant factor even when no industry effect is controlled in the model.

As a robustness test, the size effect is investigated using dummy variables instead of using the natural logarithm of inflation adjusted total assets. Firms in the sample are classified as small, medium and large firms as follows: In each year, firms are ranked in terms of their total assets, those in the lowest 33 percentile are classified as small, those between 33% and 67% are classified as medium and the rest are classified as large. This classification is made for each year so that a firm is classified as large in one year is not necessarily to be classified as large for the whole sample period. Hence, firm size variable will be employed as a dummy variable in this alternative

Table 9: OLS Results for the Extent of Hedging (Divided by Total Assets)

Dependent Variable: Extent of Hedging	**1**	**2**	**3**	**4**	**5**	**6**
SIZE	-0.004 (0.004)	-0.007 (0.006)	-0.001 (0.004)	-0.001 (0.007)	-0.001 (0.007)	-0.005 (0.007)
FIXED	-0.227*** (0.039)	-0.146*** (0.047)	-0.239*** (0.041)	-0.179*** (0.044)	-0.179*** (0.044)	-0.179*** (0.046)
MB	-0.003 (0.004)	-0.006 (0.004)	-0.002 (0.004)	-0.005 (0.005)	-0.005 (0.005)	-0.009 (0.006)
CURRENT	-0.035*** (0.005)	-0.035*** (0.006)	-0.032*** (0.006)	-0.035*** (0.006)	-0.035*** (0.006)	-0.041*** (0.007)
LEVERAGE	0.004 (0.008)	0.004 (0.010)	0.002 (0.009)	0.003 (0.010)	0.002 (0.010)	0.001 (0.010)
EXPOSURE			0.002 (0.032)	-0.046 (0.043)	-0.047 (0.043)	-0.047 (0.043)
DIVIDEND			0.026 (0.036)	0.013 (0.039)	0.014 (0.039)	0.024 (0.039)
PROFITABILITY			-0.111 (0.113)	-0.216* (0.115)	-0.200* (0.116)	-0.191 (0.137)
Industry Effects	No	Yes	No	Yes	Yes	Yes
Yearly Exchange Rate Change	No	No	No	No	Yes -0.118	No
Yearly Fixed Effects	No	No	No	No	No	Yes
R- Squared	0.178	0.233	0.203	0.277	0.281	0.327
Number of Observations	274	274	269	269	269	269

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively.

Table 10: OLS Results for the Extent of Hedging (Divided by Total Liabilities)

Dependent Variable: Extent of Hedging	1	2	3	4	5	6
SIZE	-0.013* (0.008)	-0.018 (0.011)	-0.009 (0.007)	-0.009 (0.012)	-0.009 (0.012)	-0.015 (0.012)
FIXED	-0.288*** (0.059)	-0.153** (0.076)	-0.311*** (0.064)	-0.201*** (0.073)	-0.201*** (0.073)	-0.204** (0.080)
MB	-0.00483 (0.006)	-0.0106* (0.006)	-0.00391 (0.007)	-0.0101 (0.008)	-0.0104 (0.008)	-0.0171* (0.008)
CURRENT	-0.033*** (0.011)	-0.033*** (0.012)	-0.029** (0.011)	-0.033*** (0.012)	-0.033*** (0.012)	-0.041*** (0.013)
LEVERAGE	-0.013 (0.011)	-0.014 (0.014)	-0.016 (0.014)	-0.016 (0.015)	-0.016 (0.015)	-0.017 (0.015)
EXPOSURE			-0.007 (0.051)	-0.072 (0.071)	-0.074 (0.071)	-0.073 (0.072)
DIVIDEND			0.0431 (0.050)	0.0245 (0.055)	0.0257 (0.055)	0.0419 (0.055)
PROFITABILITY			-0.177 (0.209)	-0.354* (0.203)	-0.335 (0.203)	-0.314 (0.229)
Industry Effects	No	Yes	No	Yes	Yes	Yes
Yearly Exchange Rate Change	No	No	No	No	Yes -0.145	No
Yearly Fixed Effects	No	No	No	No	No	Yes
R- Squared	0.139	0.199	0.154	0.232	0.235	0.279
Number of Observations	274	274	269	269	269	269

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively.

specification. This specification is applied for both logit estimations and OLS regressions for three extent measures of hedging and results are presented at Table 11. Results of new specification for size are consistent with previous findings, so empirical findings seem robust to great extent. The only noticeable difference is observed for exposure variable for logit estimations. In the previous results, the significance of exposure disappears once industry effects are controlled. However, with size dummy variables, exposure variable is found to be significant for likelihood of using currency derivatives in logit estimations.

