EXCHANGE RATE RISK and INTERNATIONAL TRADE: SURVEY RESULTS on TURKISH FIRMS

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ÖZET

Bu çalışma döviz kuru riski ve uluslararası ticaret arasındaki ilişkiyi Türk firmalari için incelemektedir. Önceki çalışmalardan farklı olarak, firmalara uygulanan bir anketin sonuçları değerlendirilmektedir. Sonuçta, firmaların, genelde, USD ve Euro'daki değişmelerden kaynaklanan bu riskin farkında olduklarını, ve kendilerini doğal hedge ile veya fiyatlarını düzenleyerek koruduklarını görmekteyiz.

Anahtar Kelimeler: Döviz kuru riski, Uluslararası ticaret

JEL code: F10, F31

ABSTRACT

This study investigates the relationship between exchange rate risk and international trade for Turkish firms. Different from earlier studies, we examine responses to a survey. We find that firms are aware of exchange rate risk, which is mainly caused by the movements in Euro and USD, and protect themselves through natural hedging or price adjustments.

Key Words: Exchange Rate Risk, International trade

JEL code: F10, F31

I. Introduction

With the higher than expected volatility of exchange rates after the breakdown of the Bretton-Woods system in early 1970s, researchers had expected a reduced volume of international trade. Early studies provided some evidence that supported this expectation both

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theoretically and empirically (e.g., Clark, 1973, Ethier, 1973; Hooper and Kohlhagen, 1978; Cushman, 1986; Savvides, 1992). However, later studies showed necessary and sufficient conditions that may lead to ambiguous or even positive relationship between international trade and exchange rate risk. Some examples for theoretical studies are Neumann (1995), Franke (1991), Viaena and Vries (1992), and for empirical studies are Assery and Peel (1991)[1].

This study also examines the relationship between exchange rate risk and trade flows. Nonetheless, we do not try to test this relationship, but rather evaluate firm level data to provide information on firms' exposure to exchange rate risk and the methods they use to protect themselves.

The remainder of the paper is organized as follows. Section 2 briefly reviews the data sources and relevant economic information for the trade-risk relationship in Turkey. Section 3 discusses the survey results. Finally, section 4 reports our main conclusions.

II. Data and Descriptive Statistics

Firm level data is obtained from *Istanbul Stock Exchange*[2] for the largest 133 firms in Turkey with international transactions. These firms are then contacted for a survey on risk and trade relationships. Only 23 firms responded to the survey giving us a 17.3% response rate.

Some descriptive statistics of the firms that responded to the survey are provided in Table 1. The median number of employees is 730, with the smallest being 145 and the largest being 3879. The average value of exports is around 83 million US dollars (USD) in 2005, while the average value of imports is around 101 million US dollars. Although we observe a slight growth in the average value of exports, the average value of imports grows significantly from 2004 to 2005. Interestingly, both the share of export revenue in total and the share of import cost in total remain stable from 2004 to 2005. The median value of the coverage ratio is 0.75 in 2005, indicating that, on average, export revenue covers 75% of import expense. If both the import and the export contracts are in

[1] Solakoglu (2005) study applies extreme bound analysis (EBA) and finds that the relationship between exchange rate risk and international trade is not robust.
[2] www.ise.gov.tr

the same currency denomination, this may help firms to naturally hedge their exchange rate risk when timelines for inflows and outflows match to a degree. On the other hand, existence of the differences between the currency unit used for exports and imports can lead to additional risk for an individual firm. For instance, a firm, with both positive levels of imports and exports, can use Euro for exports but USD for imports. In that case, it is not just the volatility of Euro and USD in terms of Turkish lira that matters, but also the volatility of USD in terms of Euro.

Table 1: Descriptive Statistics

	Average	Median	Std. Error	Min	Max
# of Employees	1056.80	730.50	219.01	145.00	3879.00
Export value (2005) [a]	83.25	29.56	23.34	2.99	282.63
Import value (2005) [a]	101.74	31.80	31.49	0.18	420.75
Export value (2004) [a]	71.20	38.38	18.88	3.32	221.87
Import value (2004) [a]	80.35	35.97	23.30	0.58	322.34
Share of export revenue in total revenue (2005)	30.83	24.50	5.18	6.00	78.00
Share of import cost in total cost (2005)	41.37	37.00	4.99	15.36	81.72
Share of export revenue in total revenue (2004)	30.64	22.32	5.04	6.00	78.00
Share of import cost in total cost (2004)	40.72	35.00	4.63	14.26	79.46
Export / Import coverage ratio (2005)	1.20	0.75	0.23	0.12	3.35
Export / Import coverage ratio (2004)	1.60	0.81	0.45	0.08	7.76

