ABSTRACT

ÖNDER, YUSUF. The Fear of Floating and the Turkish Experience. (Under the direction of Douglas K. Pearce.)

This thesis gives a brief description of the fear of floating concept and discusses the Turkish fear of floating experience. Using the intervention data released by the Central Bank of Turkey, we then estimate a reaction function for the Central Bank's interventions, conducted between the years 2002 – 2006. We make use of a multinomial logistic model to estimate a reaction function for both buy and sell interventions separately. Our results show that the TRL/USD exchange rate level, deviations from the trend and exchange rate market volume are all important factors in the Central Bank's reaction function. The Central Bank's response exhibits differences between selling USD interventions and buying USD interventions. Moreover, we also find that the Central Bank is more responsive to higher volatility in the case of depreciating Turkish New Lira environment.

THE FEAR OF FLOATING AND THE TURKISH EXPERIENCE

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 Introduction

In the last couple of years, many countries shifted their exchange rate regimes from fixed and intermediate exchange rate regimes to free-floating exchange rate regimes. According to the IMF's de facto classification, by the end of 2004, there were 35 countries with independently floating currencies (IMF, 2005). Apart from IMF`s classification, there is a big debate in the economic arena about which floaters are actually doing so, and, for those who are not, what are the reasons behind their reluctance to float freely? First mentioned in the economic arena by Calvo and Reinhart (2000), the concept of fear of floating is a growing subject in the economics literature.

This thesis gives a brief description of the fear of floating concept and discusses the Turkish fear of floating experience. Before any empirical work is done, some enlightening information about the Turkish economy and its recent history is presented for the readers who do not have much information on the Turkish economy. With this as background, we turn to a discussion of factors that might cause a central bank to manage its currency. Using the intervention data released by the Central Bank of Turkey, we then estimate a response function for the Central Bank's interventions, conducted between the years 2002 – 2006.

Having suffered from two successive crises in 2000 and 2001, Turkish monetary authorities let the lira float in the year 2001. The Central Bank announced through several press releases that, under the floating exchange rate regime, the level of the exchange rate is determined by supply and demand conditions in the currency markets but the volatility in the exchange rate is closely observed by the Central Bank, and the Central Bank may directly intervene in the markets in the event of excessive volatility in either direction. The Central Bank conducted many interventions in the currency markets after the adoption of the floating exchange rate regime, which can clearly be regarded as a fear of floating. This paper explores

the motives behind the Turkish Central Bank's interventions conducted in the last four years, by using limited dependent variable estimation techniques.

2 A Brief Description of the Concept of "Fear of Floating"

The monetary authorities' reluctance to tolerate large fluctuations in their exchange rates is simply known as the "fear of floating". We can say that, in most times, the countries that exhibit fear of floating are the ones referred to as the "emerging markets". What is special about emerging markets that makes them different in managing floating exchange rate regimes than the other developed countries that also have floating exchange rate regimes? In their paper Calvo and Reinhart (2002) investigated the reasons behind the fear of floating and proposed many reasons that may cause the fear of floating among emerging markets. In their conclusion, Calvo and Reinhart (2002, p.405) stated, "on the basis of the empirical evidence, perhaps, all that we can say is that, when it comes to exchange rate policy, discretion rules the day".

In the literature, a pure free-floating exchange rate regime is one in which the monetary authority does not intervene at all in foreign exchange markets. However, high liability dollarization ratios, currency mismatch problems, high exchange rate pass-through, the output costs of large depreciations in the domestic currency, lack of credibility and loss of access to international capital markets at times of crises are some of the leading reasons lying behind the so called fear of floating in the emerging markets. Because of these reasons, emerging markets' monetary authorities are having a hard time letting their currencies float freely and sometimes intervene directly or indirectly in the markets.

Foreign exchange intervention can be classified in many ways, the most popular classification is based on whether the monetary base is changed or not, which is known as unsterilized and sterilized intervention respectively. Currently, there is no

consensus in the economic arena on whether foreign exchange intervention is an effective policy option. However, coordinated intervention by the European Central Bank (ECB), the U.S. Federal Reserve, the Bank of Japan, the Bank of England and the Bank of Canada to support the euro on September 22, 2000 shows that major players in the financial markets think intervention is still a favorable policy option for some circumstances.

3 The Turkish Economic Outlook and Exchange Rate Regimes 1999 -2006

The Turkish economy had very high inflation rates after the 1970's. Despite the high rates of inflation and economic instability the Turkish economy achieved an average of 4-5 % real GDP growth per year during the 30-year period up to 2000. The growing public deficit and the financing of the deficit with short-term public borrowing plus the increase in real interest rates resulting from short term public borrowing have, however, become a major problem in the economy.

In 1999, the government started on a new disinflation program with the support of the IMF. The program was an exchange rate based stabilization program. The program also focused on fiscal discipline and structural reforms. The exchange rate regime was a crawling peg in which the exchange rate was predetermined in line with the targeted inflation rate. Liquidity creation by the central bank was tied to foreign exchange purchases (Atasoy and Saxena, 2004). The long-term goals of the program were re-achievement of budget equilibrium by adopting structural reforms and attaining sustainable economic growth.

Initial effects of the program were a slow-down in inflation, declines in interest rates, an increase in consumption and a reduction of the current account deficit. The current account deficit was partly financed by capital inflows, therefore the program somewhat relied on the sustainability of capital inflows. The 2000 crisis in the

Turkish economy can be described as the result of accumulated structural distortions in the economy. Analogous to the 1994 crisis, banks borrowed heedlessly from overseas with short maturities. The distortions in the economy caused the capital to flow out, and the huge capital flow triggered the banking crisis in 2000. The distortions in the Turkish economy put pressure on the pegged exchange rate regime and, along with the credibility problem due to the bad track record of policies, resulted in currency crisis after the banking crisis. In other words, the 2001 crisis started as a banking crisis, then it turned into both a banking and currency crisis (Serdengecti, 2005). After the currency crisis, Turkish authorities decided to let the lira float. From then on, the disinflation program has been carried out under a floating exchange rate regime.

The concept that is known as the "impossible trinity" in the economic literature states that a country cannot have, simultaneously, an open capital market, a fixed exchange rate, and an independent monetary policy. Turkey has full capital mobility and, in the 2001 crisis, was forced to choose between a fixed exchange rate regime and monetary independence, since she can't have both at the same time. In the 2001 crisis Turkish monetary authorities let the lira float, becoming another costly example of the concept of the impossible trinity. Willett (2002) indicates that many governments failed to learn or at least to remember the lessons of the basic impossible trinity analysis. If capital mobility grows faster than government learning ability, the result is more crises. This scenario explains a substantial portion (although of course far from all) of the large number of prominent currency crises over the past decade (Willett, 2002).