Second, in order to investigate whether firms change their hedging behavior after a year with highly volatile exchange rates, a dummy variable SHOCK, is created and interaction variables between SHOCK and other explanatory variables are included in the original models. Regarding risk management, “do nothing” can be an optimal strategy rather than hedging in a such environment that low currency volatility or high cost of hedging prevails. Some firms may be passive in risk management until a significant exogenous shock occurs. After significant exogenous shocks to currency, firms may change their risk management strategies and they may prefer to use currency derivatives and their degree of hedging may change. To examine shock effect, the sequent years after a significant change in the currency are selected. Since year-end balance sheet data are used in the analysis, end-of-year change in Real Effective Exchange Rate (REER) from December to December is obtained and the standard deviation of the percentage change in REER is calculated. Years 2007, 2008, 2010 and 2011 exhibit more than one standard deviation of the yearly REER change. As a result, SHOCK has a value of 1 in years 2008, 2009, 2011 and 2012, they represent the periods after shocks. The results are presented at Table 12. Results of this specification are also consistent with original empirical setting and alternative

Table 11: Logit and OLS Results for Alternative Specifications (Size)

	Logit P(HEDGE)	Extent (FX Position)	Extent (Assets)	Extent (Liabilities)
FIXED	-2.371*** (0.458)	-10.66 (6.619)	-0.178*** (0.047)	-0.208*** (0.077)
MB	-0.167*** (0.053)	0.475 (0.879)	-0.005 (0.005)	-0.008 (0.007)
CURRENT	-0.266*** (0.097)	-1.543* (0.787)	-0.035*** (0.006)	-0.032*** (0.011)
LEVERAGE	0.435*** (0.093)	-0.538 (0.547)	0.004 (0.010)	-0.013 (0.014)
EXPOSURE	0.867** (0.371)	-4.957 (4.134)	-0.033 (0.041)	-0.060 (0.067)
DIVIDEND	0.235 (0.228)	1.510 (2.201)	0.016 (0.039)	0.023 (0.054)
PROFITABILITY	-0.018 (0.978)	-3.522 (4.895)	-0.181 (0.113)	-0.306 (0.199)
Small Firm	-2.948*** (0.304)	-2.444 (1.875)	-0.004 (0.024)	-0.004 (0.039)
Medium Firm	-1.249*** (0.183)	-2.517 (1.683)	0.008 (0.023)	0.028 (0.039)
Industry Effects	Yes	Yes	Yes	Yes
Log Likelihood/R-Squared	-575.273	0.087	0.243	0.209
Number of Observations	1586	269	269	269

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively. Large firm is defined as a base group of firms.

size specification, so empirical findings seem robust to great extent as well. Exposure variable is found to be significant for likelihood of using currency derivatives in logit estimations alike the previous setting has indicated which is different from original empirical results. In addition, it is found that significant negative effect of fixed asset ratio is less for the following years of currency shocks as interaction term has significant positive coefficient. To sum up, results of alternative specifications seem similar to the ones in the original empirical setting in terms of both decision of using currency derivatives and extent of hedging.

Table 12: Logit and OLS Results for Alternative Specifications (Interactions with Years after Exchange Rate Shocks)