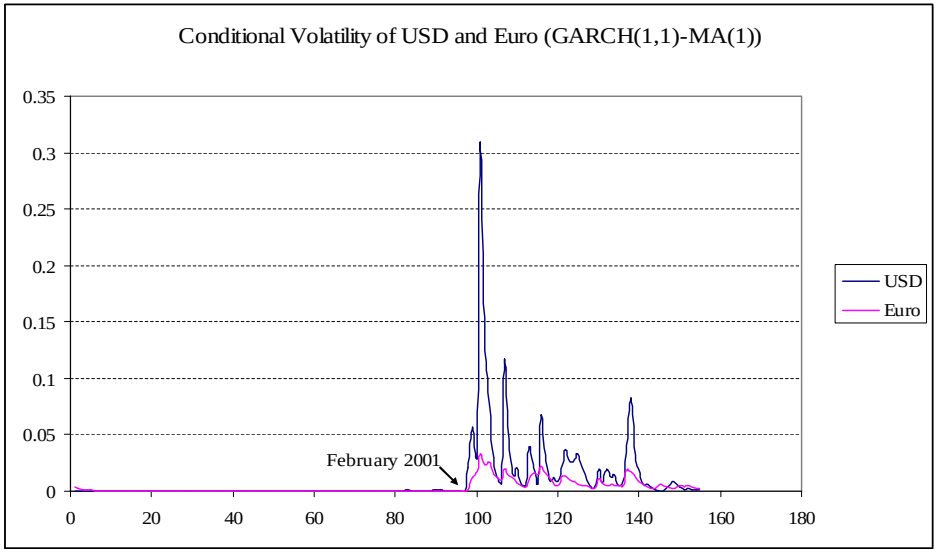
a: in millions

If we examine the international trade of Turkey for 2005, we notice that the top 10 trading partners include mostly European countries and the USA[3]. As a result, the majority of the international transactions are expected to involve three currencies: TL, Euro and USD. Moreover, when we consider the top 20 trading partners, about 70% of transactions are expected to involve these three currencies[4]. For example, in 2005, the European Union countries were the largest group of countries for Turkish exports, with about 52.5% of total volume. For imports, this share was slightly smaller around 43.9%. Hence, it should not be too problematic if prices of US dollar and Euro are used to measure the exchange rate risk faced by Turkish firms with international transactions.

[3] These are Germany, U.S.A., U.K., Italy, France, Spain, Netherlands, the Russian Federation, Israel and Greece.

[4] Trade level information for Turkey is available at the http://www.dtm.gov.tr/ web site for *Undersecretariat of the Prime Ministry for Foreign Trade*.

Figure 1: A Measure of Exchange Rate Risk



In the literature, there are several measures used to proxy exchange rate risk. These measures range from standard deviations of exchange rates to conditional volatility obtained from a GARCH type model[5]. The exchange rate volatility for the period between February 1993 and December 2005 are provided in Figure 1 for exchange rates between Euro-YTL and USD-YTL. Both volatility measures are estimated with a GARCH(1,1)-MA(1) specification and they both reveal a jump in volatility after February of 2001[6]. The jump in volatility was expected as a result of the financial crisis during that time. Although volatility shows a declining trend, it is still higher than pre-2001 period. The volatility particularly does not become stable until January of 2005. As a result of this finding, we expect firms to be negatively affected by this higher risk or we expect them to be more effective in managing that

[5] Generalized Autoregressive Conditional Heteroscedasticity (GARCH) models are heavily used in financial literature to model conditional volatility. For more details, see Engle (1982), and Bollerslev (1986).

[6] To estimate GARCH(1,1)-MA(1) model, monthly data obtained from Central Bank of Turkey is used. Estimated model is defined as:

$$\Delta s_t = \mu + e_t + \theta e_{t-1} \text{ with } h_t = \delta + \alpha e_{t-1}^2 + \beta h_{t-1}$$

In the model, s is the price of USD and Euro in terms of local currency, □ is the difference operator, and h is the conditional volatility.

risk. It is hoped that the survey responses will shed some light on their behavior.

III. Survey Results

Table 2 reports the currencies used for international trade, domestic sales and major trading partners for our sample. Consistent to the total Turkish exports and imports, it is evident that the major partners are the United States and the European Union countries[7]. It appears that USD is the preferred currency for both exports and imports. Firms that responded to the survey indicated that 57.3% of their export contracts and 52.4% of import contracts, on average, are denominated in USD. Euro appears to be the closest second alternative. As a result, firms use either USD or Euro for their transactions. As a result, the exchange rate risk is mainly carried out by the movements in these two currencies. For domestic sales, on the other hand, Turkish Lira is the currency being used. However, a significant share of sales is also completed via USD. For these firms, USD is the preferred currency for both exports and imports, that around 70% and 75% of exports and imports, respectively, are contracted in USD. About 62.5% of these firms also indicate that they tie their price to foreign currency to lower exchange rate risk. For firms that do not use USD in domestic sales, this number is around 43%.

Table 2: Markets for Trade and Currencies Used

	USD	Euro	YTL	Other
Currency used for exports (%)	57.3%	41.0%	0.7%	1.2%
Currency used for imports (%)	52.4%	46.6%	0.0%	1.0%
	US	EU	Other Europe	Other
Major export markets (% exports)	54%	35%	--	35%
Major import markets (% imports)	53%	62%	38%	59%
	USD	Euro	YTL	**Other**
Currency for domestic sales (%)	28.0%	4.9%	67.3%	0.1%

[7] Based on the largest trading partners reported in the survey.

