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THE RELATIONSHIP BETWEEN FOREIGN EXCHANGE RATE AND FOREIGN DIRECT INVESTMENT IN TURKEY

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ABSTRACT. The link between exchange rate and FDI flows has been investigated by several empirical studies. Besides exchange rate level and exchange rate volatility, some of the studies have also considered the effects of exchange rate expectations in their analysis. This study tries to test the hypothesis that there exists a reciprocal relationship between FDI inflows in Turkey and the real exchange rate level. Time series data for the period from January, 2007 to January, 2015 were used to investigate the effect of real exchange rate on foreign direct investment in Turkey in a long run. For this purpose, we employed a bound test cointegration approach that is based on the Autoregressive Distributed Lag Model (ARDL). The results obtained from a long-term static analysis of estimated ARDL model revealed that there is a cointegration relationship between the exchange rate level and FDI inflows in Turkey.

JEL codes: F31; F21

Keywords: Foreign Direct Investment; Real Exchange Rate; ARDL (Bound Test); Turkey

1. Introduction

In a country, when its saving level goes below its investment level, it requires to finance the saving gap. Short-term capital inflows, which are mostly done by portfolio investors, may damage the financial stability in case of a liquidity crisis in developing countries. In this context, foreign direct investment (FDI) is a more stable and preferred source of financing domestic saving deficit. Thus, to attract FDI becomes an important goal for developing countries. It is assumed that FDI brings new technology and increases tacit knowledge and productivity of workers. Besides these, FDI improves the balance of payment accounts of the host country and creates new job opportunities. There are many theories trying to explain the determinants of foreign direct investment. There are few important variables that play a role in decisions relating to foreign direct investment such as exchange rates, local barriers to trade, transaction costs, financial stability, political risks, labor costs, proximity to market, and factor endowments of host countries. One of the important determinants of FDI is the behavior of both exchange rate level and its volatility. Depreciation of a host country's currency reduces its production cost, which is called a relative wage channel. Depreciation of the local currency lowers the relative cost of capital, and thereby, supports foreign direct investments. After depreciation, foreign investors can acquire more capital with their existing wealth (Froot and Stein, 1991; Barrel and Pain, 1996; Harris and Ravensraft, 1991; Swenson, 1994). In addition, the home country's currency appreciation results in an increase in the real wealth of multinational firms, known as relative wealth channel. The more the firm accumulates wealth in the host country, the more it gets opportunity to make further investments. Klein and Rosengren (1992) showed that wealth channel was a very important variable that could explain high FDI inflows in the USA from 1979 to 1991. Portfolio investors may easily hedge their foreign exchange risk in derivative markets. However, FDI is subject to various kinds of exchange rate risks such as translation, transaction, and economic risk. Translation exposure is that foreign branches of firms should also get their balance sheet restating their financial statements in their home country. If there are changes in exchange rates, real value of firm assets will also change in the home country. Economic risk arises from the real business risk of the company (Husted and Melvin, 2010).

As stated, the level of exchange rate is a very important variable for foreign firms. So, this study is based on the effects of the exchange rate level and FDI inflows in Turkey. In this study, the existence of a cointegration relationship between the real exchange rate level and FDI inflows in Turkey was investigated. Section II summarizes recent empirical studies; Section III describes variables and discusses the empirical findings of the model; and Section IV draws important conclusions.

2. Literature Review

FDI occurs when the benefits of manufacturing in the host country outweigh the loss of large scale production associated with one plant in the home country. The choice of investment location is an important criterion for a multinational firm while deciding on FDI. Both volatility and the level of exchange rates are important factors in determination of FDI inflows and outflows. Exchange rate volatility severely affects the long-run production costs. In addition, an increase in volatility decreases investors' optimistic expectations for the economy of the host country. In other words, increase in volatility increases risk associated with the expected returns on the investment (Cushman, 1985). Several empirical studies have analyzed the relationship between FDI and exchange rate changes in terms of both the level and volatility; whereas, some have also included the effects of exchange rate expectations. It is argued that the appreciation of foreign currency increases foreign investors' wealth. Local companies become cheaper for them as compared to local investors. Baek and Okawa (2001) found that a stronger yen against the dollar and other Asian currencies promote Japanese foreign direct investment in Asia. Cushman (1985) analyzed relationship between FDI and exchange rate in different cases. An appreciation of foreign currency promotes FDI in one case, whereas causes to reduce in the other. The study of Bénassy-Quéré et al. (2001) had stated that the exchange rate volatility is detrimental to FDI.