	Logit P(HEDGE)	Extent (FX Position)	Extent (Assets)	Extent (Liabilities)
FIXED	-2.289***	-10.80	-0.250***	-0.326***
	(0.557)	(10.16)	(0.061)	(0.092)
MB	-0.181***	0.454	-0.010	-0.015
	(0.066)	(0.916)	(0.006)	(0.009)
CURRENT	-0.267**	-1.567*	-0.035***	-0.026*
	(0.121)	(0.952)	(0.007)	(0.014)
LEVERAGE	0.349***	-0.992	0.005	-0.008
	(0.107)	(0.736)	(0.013)	(0.018)
EXPOSURE	0.826*	-3.547	-0.045	-0.084
	(0.466)	(4.434)	(0.045)	(0.070)
DIVIDEND	0.272	3.117	0.034	0.038
	(0.269)	(3.656)	(0.056)	(0.076)
PROFITABILITY	-0.436	-8.279	-0.216	-0.289
	(1.253)	(8.613)	(0.159)	(0.255)
SHOCK	0.924	0.164	-0.059	0.019
	(0.910)	(8.454)	(0.082)	(0.140)
FIXED*SHOCK	-0.450	3.306	0.211**	0.323**
	(0.901)	(10.19)	(0.094)	(0.161)
MB*SHOCK	-0.036	-1.292	0.006	-0.001
	(0.120)	(1.527)	(0.021)	(0.030)
CURRENT*SHOCK	0.007	0.042	-0.003	-0.025
	(0.210)	(1.509)	(0.011)	(0.020)
LEVERAGE*SHOCK	0.263	1.774	-0.013	-0.029
	(0.210)	(1.267)	(0.023)	(0.036)
EXPOSURE*SHOCK	0.139	-4.936	0.088	0.169
	(0.670)	(9.524)	(0.062)	(0.103)
DIVIDEND*SHOCK	-0.012	-4.352	-0.058	-0.058
	(0.516)	(4.063)	(0.062)	(0.090)
PROFITABILITY*SHOCK	0.475	12.00	0.037	-0.050
	(2.056)	(11.57)	(0.225)	(0.400)
Small Firm	-3.465***	-1.933	0.002	-0.005
	(0.434)	(2.556)	(0.048)	(0.070)
Medium Firm	-1.352***	-2.742	-0.022	-0.035
	(0.213)	(3.000)	(0.029)	(0.045)
Small Firm*SHOCK	-1.249**	0.702	-0.009	-0.043
	(0.593)	(2.439)	(0.051)	(0.079)
Medium Firm*SHOCK	-0.229	-0.975	-0.084*	-0.184**
	(0.355)	(3.874)	(0.043)	(0.074)
Industry Effects	Yes	Yes	Yes	Yes
Log Likelihood/R-Squared	-568.762	0.099	0.295	0.276
Number of Observations	1586	269	269	269

Robust standard errors are presented in parentheses. *,**,*** represents statistical significance at 10%, 5% and 1% levels respectively. Large firm is defined as a base group of firms.

CHAPTER VI

CONCLUSION

Derivative contracts are financial instruments which are designed for varied purposes. While they can also be utilized for speculation purposes, one vital application area is to hedge against certain risks that non-financial firms face such as interest rate risk, counterparty risk, default risk etc. However, as it is the case in several emerging market economies, these instruments are also important for non-financial firms so as to contain FX risks given the occurrence of drastic movements and volatilities in exchange rates. Hence, examining the determinants of derivatives use and the extent of this usage carries importance in terms of financial stability.

While there is a well-established literature in the cases of advanced economies, few studies have been conducted to assess the determinants of use of derivatives in emerging markets, possibly due to lack of reliable data. This study exploits a unique data set constructed from the footnotes of financial statements of non-financial companies quoted in the BIST. In particular, the information about the risk management activities, FX positions and derivatives use of 178 non-financial firms for the period covering 2007-2017 are used in the analysis.

The results of the initial analysis point out that overall on-balance-sheet open FX positions (both in terms of US Dollar and Euro) had been worsening over the sample period. However, not only the number of firms employing FX derivative contracts but also their hedge ratio had increased in the sample period. In other words, non-financial firms in the sample are utilizing off-balance sheet activities more frequently compared to earlier periods. Sample data also enables to identify the FX risks from the industry-level perspective. As of latest 2017 data, it is found that sectors such as utilities, transportation and communication, basic metal industry and chemicals carried out the largest FX open positions. On the other hand, hedge ratios are highest for the firms operating in industrial conglomerates, transportation and communications, chemicals and fabricated metal sectors.

In addition to the descriptive analysis, initial step of empirical analysis includes univariate tests to compare and contrast firm-level characteristics of hedgers and non-hedgers in the sample data. It is found that currency derivative users are larger than their non-user counterparties. They are also found to hold lower level of tangible assets and liquidity buffers. Furthermore, indebtedness and FX exposures of hedgers are identified to be higher than those of non-users. The results of univariate analysis also show that hedgers pay more dividends and they are more profitable than non-hedgers.