Policies and actions that were adopted after the 2001 crisis were not limited to crisis management in the short term. Measures were taken in order to remove distortions in the Turkish economy, to strengthen the financial system and to change the dynamics of the economy with the purpose of achieving price stability, sustainable public finances and sustainable growth in the long run. Right after the 2001 crisis,

economic policies were instituted, in the short run, at maintaining financial stability and convincing market participants that robust macroeconomic policies would be put into practice with assurance in order to solve the problems of the economy (Serdengecti, 2005). The Central Bank of Turkey has been given independence after a period of 30 years of high and chronic inflation. The "Banking Sector Restructuring Program" was put into practice in May 2001. The main goal of the program was to eliminate the distortions in the financial sector, improving its intermediary function and thus enhancing its competitiveness by international standards. The Central Bank conducted planned foreign exchange buying auctions since April 2002 in order to build up the Central Bank reserves with the excess FX supply in the local markets. In addition to the planned FX buying auctions, the Central Bank also conducted many foreign exchange interventions since 2002. As a reason for these interventions, they stated through press releases that the Bank was not trying to affect the level of the Turkish New Lira and that the interventions were mainly based on volatility that occurred in either direction. The Turkish Central Bank also announced that a full-fledged inflation targeting policy will be in effect in 2006.

The Turkish economy nowadays is showing signs of success in the economic stabilization program. With the stabilization program that was launched in May 2001, great progress toward macroeconomic stability was made, especially in the disinflation process and recovery in growth. Single digit inflation was reached after a period of more than thirty years of high and chronic inflation and implicit inflation targets were attained in 2002, 2003 and 2004 (Serdengecti, 2005). The Turkish economy achieved high rates of growth for three consecutive years in the falling inflation environment. However, current account deficits and short-term capital inflows caused concerns. With the short-term capital, the Turkish New Lira has appreciated against other currencies, which is becoming another topic of discussions in the local economic arena.

Turkish monetary authorities conducted several interventions after the adoption of the floating exchange rate regime in February 2001. In 2005, the Central Bank of Turkey began to announce all foreign exchange interventions that took place after 2002 as part of the Central Bank's transparency rule. Considering ongoing interventions after the adoption of a free-floating exchange rate regime, one can easily tell that Turkey is suffering from the fear of floating. In the rest of this paper, the Turkish fear of floating experience is discussed and a response function for the Turkish monetary authorities' interventions in the foreign exchange market is estimated.

4 Reasons Behind the Fear of Floating

4.1. Sudden stop Problem

The Sudden Stop Problem can be described as losing access to global financial markets or, in other words, huge declines in capital inflows to a country. It is very common for emerging markets to experience the sudden stop problem during times of financial crisis. Capital inflows equal current account deficits plus accumulation of international reserves. As a result of a sudden stop, countries face significant reserve losses or decreases in current account deficits. Country experiences show that both reserve losses and decreases in current account deficits occur together in a sudden stop. While a loss of international reserves increases the country's financial vulnerability, contractions in the current account deficit usually have serious effects on production and employment (Calvo and Reinhart, 1999).

Emerging markets do have unstable currencies, and as a result of this fact they cannot borrow in their own currencies. They are often forced to borrow in US dollars, which in turn brings about highly dollarized economies. This high dollarization makes these economies very vulnerable to both external and internal

shocks. Although appreciations in the domestic currency do not cause many problems for emerging market countries, depreciations in the domestic currency cause a great deal of fear in the domestic market since most of the debt is denominated in US dollars. Once triggered, a currency crisis in such a highly dollarized economy can easily turn into a banking and payment system crisis or vice versa, resulting in capital flow reversals known as sudden stops.

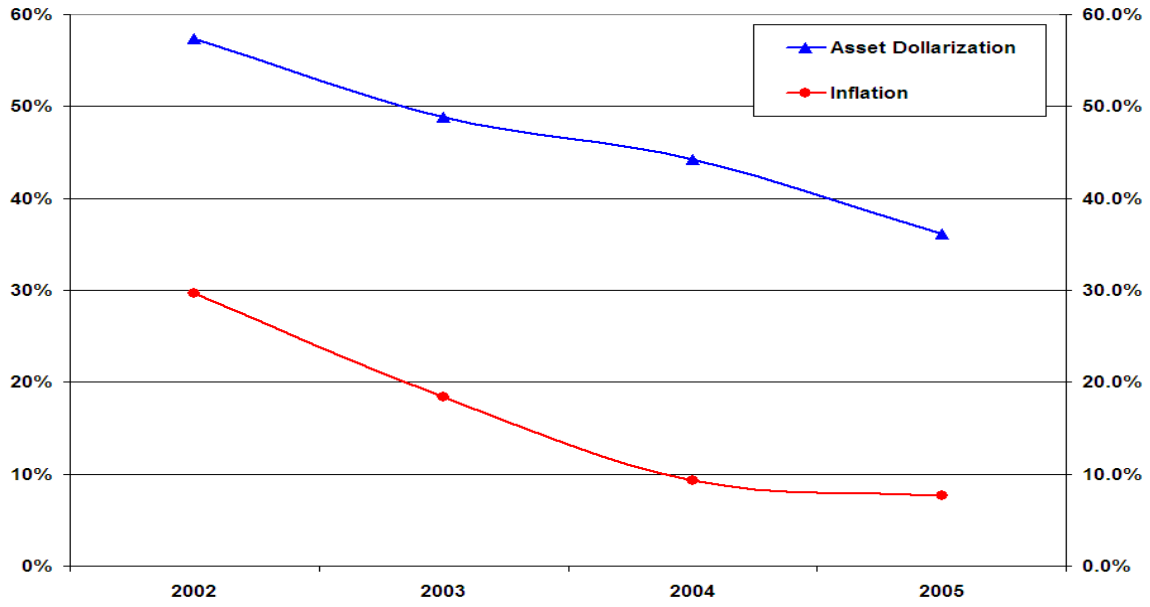

Figure 1: Asset Dollarization versus Inflation

Figure 1 shows the asset dollarization ratio to total assets in Turkey between the years 2002 to 2006 and helps us to see the correlation between dollarization and inflation. Asset dollarization ratio is calculated as the ratio of foreign exchange deposits to total deposits. In recent years, the decline in the inflation rate and asset dollarization became clearer: The asset dollarization ratio decreased from 57 percent in 2002 to 36 percent in 2005, while inflation decreased from 29 percent in 2002 to 7 percent in 2005.

The literature on the effects of dollarization on inflation shows that there is a strong correlation between dollarization and inflation. One of the recent papers that

explored the relevance of financial dollarization to the inflation process is Bailey (2005). He studied the case for the Jamaican economy. In his conclusion he states that financial dollarization influences the inflation outcome in a number of ways. Dollarization increases the inflation outcome for a given fiscal deficit, due to the substitution away from the domestic currency by economic agents. Exchange rate depreciation pressures arising from increased foreign currency holdings contributes to additional inflationary impulses, associated with the relatively high exchange rate pass-through to inflation (Bailey, 2005).