Caves (1982) stated that the appreciating value of the dollar stimulates U.S. firms' foreign direct investments in Europe. Barrell and Pain (1996) supported this finding by stating that appreciation of the exchange rate increases direct investment to minimize the production costs. In the empirical literature, the factors that cause FDI outflows are also investigated. In this study, we focused only on the relationship between FDI inflows and exchange rate level. Amuedo-Dorantes and Pozo (2001) tested the response of FDI inflows for both the level of the exchange rate and its volatility for the period 1976–1998 in the USA; interestingly, they could not find any statistically significant relationship between the two in a short run, but their results indicated that when foreign exchange rate uncertainty increases, the FDI inflows decrease.

Takagi and Shi (2011) analyzed the relationship between the exchange rate and Japanese FDI for nine Asian countries for the period 1987−2008; and found a sharp increase in FDI inflows from Japan to the concerned countries caused by depreciation of the host country's currency. An increase in exchange rate volatility also promotes FDI inflows. This situation indicates that FDI is a substitute for exports in these countries. However, this observation is inconsistent with those made by Itagaki (1981) and Cushmans (1985). It seems that if foreign investors produce substitute products, then they have a tendency to invest more to escape foreign exchange risks. However, some other researchers showed that foreign investors either postpone or reduce their investment decisions in case of exchange rate volatility (Dixit, 1989; Campa, 1993; Kiyota and Urata, 2004).

Yapraklý (2006) indicated that the exchange rate variable, which is considered as a sign of the level of competitiveness in earlier studies, has an effect on FDI from income and cost perspectives. Depreciation allows for the investor, whose production is export-oriented, to increase the national input in terms of production along with exports and profits. This is called the income effect, and in such cases, depreciation of a currency in the foreign exchange markets positively affects FDI. However, the use of imported inputs in the production by an export-oriented investor and a high degree of dependence on imported inputs can cause the investor's exports and profits to decrease. This is known as the cost effect, and in such cases, a depreciation of the domestic currency in the foreign exchange markets negatively affects FDI. The net effect of foreign exchange rates on FDI changes with respect to the magnitude of income and cost effects. If the income effect is greater than the cost effect, an increase in the exchange rate positively affects FDI, and negatively in opposite conditions, i.e., the cost effect is greater than the income effect (Green and Clegg, 1999: 600; Chakrabarti, 2003: 156).

Özað (1994) found that the level of GDP, subsidies, and incentives have a positive effect on FDI, whereas real foreign exchange rates and labor costs have a negative effect. Likewise, Erdal and Tatoðlu (2002) found that foreign exchange rate volatilities in an economy adversely affect investments. On basis of an exhaustive literature survey of the studies performed during 1970–2006, Yapraklý (2006) concluded that there was a positive relation between foreign direct investment flows in Turkey and GDP and openness, whereas there was a negative relation between labor costs, real exchange rates, and the foreign trade deficit, along with as a reciprocal causality relationship. The negative relationship between FDI and foreign exchange rates can be considered as an indicator of the high degree of imported input usage by foreign firms operating in Turkey.

However, on this subject, all the applied studies lead to no conclusion. Edwards (1990) found that changes in exchange rates have a positive effect on FDI. Contrarily, Contractor (1990), Froot and Stein (1991), and Blonigen and Feenstra (1996) found a negative effect of exchange rate changes on FDI. Calderon and Jorge (1985), Sader (1995), and Tuman and Emmert (1999), however, could not find a significant relation between these two variables.

3. Empirical Analysis Process

The aim of this study was to analyze the relationship between the exchange rate and foreign direct investment in Turkey during January, 2007 to January, 2015.