To gain more insight about the probability of using derivative instruments for hedging purposes is evaluated with logit regressions. In this context, a dummy variable is defined for the firm/year observations which take a value of 1 if off-balance sheet position has non-zero balance, and 0 otherwise. Firm-level determinants of derivative use are determined from the theoretical and empirical literature, representing the cost of financial distress, present value of growth

opportunities, level of FX exposure, profitability and hedging alternatives. Logit results show that firm size and leverage ratio increase the probability of hedging, while tangibility, growth opportunities and liquidity decrease it. These findings are consistent with what theory predicts except for present value of growth opportunities. Exposure measure which is found to have significant positive relationship with the tendency to use derivative instruments becomes insignificant when industry effects are controlled in the model. Hence, the portion of export sales to total sales can be suggested to be an industry specific characteristic for non-financial firms. However, with the alternative setting employed for robustness, exposure level still seems to be significant for hedging decision with the predicted sign even after industry effects are controlled.

This study also examines the determinants of extent of derivative use by non-financial firms in Turkey. Using a sample of firms which take positions in derivative contracts (for the firms whose hedge dummy variable takes the value of 1), it is found that liquidity buffers appear to have a negative and significant relationship with the extent of hedging. This relation is found to be valid across different definitions of dependent variables and robust as well according to alternatively specified models.

This research can be extended in several ways. First, in addition to the derivative use for hedging FX risks, other risks faced by corporations such as interest rate risk, maturity risk and credit risks can be investigated. In this way, one can decipher whether or not firm-level determinants of use of FX derivatives differ from that of interest rate or commodity derivatives. Second, similar analysis can be extended to financial companies, instead of non-financial companies. Since their business model and legal environment are different from that of real sector firms, determinants of

risk management activities and extent of hedging may also differ. Moreover, results of this study fail to indicate that level of FX exposure is significant in explaining the extent of hedging. One possible explanation for this finding may be that as Ayturk et al. (2016) mentioned also due to finding limited evidence about firm value increasing benefit of derivative usage for Turkish non-financial firms, the use of the percent of sales from exporting may not be an appropriate proxy for exposure without controlling natural or operational hedging activities. In fact, a firm may have similar or identical currency composition in cost structure with revenue structure, so portion of export sales may not represent implicit exposure of that firm. Hence, this study can be extended with a broader empirical setting which controls for operational and natural hedging. Lastly, there may be firms that are able to reflect FX movements to their prices. Thus, a firm's ability of reflecting FX changes to its sales may be controlled to measure a firm's exposure to foreign exchange volatility.

This study has pursued examining not only factors affecting the usage of derivative instruments but also factors affecting the degree of hedging. In addition to extent of hedging variable discussed in existing literature alternative extent of hedging variable is employed for the course of this study. With this variable, measuring derivative usage with respect to risk exposure is intended. Thus this variable is defined as total derivative usage scaled by risk exposure. Since FX positions are available data and a firm's FX position represents currency risk exposure that firm faces, this study examines only currency derivative usage. On the other hand, for instance it is more complex to measure how much interest rate risk a firm is exposed. Secondly, this study employs balance sheet data of firms because of the need for matching FX positions with derivative usage. Hence, derivative contracts which are used during year but closed before reporting date may be overlooked. Both of these

limitations may cause an underestimation of the usage of derivative instruments and the extent of hedging by Turkish non-financial firms.

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APPENDIX A: Balance Sheet FX Positions According to Liquidity and Term