4.2. Exchange Rate Pass Through

Exchange rate pass-through is simply known as the change in domestic prices that is caused by changes in the exchange rate. In other words, it can be defined as the percentage change in the domestic-currency price of an imported good resulting from a 1 percent change in the nominal exchange rate between the importing and exporting countries. The pass-through process to consumer prices is composed of two steps. Exchange rate movements are transmitted to import prices in the first step and in the second step, changes in import prices are transmitted to consumer prices. The consumer price index (CPI) is calculated according to a consumption basket, which consists of both domestic and imported goods. The ratio of imported goods in the consumption basket is the first factor that determines how much of the change in the prices of imported goods is transmitted to the consumer price index. The second factor that affects the pass-through to the CPI is how the domestic goods' prices change as a result of the change in exchange rate. In their paper, Jeannine Bailliu and Hafedh Bouakez (2004) conclude that exchange rate pass-through to both import and consumer prices has declined in industrialized countries over the past decade. Several plausible explanations for this potential decline have been advanced in the literature, including the shift to a low-inflation environment in industrialized countries (brought about by a move towards more credible monetary

policy regimes) and changes in the structure of imports towards sectors that have lower rates of exchange rate pass-through (Jeannine Bailliu and Hafedh Bouakez, 2004).

Gagnon and Ihrig (2004) estimate that the long-run average rate of pass-through of twenty industrial countries over the period 1971 to 2003 was 23 per cent, but considering the period from late 1980's up to 2003 the average rate of pass-through decreased to 5 per cent for the sample of 20 industrialized countries. According to their paper, the reasons behind the reduced pass-through of exchange rate changes into consumer price inflation are the increased credibility of the monetary authorities and their actions taken against inflation.

However, when we consider the emerging market economies, we cannot talk about low values of pass-through. As characteristic members of the emerging markets, let's consider Brazil and Turkey. According to Choudhri et al. (2003), for Brazil, the long-term estimate for the pass-through is around 45 per cent, and for Turkey the long-term estimate for the pass-through is around 50 percent. These two estimates for the pass-through in these characteristic emerging market economies are about 10 times the estimate for the average pass-through in 20 industrialized economies. This significant difference in pass-through values between industrialized countries and emerging market countries can explain the fact that countries with high pass-through are more sensitive to changes in their exchange rates. Figure 2 shows the relationship between the prices and change in exchange rates in the Turkish economy. Looking at the figure, we can see that the changes in the exchange rate affect consumer prices and there is a strong positive correlation between the change in the exchange rate and the consumer price index with some lag.

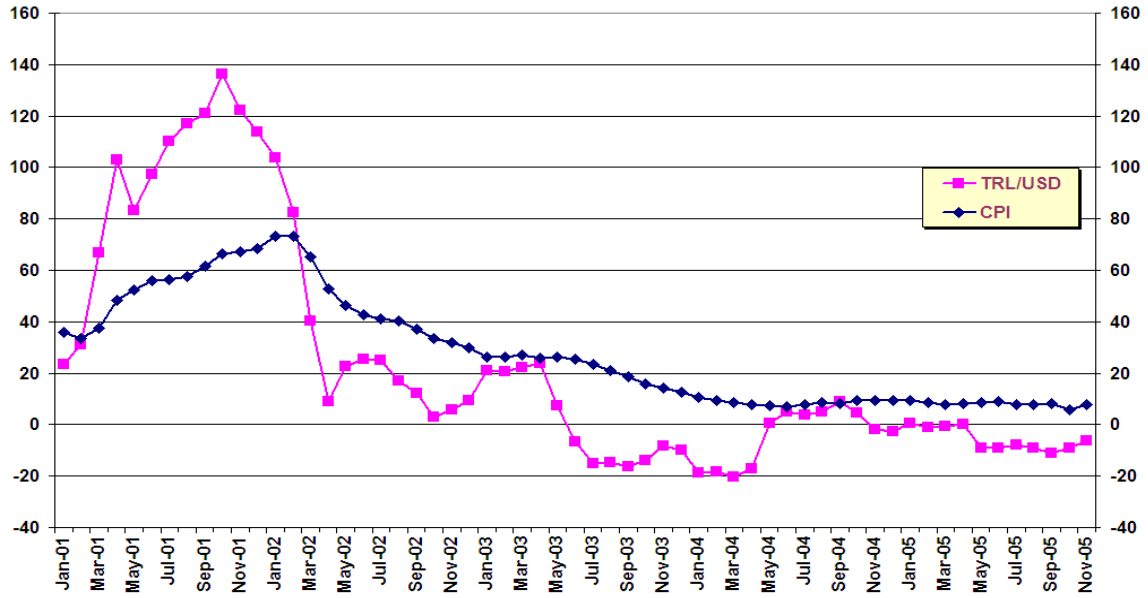

Figure 2: Prices versus % Change in TRL/USD 2001-2005
Source: Central Bank of Turkey

At this part of the paper, we focused on the case where there is depreciation in the local currency, because in an economy with high exchange rate pass-through, the cost of currency depreciation is much more higher than currency appreciation. However, in real life both appreciation and depreciation take place one after another. We will consider the case where the Central Bank responds to both appreciation and depreciation and compare the impact of responses in the concluding parts of the paper.

4.3. Exchange Rate Volatility

The mobility of capital has increased very much in the last couple of years with the liberalization of capital flows, such that one can easily and quickly transfer enormous amounts of foreign exchange in or out of many countries. According to a BIS survey (2004), as of April 2004 the daily international foreign exchange market trading volume was $ 1.9 trillion. This huge money flow can cause large fluctuations in exchange rates over the whole world.

Apparently, one of the main reasons for the fear of floating is the fear of volatility, which can be defined as abrupt and large exchange rate movements. Since high volatility increases exchange rate risk, in a country with high exchange rate volatility, it is harder to make investment decisions and international trade. In the literature, there are no solid findings of a negative effect of exchange rate volatility on trade for the developed economies. However, for developing and undeveloped countries, the growing literature on this subject shows that there is a negative correlation between higher exchange rate volatility and trade with the rest of world. A recent paper considering the case for Turkey by Vergil, (2002) showed that exchange rate volatility had a negative effect on exports for the 1990 – 2000 period. His findings show that for the 1990 – 2000 period, there is a statistically significant negative relationship between the Turkey's real exports and its exchange rate volatility. In developing countries, volatility has also negative effects on productivity and growth. In their paper Rogoff, et al (2006) stated that in countries with relatively low levels of financial development, exchange rate volatility generally reduces growth, whereas for financially advanced countries, they did not find any significant effect.

The only way to overcome the uncertainty borne by excess exchange rate volatility is through proper use of financial hedging instruments. Countries which have undeveloped or less developed than average capital markets are vulnerable to problems caused by higher volatility because they do not have exchange markets to trade forward, futures and derivative contracts. Even if they have these exchange markets, they lack volume and a significant amount of time is needed before they fulfill the needs of the domestic financial markets. In order to reduce the risks arising from large exchange rate movements, financial hedging instruments should be encouraged in economies with developing and undeveloped capital markets.

A look at the market data might help us better understand the difference in exchange rate volatility patterns between developed and developing economies. To

make a comparison, EUR/USD and USD/JPY spot rates are taken as candidates for developed economy currencies and the TRL/USD spot rate is taken as a typical member of developing economy currency as well as an emerging market one. The data span 940 trading days between May 24, 2002 and February 16, 2006.