The variables and their symbols that were used in the Model are: real effective exchange rate, *"rer"* and foreign direct investment inflows, *"fdi."* The base year of the variables is 2003=100. The required data were obtained from the EVDS system of the Central Bank of the Republic of Turkey (CBRT).

Before making a final decision on the model, wherein the variables are fed, some steps need to be taken. In the first stage, logarithm values of both the variables were considered to free them from their unit values (bringing them at the same level). In the second stage, to select the right model, stationarity levels of the variables were analyzed. Since, the plotted series did not exhibit any trend, the stationarity of the series was analyzed using Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. As shown in Table 1, the stationarity of the model variables was first analyzed for their levels; and "*lnfdý*" and "*lnrer*" variables were found to be integrated at *I(0)* and *I(I)* levels, respectively.

As depicted in Table 2, "*lnfdý"* and "*lnrer"* become stationary at *I(0)* and *I(I)* levels, respectively. After analyzing stationarity, as shown in Tables 1 and 2, we decided to use the ARDL analyses (Auto Regressive Distributed Lags/Bound Test).

Table 1 ADF and PP Tests Results (with constants)

Variables	ADF		PP	
	Level	1^{ST} Difference	Level	1^{ST} Difference
lnfdi	-9.656221(0)		-9.662100(4)	
lnrer	-1.870959(4)	-5.566494(3)	-2.103793(2)	-7.898726(2)

Note: Variables are statistically significant at *5%* level; and the optimal lag lengths of the variables are shown in parentheses.

Since we felt it would be wise to consider the international financial crisis, which started after the Lehman Brothers' bankruptcy in 2008 and severely affected the sector, we checked for the existence of a structural break by employing Zivot and Andrews one break test. We employed Zivot and Andrews unit root test, which internally determines structural breaks, to check if structural breaks cause spurious unit roots and if the series really integrates at the same level (Küçüksoy and Çiftçi, 2014). According to the results presented in Table 2, we can say that since "*lnfdý"* and "*lnrer"* become stationary at *I(0)* and *I(I)* levels, the results of the Zivot and Andrews test support the ADF and PP tests. As a result, we have decided that because *I(0)* and *I(I)* are stationary at different levels and none of the variables is *I(II),* ARDL Test (Bound Test) should be used.

Table 2 Zivot and Andrews (1992) one break tests (with constants)

Variables	t-statistics [k]	Prob.	Break Date
lnfdý	−8.520055 [1]	0.008639	2008:09
lnrer	−3.786376 [3]	0.044449	2011:05

Note: The critical values for Zivot and Andrews (1992) test are −5.34, −4.93 and −4.58 and significant at the 1%, 5% and 10% levels for constant model, respectively (Zivot and Andrews, 1992).

ARDL Test (Bound Test) methodology of Pesaran et al. (1999, 2001) provides several advantages to researchers over conventional cointegration testing methods. According to this approach, even if some time series are integrated in order *I(0)* or *I(I)*, the long-term relationship between the series can be investigated. It involves only a single-equation set-up that makes it simple to implement and interpret. In addition, different variables can be assigned into different lag-lengths as they enter into the model (Giles, 2013). The bound test approach has been employed to find out the long-run relationship between the two variables, the exchange rate level and FDI inflows, because ARDL methodology is free from burden of establishing order of integration among the variables.

We used equation (3.1) for the estimation:

$$\Delta lnfdi_t = \beta_0 + \sum_{i=0}^{k} \beta_{1i} \Delta lnfdi_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta lnrer_{t-i} + \beta_3 lnfdi_{t-1} + \beta_4 lnrer_{t-1} + \beta_5 d1 + u_t \qquad (3.1)$$

The variables, $Älnfdi_t$, $Älnrer_t$, $d1$, andu_t, represent direct investment inflows in Turkey, real effective exchange rate, the dummy variable, and error-term, respectively. "*Ä*" and *"ln"* represent first difference and logarithmic form, respectively. ARDL analysis involves certain steps for estimation of long-term coefficients of the variables. The steps applied in the estimation of long-term coefficients of the equations are based on the study of Þimþek and Kadýlar (2005). First of all, an appropriate lag structure, according to Akaike Info Criterion (AIC), was chosen for the model. The minimum AIC level reached at the second level. Unrestricted Error Correction Model was employed with OLS for the model and the estimation results are given in Table 3. CUSUM test result confirmed that the model satisfies the stability condition. This can be seen in Graph 1. Moreover, diagnostic tests were also applied, and the results are shown in Table 4.