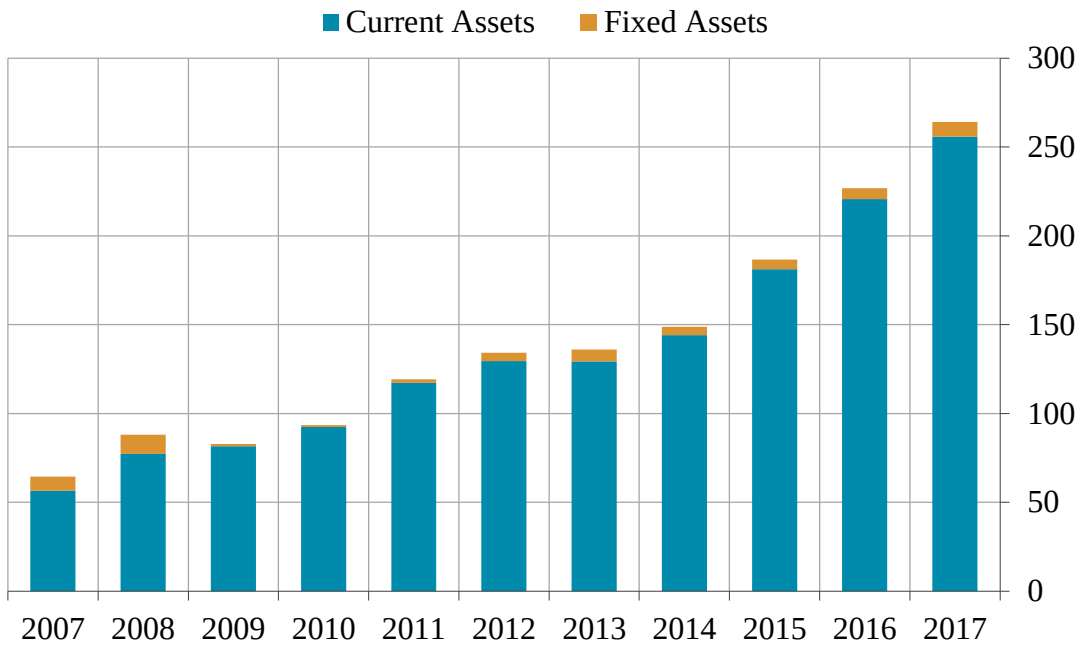

Figure 11: Total Balance Sheet FX Assets of Sample Firms (TL Equivalent, Billion TL)

Source: KAP, BIST, Author's Calculations.

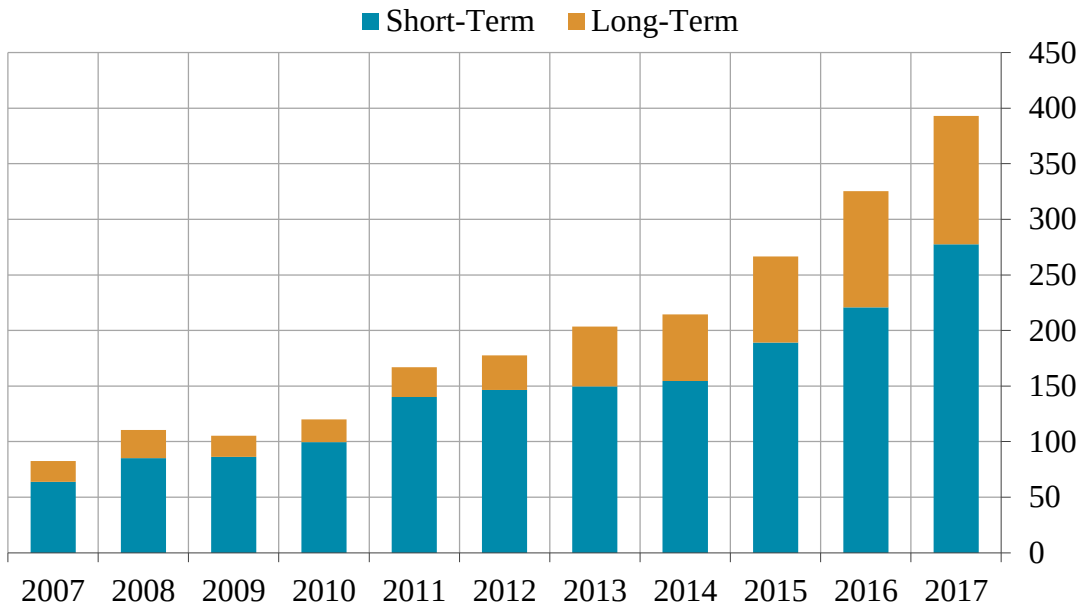

Figure 12: Total Balance Sheet FX Liabilities of Sample Firms (TL Equivalent, Billion TL)

Source: KAP, BIST, Author's Calculations.