Table 1 presents the descriptive statistics for daily returns of EUR/USD, USD/JPY and TRL/USD exchange rates. Among the three, TRL/USD has the highest variance of all with a sample variance of 0.58364, which is almost 1.5 times that of EUR/USD and 2 times that of USD/JPY.

Table 1: The Descriptive Statistics for Daily Returns of Selected Currencies

TRL/USD RETURNS		*EUR/USD RETURNS*		*USD/JPY RETURNS*	
Mean	-0.00279	**Mean**	0.02867	**Mean**	-0.00471
Standard Error	0.02492	**Standard Error**	0.01974	**Standard Error**	0.01765
Median	-0.08281	**Median**	0.03815	**Median**	0.00880
Standard Deviation	0.76396	**Standard Deviation**	0.60507	**Standard Deviation**	0.54129
Sample Variance	0.58364	**Sample Variance**	0.36612	**Sample Variance**	0.29299
Kurtosis	2.48897	**Kurtosis**	0.49025	**Kurtosis**	1.35243
Skewness	0.81275	**Skewness**	-0.00363	**Skewness**	-0.06226
Minimum	-2.17016	**Minimum**	-1.97597	**Minimum**	-2.56121
Maximum	3.57677	**Maximum**	2.22553	**Maximum**	2.66015
Count	940	**Count**	940	**Count**	940

To compare the volatility between these currencies, a GARCH(1,1) model was used. Plots of volatilities and their 25-day moving averages are presented in the graphs below. Figure 3 shows the volatility plot for EUR/USD; the volatility has a clear pattern and takes values between 0.24 and 0.63. Periods of low volatility are followed by periods of low volatility and periods of high volatility are followed by periods of high volatility. EUR/USD being the most traded currency in the foreign exchange markets, the EUR/USD volatility can be regarded as a benchmark for other pair of exchange rates.

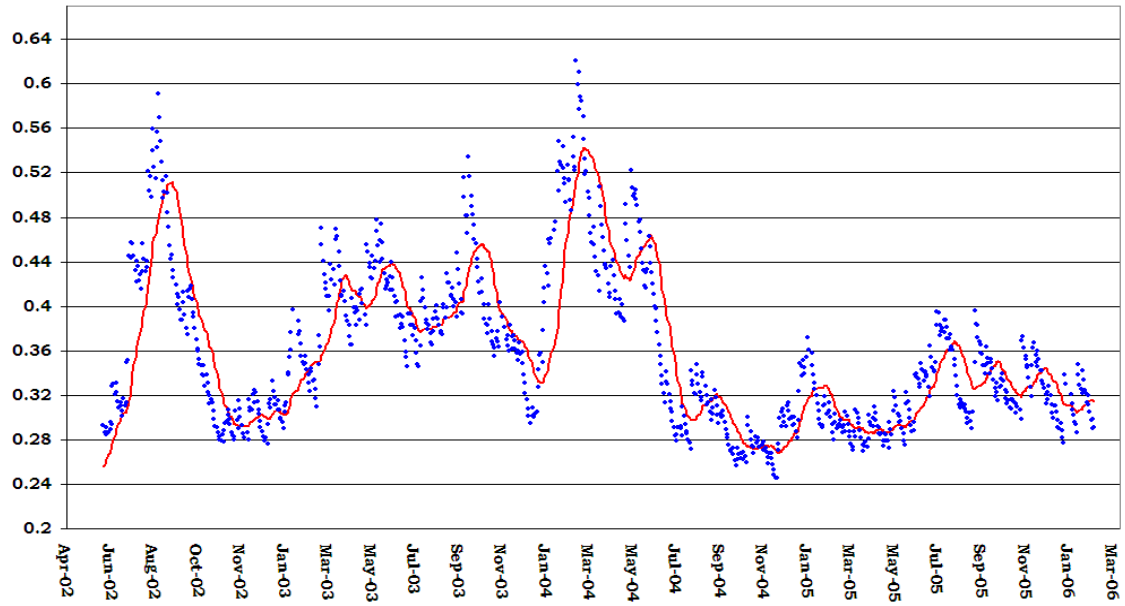

Figure 3: The Volatility of EUR/USD and its 25-day Moving Average

Figure 4 shows the volatility plot for USD/JPY; the volatility has a clear pattern and takes values between 0.53 and 0.21. The volatility for USD/JPY seems to be less than EUR/USD volatility, but the difference between these volatilities is small.

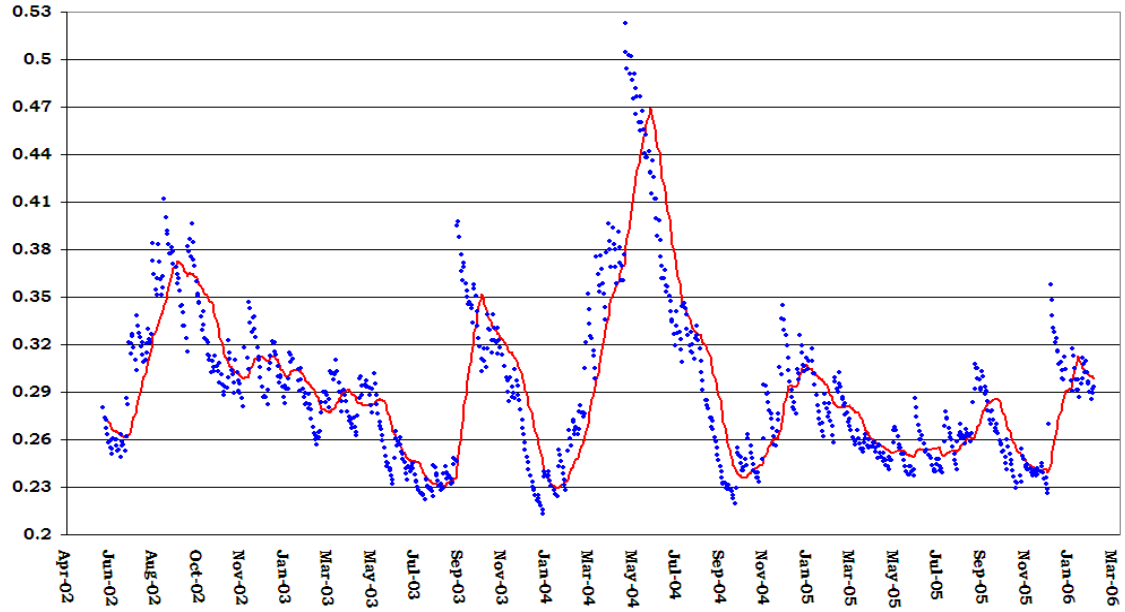

Figure 4: The Volatility of USD/JPY and its 25-day Moving Average

As we can see in Figure 5, the volatility plot for TRL/USD shows a huge difference when compared to that of EUR/USD or USD/JPY. Here the volatility takes values

between 4.5 and 0.14. The maximum value for volatility is 4.5 for TRL/USD compared to 0.63 for EUR/USD. On average, the volatility of TRL/USD is two times that of EUR/USD. A pattern for volatility cannot be seen for TRL/USD and the changes in volatility are more abrupt than that of EUR/USD and USD/JPY.