Table 3 Model Unrestricted ECM-OLS Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	27.98246	7.848061	3.565525	0.0006
Ä(lnfdý(-1))	0.245863	0.148267	1.658245	0.1009
Ä(lnfdý(-2))	0.087391	0.103311	0.845908	0.4000
Ä(lnrer(-1))	3.496983	3.001060	1.165249	0.2471
Ä(lnrer(-2))	1.555925	3.096882	0.502416	0.6167
lnfdý(-1)	-1.190711	0.190315	-6.256511	0.0000*
lnrer(-1)	-3.056212	1.431335	-2.135218	0.0356*
d1	0.348320	0.267062	1.304266	0.1956
R-squared	0.491015	Mean dependent var		-0.003789
Adjusted R-squared	0.449586	S.D. dependent var		0.973794
S.E. of regression	0.722457	Akaike info criterion		2.268947
Sum squared resid	44.88716	Schwarz criterion		2.485397
Log likelihood	-98.64050	Hannan-Quinn criter.		2.356377
F-statistics	11.85195	Durbin-Watson stat.		1.994858

Prob (F-statistics)	0.000000	
ECT(-1) -1.059931		Prob. 0.0000

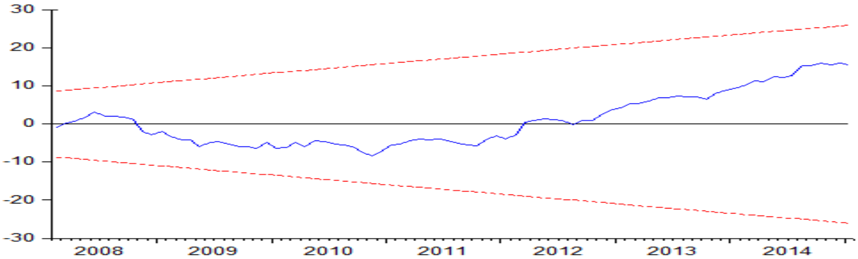
Note: The corresponding coefficient is significant at 5% level

Table 4 Residual Diagnostic Various Tests

Diagnostic Tests	P-Values*
Breusch-Godfrey Serial Correlation LM Test	0.990
Heteroskedasticity Test: ARCH	0.688

Note: * 5% significance level was considered.

Graph 1 CUSUM Test Results



Note: the corresponding coefficient is significant at 5% level

The next step of this empirical analysis is to test the existence of a long-term cointegration relationship between the variables, *"lnfdi"* and *"lnrer",* by employing the Bound Test Approach. The calculated *F*-statistics is obtained from unrestricted ARDL-ECM. Then, the critical values of *F*-statistics are tabulated by following the study of Pesaran, et al. (2001). If the calculated *F*-test exceeds the upper bound value, the null hypothesis of no cointegration can be rejected. The results from Table 5 show that the calculated *F*-test statistics is higher than the upper bound value. According to Wald Test (*F*-statistics) results, which are shown in Table 5, the long-term cointegration relationship exists between *"lnfdi"* and *"lnrer"* in this model.

Table 5 Results of Bound Test for Cointegration

Test Statistic	*Value*	*df*	*Probability*	*Results*
F-statistic	*19.63680*	*(2, 86)*	*0.0000*	*Co-integration exists*
Chi-square	*39.27361*	*2*	*0.0000*	
Null Hypothesis: C(6)=C(7)=0				

Note: *Pesaran, et al. (2001:300). Table C1 (iii).

To be able to comment on the results, the statistics given in Table 5 need to be compared with the critical values given in Table CI (iii) in the study of Pesaran et al. (2001). According to the bound *F*-test, because in unrestricted intercept and no trend model, the calculated *F*-statistics value for $k=2$(19.64) is greater than the upper bound value (4.85), the null hypothesis that there is no long-term relationship is rejected. This results shows that there is a long-term relationship between foreign direct investment inflows and real effective exchange rates. In other words, the two variables move together in a long run.