Based on the survey responses, we can agree that the firms are aware of the exchange rate risk and are affected to some degree. About 78% of these firms indicate that this risk impacts their production and trade decisions. In addition, around 33% of these firms try to lower or eliminate that risk by following a natural hedging strategy. That is, they try to match import expense by export revenue. Given that only 1 out of 3 firms use that strategy, we can assume that they either use different currencies for exports and imports or it is not an easy task to match cash inflows and outflows. As expected, only 27% of the firms utilize derivative products to hedge that risk. Since Turkey does not have a well-developed market for derivative products, this should not be surprising.

Furthermore, only about 52% the firms report the existence of a risk department. This is again surprising as most firms imply that they are aware of the risk and its impacts on production and trade. About 61% of the firms indicate that they protect themselves from exchange rate risk by adjusting their pricing-to-market. In other words, sale price is adjusted based on a mark up over exchange rate adjusted cost. This is perhaps true for importing, but it will be extremely difficult to attain a similar adjustment for an exporter as they compete in a highly competitive market.

Table 3 reports the coverage ratios, the value of exports, the value of imports, the share of export revenue in total, and the share of import cost in total for the firms in our sample by the different hedging strategies employed for 2005. The median value of the cover ratio, which is measured as the export value divided by the import value, is 1.82 for the firms, which indicate that they use revenue-cost matching. On the other hand, for the firms which say 'No', the ratio is 0.70. That means, firms with revenue matching strategies are mostly the net exporters. Since their export revenue is 1.82 times more than their import expense, even if timing is not perfectly matched, they may have the flexibility to match the expense outlay. Compared to the firms which responded 'No', these firms also have a larger overlap on the currency they use for

imports and exports[8]. In addition, median value of exports revenue and import revenue is not significantly different from each other. For the firms who do not use that strategy, the value of imports is much larger than the value of exports.

Table 3: Coverage ratio and Hedging Tools

	Response	Cover Ratio (2005)	Value of exports (2005)*	Value of imports (2005)*	Pis 2005	Pic 2005
Matching export and import revenue	Yes	1.82	29.56	31.80	23%	33%
	No	0.70	26.97	69.12	27%	44%
Derivative products	Yes	0.79	17.18	14.23	36%	37%
	No	0.7	51.48	45.94	22%	38%
Pricing to margin	Yes	0.55	25.27	82.45	17%	43%
	No	1.09	31.26	19.21	32%	33%
Indexing prices to foreign currency	Yes	0.79	11.06	16.57	21%	34%
	No	0.71	15.13	45.94	32%	44%

*. In millions (YTL)

Firms that report the use of derivative products for hedging are the ones with much lower value of exports and imports than the ones that do not. However, the median value of the share of revenue in total is much larger for these firms. Firms that change prices to protect themselves are the ones that can be characterized as net importers. Given the low value of the share of export revenue in total, it can be argued that domestic market is the main market for their products and they have some degree of market power. The high value of employees – with a median value of 2260 – also supports this view. These firms' coverage ratio is also low. Surprisingly, indexing domestic prices to a foreign currency is not a strategy used mainly by net importers.

The survey results do not provide any evidence for the third country effect as discussed by Cushman (1986). About 83% of the firms for exports and about 96% of the firms for imports indicate that they do not shift their exports or imports to a different country. Moreover,

[8] Although the number of observation is smaller than we prefer, the correlation between the share of USD use for exports and imports is around 94% for firms who says 'Yes', while it is around 29% for firms who responds with 'No'.

although somewhat lower, about 70% of the firms report that they do not change the currency used for international trade due to a higher risk.

Only a small percentage of the firms face a large number of competitors, while more than half compete with 10 or less firms. Interestingly, about 78% of the firms argue that they are either the largest or within the top 10% for the market share in their sector. Out of these firms, about 44% indicate that they have sufficient market power to determine the price they pay or receive. About 17% of the firms can determine the price they pay, while about 26% indicate they do not have any power.

III. Conclusion

The relationship between exchange rate risk and international trade has been investigated many times in the past. Unfortunately, these studies do not agree on the direction of the effect of risk on trade flows and some even on the significance of the relationship. In this study, instead of investigating this relationship directly at a country or industry level, we focus on firms' responses to a survey. Some expected and some unexpected but interesting findings emerge from the analysis of the survey.

Firstly, the firms use mainly USD and Euro to denominate trade contracts, which is not surprising given the exporting and importing countries. In addition, it appears that USD for exports and Euro for imports are the first choice by the firms. Secondly, although the majority of firms indicate that they are aware of the risk, only about half of the firms have a department dealing with this risk. Thirdly, we find that firms mostly use natural hedging or price adjustments to protect themselves from exchange rate risk. For firms with higher value of imports particularly, adjusting prices appears to be the preferred strategy. Finally, the firms' responses show that the firms do not shift their export country, import country or currency denomination of the trade contract as a result of a higher risk. That means, there is no third country effect as Cushman (1986) study argues.

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