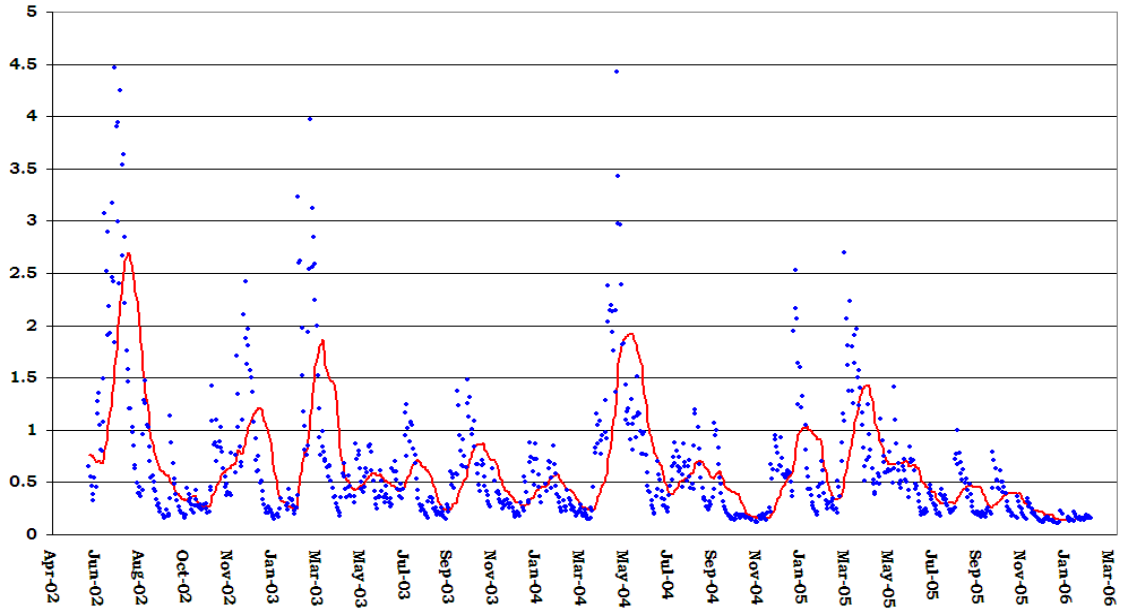

Figure 5: The Volatility of TRL/USD and its 25-day Moving Average

5 The Data

The data set used in this paper contains daily average Turkish Lira/USD, Turkish Lira/EUR spot exchange rates and daily data on the foreign exchange market interventions of the Turkish Central Bank. All raw data are taken from the Central Bank's electronic data delivery system which is accessible to anyone from the Bank's website. The intervention data, measured in millions of USD, includes both purchase and sale interventions. The data set covers the period between May 24, 2002 and February 16, 2006. In total, the set includes 940 days of foreign exchange trading.

5.1. The TRL/USD exchange rate 2002 – 2006

Table 2 provides summary statistics of the TRL/USD exchange rate series used in the empirical analysis. The daily TRL/USD returns are positively skewed which means that the distribution of returns is skewed to the right hand side. The TRL/USD returns show a kurtosis close to that of a standard normal distribution.

Table 2: The Descriptive Statistics for TRL/USD

TRL/USD			*TRL/USD % Returns*	
Mean	1.44600		**Mean**	-0.00570
Standard Error	0.00384		**Standard Error**	0.02484
Median	1.41237		**Median**	-0.08285
Standard Deviation	0.11784		**Standard Deviation**	0.76172
Sample Variance	0.01389		**Sample Variance**	0.58021
Kurtosis	-0.83498		**Kurtosis**	2.37975
Skewness	0.66578		**Skewness**	0.76943
Minimum	1.25410		**Minimum**	-2.19405
Maximum	1.74639		**Maximum**	3.51429
Count	940		**Count**	940

Figure 6 shows the path of the TRL/USD exchange rate for the period 2002 – 2006. After reaching a record high of 1.7464 TRL/USD in 2003, the Turkish New Lira started to appreciate against the US dollar. This figure also shows the 25 and 100 day moving averages that are calculated by using the nominal daily TRL/USD exchange rates. Interventions are shown as dots on the graph. The dots above the nominal exchange rate line represent interventions when the Central Bank is selling USD and the dots below nominal exchange rate line represent interventions when the Central Bank is buying USD.

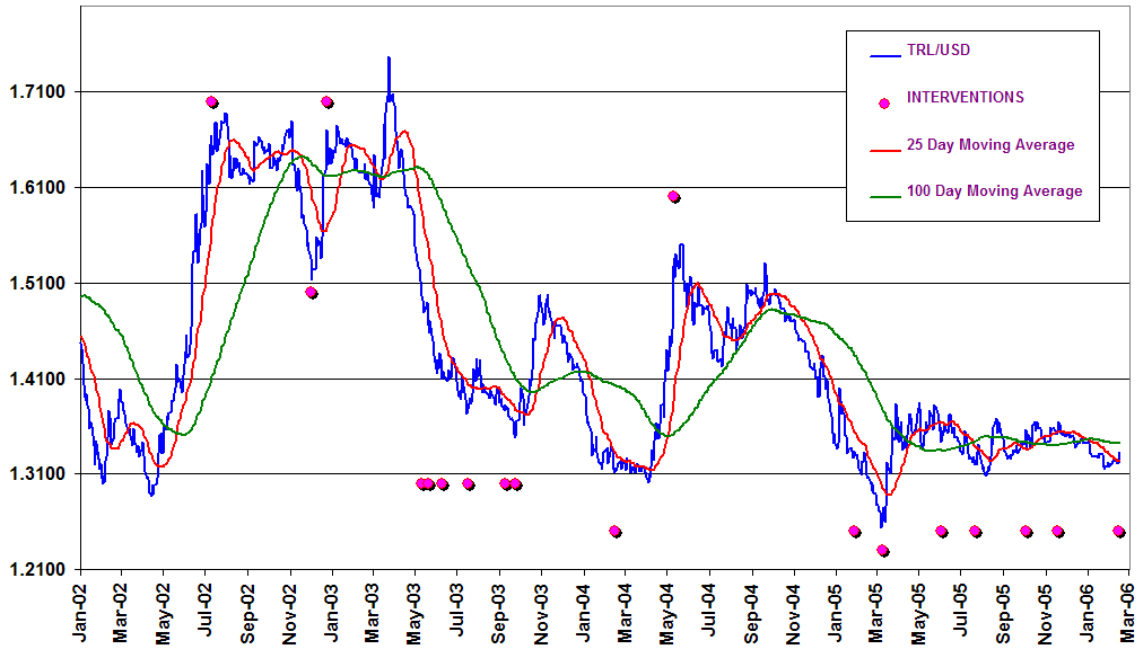

Figure 6: The TRL/USD Exchange Rate and Interventions

5.2. Interventions by Central Bank

In this part of the paper, descriptive statistics summarizing the Central Bank's interventions are presented for the period 2002–2006. A buying intervention stands for the case where the Central Bank is buying USD against TRL, and a selling intervention stands for the case where the Central Bank is selling USD against TRL. For the rest of the paper, the distinction between a buying and a selling intervention is based on the above definition.