In the following stage, long-term elasticities, obtained from the results estimated with OLS of the Unrestricted Error Correction Model, were calculated as: the coefficient of one lagging independent variable is multiplied by a negative sign and divided by the coefficient of the lagged value of the dependent variable (Simsek and Kadilar, 2005). According to the coefficients that we have calculated in this framework, the elasticity of "*lnrer*" is −2.57.

In the final stage, short-term parameters were estimated. These models are supported by diagnostic tests. However, the calculated *F*-statistics value (0.34) is less than the upper bound value; therefore, no short-term relationship was found between foreign direct investment and foreign exchange rates.

4. Conclusion

A decision of foreign direct investment is a very controversial issue. The firms need to take into account both the involved risks and the accrued benefits. In other words, foreign direct investment has many pros and cons. Therefore, foreign direct investment decisions cannot be taken only on the basis of short-term macroeconomic variables and environmental factors. It is a long run phenomenon. This study could not find any statistically significant relationship between foreign direct inflows and exchange rate level in a short run, but results indicate that foreign exchange levels and direct investment inflows correlate in a long run. The rise in the real exchange rate level represents appreciation of the domestic currency for Turkey. The estimation results showed that real exchange rate appreciation causes a decrease in the foreign direct inflows. It seems that the wealth channel is valid for Turkey. To put it more clearly, if domestic currency depreciates sharply, the international price of domestically owned enterprises also falls; and as a result, foreign firms divert their investments to Turkey.

REFERENCES

Amuedo-Dorantes, C. and Pozo, S. (2001), "Foreign Exchange Rates and Foreign Direct Investment in the United States," *The International Trade Journal* 15(3): 323-343.

Baek, In-M, and Okawa, T. (2001), "Foreign Exchange Rates and Japanese Foreign Direct Investment in Asia," *Journal of Economics and Business* 53: 69-84.

Barrell, R., and Pain, N. (1996), "An Econometric Analysis of U.S. Foreign Direct Investment," *The Review of Economics and Statistics* 78(2): 200-207.

Bénassy-Quéré, A., Fontagné, L., and Lahrèche-Révil, A. (2001), "Exchange Rate Strategies in the Competition for Attracting Foreign Direct Investment," *Journal of the Japanese and International Economies* 15: 178-198.

Blonigen, B. A., and Feenstra, R.C. (1996) "Protectionist Threats and Foreign Direct Investment," NBER Working Paper No. 5475: 1-43.

Calderon, R., and Jorge, J. (1985), "Towards the Theory of Foreign Direct Investment," *Oxford Economic Papers* 37(2): 282-291.

Campa, J. M. (1993), "Entry by Foreign Firms in the United States under Exchange Rate Uncertainty," *Review of Economics and Statistics* 75: 614-622.

Caves, R. E. (1982), *Multinational Enterprise and Economic Analysis*. Cambridge: Cambridge University Press.

Chakrabarti,A. (2003), "A Theory of the Spatial Distribution of Foreign Direct Investment," *International Review of Economics and Finance* 12(2): 149-169.

Contractor, F. J. (1990), "Do Government Policies Toward Foreign Investment Matter?," Rutgers University GSM Working Paper 15: 1-88.

Cushman, D. (1985), "The Real Exchange Rate Risk Expectations, and the Level of Direct Investment," *The Review of Economics and Statistics* 67(2): 297-308.

Dixit, A. (1989), "Entry and Exit of Firms under Uncertainty," *Journal of Political Economy* 97(3): 620-638.

Edwards, S. (1990), "Capital Flows, Foreign Direct Investment and Debt Equity Swaps in Developing Countries," NBER Working Paper 3497: 1-35.

Erdal, F., and Tatoðlu, E. (2002), "Locational Determinants of Foreign Direct Investment in an Emerging Market Economy, Evidence From Turkey," *Multinational Business Review* 10(1): 21-27.

Froot, K. A., and Stein, J. C. (1991), "Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach," *The Quarterly Journal of Economics* 106(4): 1191–1217.