APPENDIX B: Balance Sheet FX Positions According to Denomination of Currency

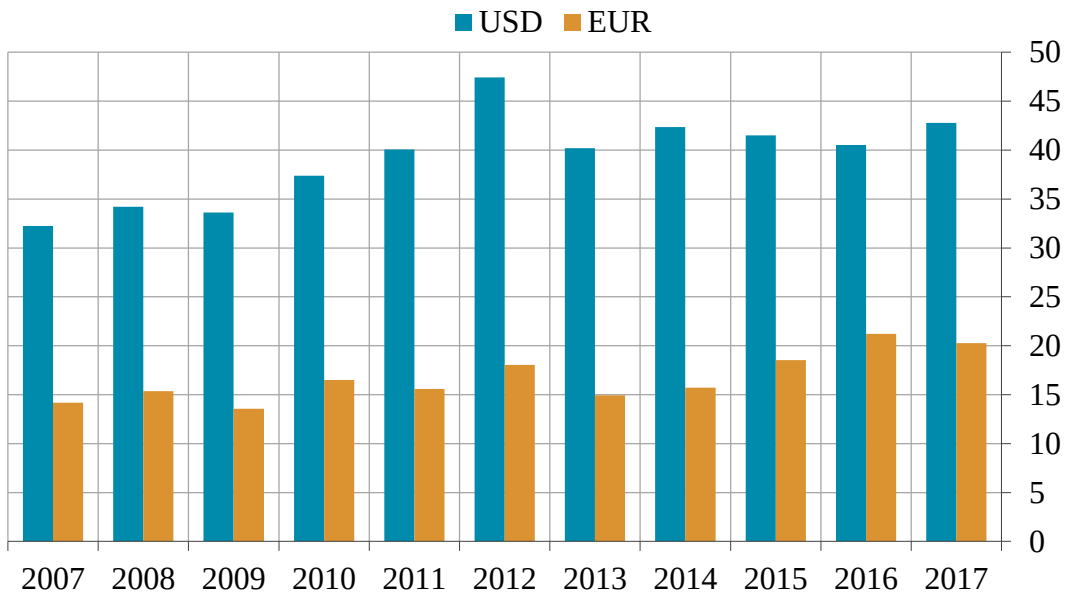

Figure 13: Total Balance Sheet FX Assets of Sample Firms According to Denomination of Currency (Billions)

Source: KAP, BIST, Author's Calculations.

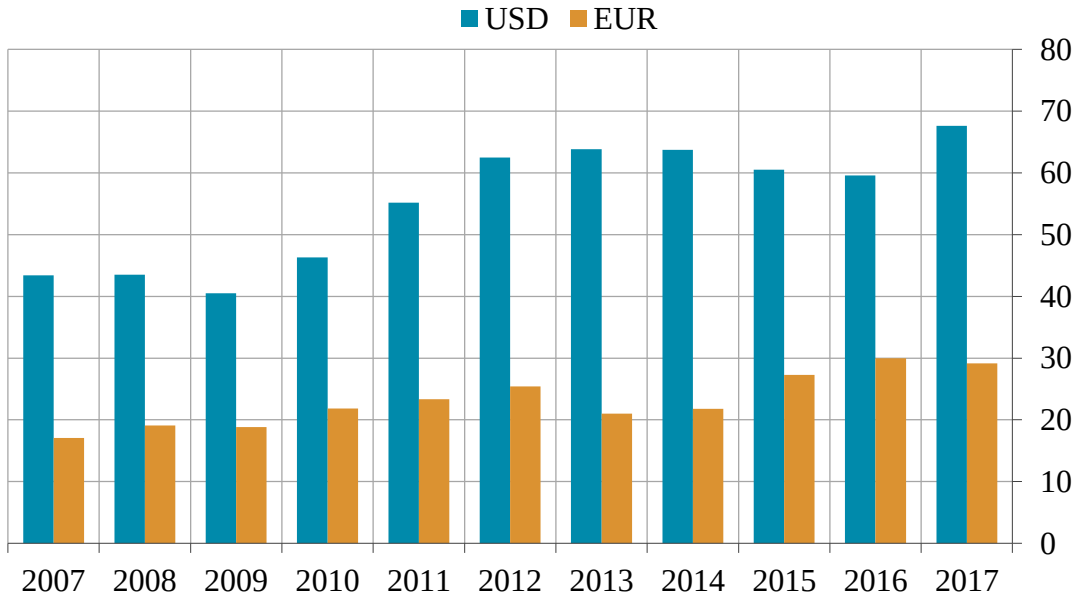

Figure 14: Total Balance Sheet FX Liabilities of Sample Firms According to Denomination of Currency (Billions)

Source: KAP, BIST, Author's Calculations.