Descriptive statistics for the selling and buying interventions are shown in Table 3. The number of buying interventions is 15 and the number of selling interventions is 3. Thus the Turkish Central Bank intervened most often to keep the Lira from appreciating or, at least, reducing the amount of appreciation. There is a significant difference in the mean values of buying and selling interventions. The mean value for buying interventions is 1,672 million dollars while the mean value of selling interventions is only 7 million dollars. In a survey conducted by Christopher J. Neely

(2000), 95 percent of monetary authorities report that market reaction sometimes or always affects the total size of trades of an intervention. So we can say that the magnitude of an intervention mostly depends on the market reaction to the first trades during an intervention. When we look at the mean values of the buying and selling interventions, we see that there is a significant difference between these two. Keeping in mind the result of the above survey, which says that the size of an intervention mostly depends on the market reaction, we can infer that the Turkish Central Bank succeeded in achieving the desired market reaction for the selling interventions because the mean value of selling interventions is much lower than buying interventions. Another alternative statement would be that the Central Bank cares less about the Lira depreciation for the considered time period.

Table 3: Descriptive Statistics for Interventions (millions of USD)

Buying Interventions		*Selling Interventions*	
Mean	1672.867	**Mean**	7
Median	1347	**Median**	9
Standard Deviation	1379.430	**Standard Deviation**	3.464
Minimum	16	**Minimum**	3
Maximum	5000	**Maximum**	9
Sum	25093	**Sum**	21
Count	15	**Count**	3

Buying intervention: The Central Bank is buying USD against TRL
Selling intervention: The Central Bank is selling USD against TRL

Figure 7 shows the cumulative amount of intervention for both buying and selling operations. There has been a significant increase in the magnitude of buying interventions starting from 2005. This might be due to the lack of market reaction to interventions in the last year and can also reflect Central Bank's interest in building up foreign exchange reserves.

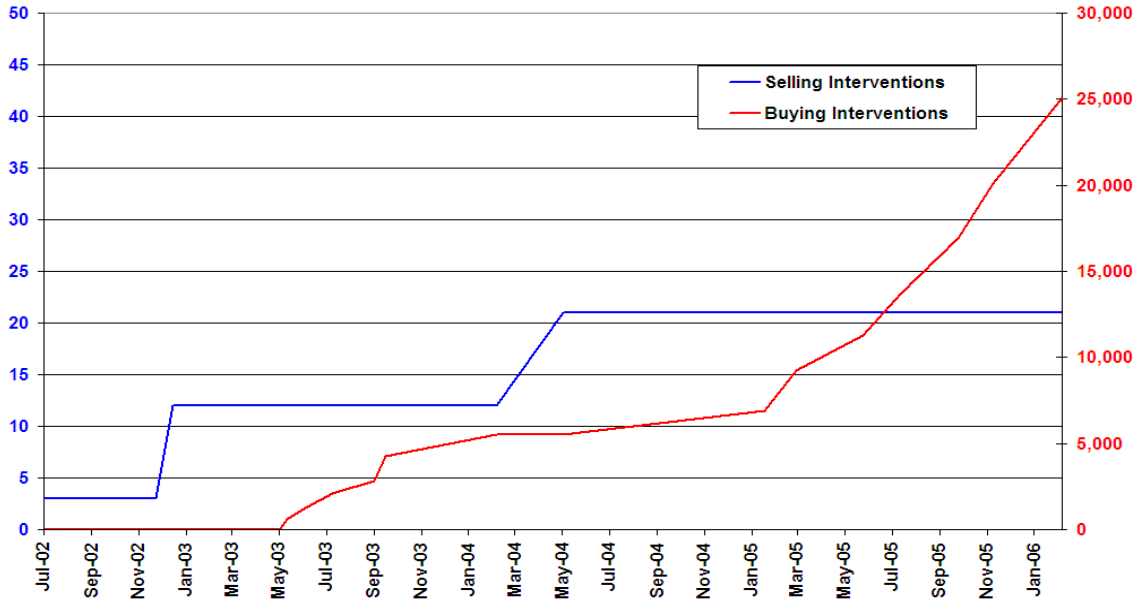

Figure 7: The Cumulative Amount of Interventions by Type (millions of USD)
Buying intervention: The Central Bank is buying USD against TRL
Selling intervention: The Central Bank is selling USD against TRL

Another feature to be mentioned about the interventions is the distribution of intervention days throughout the week. According to a hypothesis stated by Szakmary and Mathur (1997), monetary authorities tend to intervene more towards the end of the week. Figure 8 shows that interventions conducted by the Turkish Central Bank are almost evenly distributed through out the working days of week.

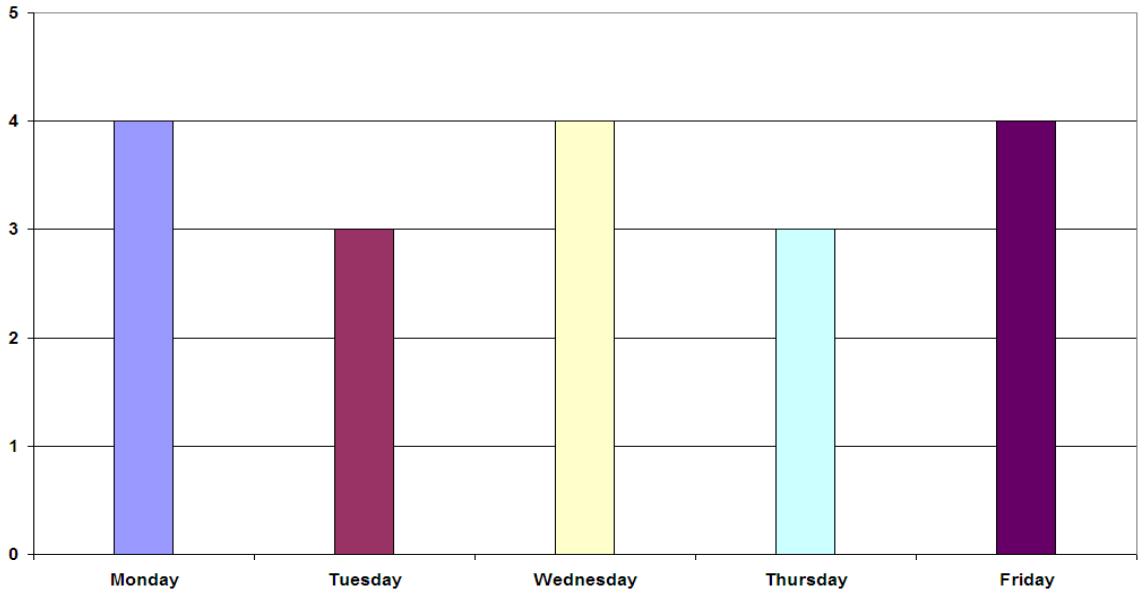

Figure 8: The Distribution of Interventions by Days

However, the magnitude of interventions is not evenly distributed throughout the days of the week. Figure 9 shows that the magnitude of interventions conducted by the central bank was much greater on Wednesdays and Fridays than the other weekdays.