Giles, D. (2013), "ARDL Models - Part II - Bounds Tests," http://davegiles.blog spot.ca/2013/06/ardl-models-part-ii-bounds-tests.html (Accessed: 1.02.2015).

Green, S. S., and Clegg, J. (1999), "The Determinants of New FDI Capital Flows into the EC: Statistical Comparison of USA and Japan," *Journal of Common Market Studies* 37(4): 597-616.

Harris, R. S., and Ravenscraft, D. (1991), "The Role of Acquisitions in Foreign Direct Investment: Evidence from the US Stock Market," *Journal of Finance* 46(3): 825-44.

Husted, S., and Melvin, M. (2010), *International Finance*. 8th edn. Boston, MA: Addison-Wesley.

Küçüksoy, Ý., and Çiftçi, Ý. (2014), "Dýþ Ticaret Hadlerinin Dýþ Ticaret Dengesine Etkisi: Harberger-Laursen-Metzler Hipotezinin Türkiye Uygulamasý (The Effect of Terms of Trade on Balance of Trade: Application of Harberger-Laursen-Metzler Hypothesis for Turkey," *Optimum Journal of Economics and Management Sciences* 1(2): 103-129.

Itagaki, T. (1981), "The Theory of the Multinational Firm under Exchange Rate Uncertainty," *Canadian Journal of Economics* 14(2): 276-297.

Kiyota, K., and Urata, S. (2004), "Exchange Rate and Exchange Rate Volatility and Foreign Direct Investment," *The World Economy* 27(10): 1501-1536.

Klein, M. W., and Rosengren, E. (1992), “The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wages,” NBER Working Papers 4192: 1-26.

Özað, F. E. (1994), “Ev Sahibi Ülke Açýsýndan Yabancý Sermaye Yatýrýmlarýný Etkileyen Faktörlerve Türkiye Üzerinebir Uygulama (Factors that Affecting the Foreign Direct Investment in terms of Host Country and an Application on Turkey),” *Ekonomik Yaklaþým* 5(12): 63-77.

Pesaran, M. H., Shin, Y., and Smith, R. J. (2001), “Bounds Testing Approaches to the Analysis of Level Relationships,” *Journal of Applied Econometrics* 16: 289–326.

Pesaran, M. H., Shin, Y., and Smith, R. J. (1999), “Bounds Testing Approaches to the Analysis Long Run Relationships,” 1-39, http://www.econ.ed.ac.uk/papers/pss1new.pdf (Accessed: 01.02.2015).

Sader, F. (1995), “Privatizing Public Enterprises and Foreign Investment in Developing Countries, 1988-93,” Foreign Investment Advisory Service Occasional Paper 5: 1-62.

Þimþek, M. and Kadýlar, C. (2005), “Türkiye'nin Ýhracat Talebi Fonksiyonunun Sinir Testi Yöntemiile Eºbütünleºme Analizi (The Cointegration Analysis of Turkey’s Export Demand Function by Bounds Test),” *Doðuþ University Journal* 6(1): 144-152.

Swenson, D. (1994), “Impact of US Tax Reform on Foreign Direct Investment in the United States,” *Journal of Public Economics* 54(2): 243-266.

Takagi, S., and Shi, Z. (2011), “Exchange Rate Movements and Foreign Direct Investment: Japanese Investment in Asia, 1987-2008,” *Japan and the World Economy* 23(4): 265–272.

Tuman, J. P., and Emmert, C. F. (1999), “Explaining Japanese Foreign Direct Investment in Latin America 1979-1992,” *Social Science Quarterly* 80(3): 539-555.

Yapraklý, S. (2006), “Türkiye’de Doðrudan Yabancý Yatýrýmlarýn Ekonomik Belirleyicileri Üzerine Ekonometrik Bir Analiz (An Econometric Analysis on the Economic Determinants of Foreign Direct Investments in Turkey),” *D.E.Ü. Ý.Ý.B.F. Dergisi* 21(2): 23-48.

Zivot, E., and Andrews, D., (1992), “Further Evidence of the Great Crash, the Oil-price Shock and the Unit-root Hypothesis,” *Journal of Business and Economic Statistics* 10: 251-270.