APPENDIX C: Off-Balance Sheet FX Positions According to Denomination of Currency

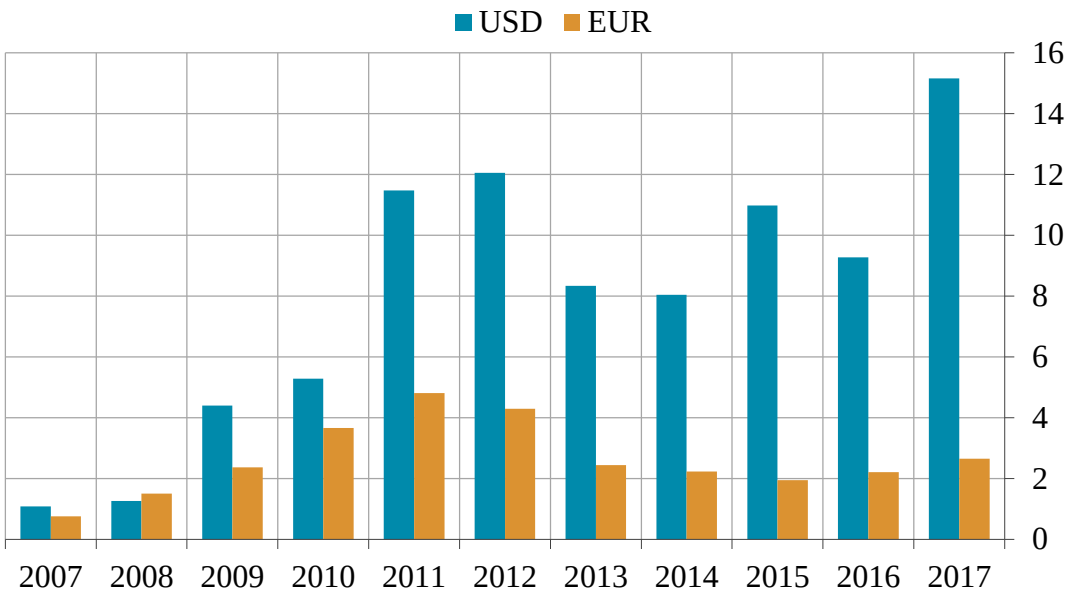

Figure 15: Total Off-Balance Sheet FX Assets of Sample Firms According to Denomination of Currency (Billions)

Source: KAP, BIST, Author's Calculations.

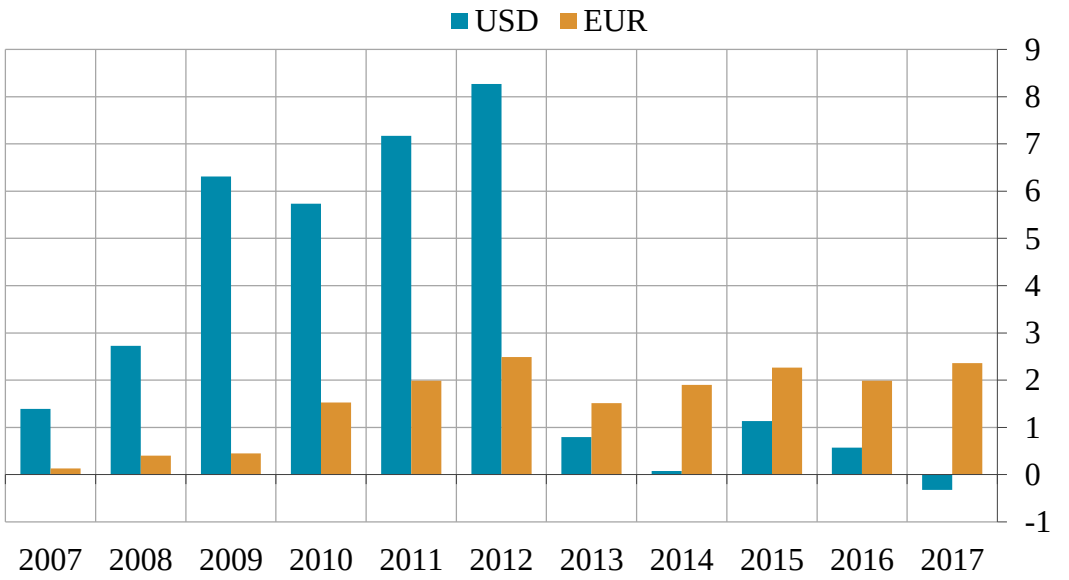

Figure 16: Total Off-Balance Sheet FX Liabilities of Sample Firms According to Denomination of Currency (Billions)

Source: KAP, BIST, Author's Calculations.