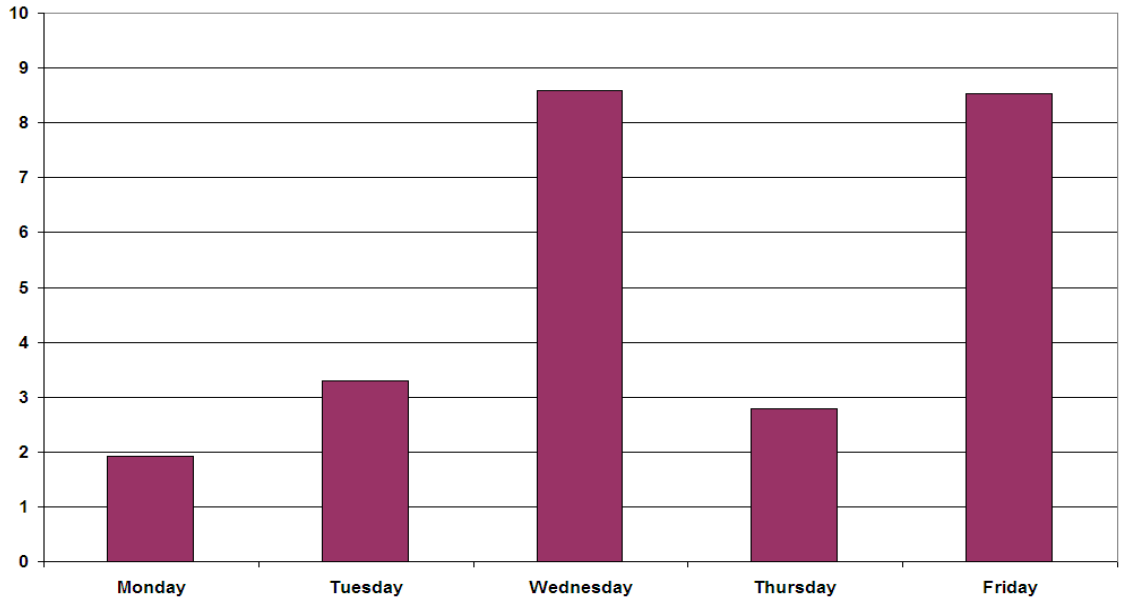

Figure 9: The Magnitude of Interventions by Days (in Billion USD)

The last point to mention about the interventions conducted by the Turkish Central Bank is the Bank's decision to accumulate foreign exchange reserves from inflows of foreign capital. After gaining economic stability and regaining foreign investors' confidence in the economy, Turkey has been experiencing a significant increase in foreign capital inflows. Together with the positive effect of macroeconomic stability, capital inflows put downward pressure on the TRL/USD level, which in turn boosted the Central Bank's interest in building up foreign exchange reserves to gain more credibility in the markets.

Figure 10 shows the sum of short-term inflows and foreign direct investment together with buying interventions conducted by the Central Bank on a yearly basis between 2002-2005. The increase in capital flows triggered purchasing operations

by the Central Bank, but a strong correlation between the two variables is questionable since purchase operations declined significantly despite an increase in capital inflows in the year 2004.

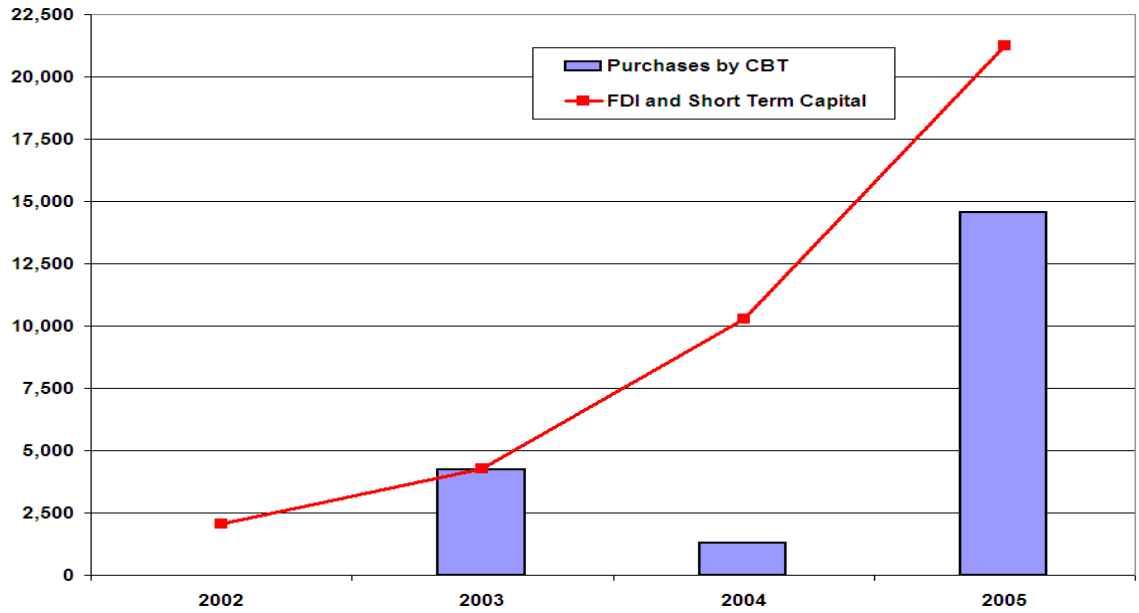

Figure 10: Capital Inflows and Purchases by the Central Bank (in Million USD)

6 Brief Review of Intervention Literature

There is a huge amount of literature on the foreign exchange market interventions by monetary authorities. Some of these studies concentrate on the market effects of interventions, some concentrate on their effectiveness and the rest concentrate on the motives behind the interventions. This paper is in the third sub-group mentioned above; it estimates a reaction function for the Turkish Central Bank's interventions by using limited dependent variable estimation techniques. In this group of papers the motivating factors behind the monetary authorities' interventions in the foreign exchange markets are studied.

The lack of high frequency data on foreign exchange intervention restrained the literature on estimating reaction functions of the monetary authorities to only the

leading ones, such as the U.S. monetary authorities, the Deutsche Bundesbank and the Japanese monetary authorities. One of the leading papers in this subject, Almekinders and Eijffinger (1994) studied the objectives of foreign exchange market intervention by the Bundesbank and the Federal Reserve System in the Deutsche Mark-U.S. dollar market and the Japanese yen-U.S. dollar market. The sample period considered in their paper is the post-Louvre period February 23, 1987 to October 31, 1989. Their results reproduced the 'leaning against the wind' policy by the Deutsche Bundesbank and the Federal Reserve, and showed that an increase in the conditional variance of daily DM/USD returns led both central banks to increase the volume of intervention. Recently, intervention data by the Bank of Japan has become available and Frenkel et al (2005) used the data on Japanese monetary authorities intervention on the foreign exchange markets during the period 1991 to 2001. Their paper analyzed the motivations behind the interventions in the foreign exchange markets conducted by Japanese and U.S. monetary authorities and compared them. They find that the absolute difference between the exchange rate and PPP (125 yen/U.S. dollar) target exchange rate as well as the absolute difference between the exchange rate and a moving average were the key variables in the reaction function of the Japanese monetary authorities during the 1990s. Their findings further indicate that the U.S. monetary authorities intervened only occasionally, possibly at the request of Japanese monetary authorities.

One other recent paper in this literature is by Eduardo Moron and Juan Francisco Castro (2000). They studied the fear of floating case for Peru and tried to find the motives behind the Central Bank of Peru's interventions in the foreign exchange markets, analyzing the data available between 1995 and 2000. In the empirical part, they made use of both binary logit and multinomial logit estimation methods to analyze the motives behind the Central Bank of Peru's interventions. They concluded that the exchange rate level is a relevant variable when explaining both the probability of an intervention operation in the exchange market and the targeting of the policy instrument in a monetary policy reaction function.

This paper is unique in that it is the only paper that estimates a reaction function for the Central Bank of Turkey's interventions with up-to-date data and examines the reasons behind the Turkish fear of floating case since she adopted a free-floating exchange rate regime in 2001. In structure, this paper and Moron et al. (2000) are very similar; they both examine the fear of floating cases for separate countries and study the motives behind the interventions conducted by the case specific countries' Central Banks. They both make use of the multinomial logistic model to study the motivations for interventions.

7 The Reaction Function of the Turkish Central Bank

The most common technique for analyzing motives behind a Central Bank's interventions is the qualitative limited dependent variable model. The papers mentioned in the literature review have made significant contributions to this subject. This paper uses the qualitative limited dependent variable model technique to estimate the reaction function of Turkish monetary authorities.

This paper does not use a binary logit model to estimate the reaction function of the Central Bank. In the sample period the Central Bank conducted both buying and selling interventions. The motives behind a buying intervention are surely different from those for a selling intervention. If we apply a binary logit estimation technique, motives behind the buying and selling interventions are treated as similar, whereas they are not. If we intend to include the level of the exchange rate in a binary logit model where the data set contains both buying and selling interventions, we will not be able to distinguish properly between a selling and buying intervention stance. Assume that the Central Bank defends an imaginary exchange rate band of its own and conducts both buying and selling operations when the bank thinks it is necessary, where an increase in the exchange rate means the local currency is

depreciating and vice versa. When we analyze these sample data using a binary logit model, if we use the level variable as an independent variable to distinguish between a buying and selling intervention stance we fall into the following fallacy: If there are more buying interventions than selling interventions, meaning that on the average there is appreciation in the local currency against the USD, our model will predict that a decrease in the level of the exchange rate will increase the probability of intervention, which is not a true statement to make. And if there are more selling interventions than buying, meaning that on the average there is depreciation in the local currency against USD, our model will predict that an increase in the level of the exchange rate will increase the probability of intervention, which is not a true statement either.

We make use of a multinomial logistic model to estimate a reaction function for both buy and sell interventions separately. Three or more categories are involved in a multinomial logistic model where one of the categories is set as the reference group. If k categories are used in a multinomial logistic model, these k categories will generate k-1 binary logistic regression equations, and each of these k-1 binary logistic regression equations are compared to the reference group. The general formulation of the multinomial logistic model is as follows:

$$\Pr(\ y_i = 1 \mid x_i) = P_{i1} = \frac{1}{1 + \sum_{j=2}^{J} \exp\ \left(x_i' \beta_j\right)}$$

$$\Pr(\ y_i = j \mid x_i) = P_{ij} = \frac{\exp\ \left(x_i' \beta_j\right)}{1 + \sum_{j=2}^{J} \exp\ \left(x_i' \beta_j\right)} \qquad for \qquad j > 1$$

If the dependant variable has j categories and we set the first category as base (j=1), then the odds and odds ratios are:

$$\frac{P_{ij}}{P_{i1}} = \frac{\eta_{ij}}{\eta_{i1}} = \exp(x_i'\beta_j) \quad \Rightarrow \log\left[\frac{P_{ij}}{P_{i1}}\right] = x_i'\beta_j \qquad j = 2,..., J.$$

and

$$\log\left[\frac{\left(P_j \mid x_k = 1\right)/\left(P_1 \mid x_k = 1\right)}{\left(P_j \mid x_k = 0\right)/\left(P_1 \mid x_k = 0\right)}\right] = \beta_{jk}$$

In our model, the qualitative dependent variable 'y_i' is the Central Bank's intervention decision. It takes value '0' for a no intervention stance, takes the value '1' for a buying intervention and '2' for a selling intervention. We set the no intervention stance (intervention= '0') as the base category and analyze the buying and selling interventions against a no intervention stance. The probabilities of each category can be formulized as:

$$\Pr(y_i = 0 \mid x_i) = P_{i0} = \frac{1}{1 + \exp(x_i'\beta_1) + \exp(x_i'\beta_2)} = \frac{\eta_{i0}}{\eta_{i0} + \eta_{i1} + \eta_{i2}}$$

$$\Pr(y_i = 1 \mid x_i) = P_{i1} = \frac{\exp(x_i'\beta_1)}{1 + \exp(x_i'\beta_1) + \exp(x_i'\beta_2)} = \frac{\eta_{i1}}{\eta_{i0} + \eta_{i1} + \eta_{i2}}$$

$$\Pr(y_i = 2 \mid x_i) = P_{i2} = \frac{\exp(x_i'\beta_2)}{1 + \exp(x_i'\beta_1) + \exp(x_i'\beta_2)} = \frac{\eta_{i2}}{\eta_{i0} + \eta_{i1} + \eta_{i2}}$$

It is important to point out that our model does not violate the assumption of Independence of Irrelevant Alternatives (IIA), because the ratio of probabilities of buying and selling interventions is necessarily the same regardless of the any other alternatives. The validity of this assumption makes it possible to rely on our estimates.

One other essential thing to mention is that the expectations for the signs of the coefficients of the independent variables are made on the basis that we make our comparisons for a selling intervention and a buying intervention against a no intervention stance by the Central Bank.

Since we do not know the factors that trigger the Central Bank intervention, we will use a number of factors we think might trigger the Central Bank's intervention. The selection of explanatory variables is based on general local market's perception on the interventions and Central Bank's press releases about the interventions. The independent variables, which are used to model the Central Bank's intervention stance, are as follows:

a. Deviations from Trend

The deviations of the daily TRL/USD spot rate from its 25-day and 100-day moving average are used. The moving averages can be considered as the medium-term paths of the exchange rate. The monetary authorities might be targeting the moving averages to smooth the exchange rate fluctuations. We expect that an increase in the deviation of the daily TRL/USD spot rate from its moving average will increase the likelihood of selling intervention. In other words, for selling interventions we expect a positive sign for the coefficient of the deviation of the daily TRL/USD spot rate from its moving average.

$$\text{dev\_mov}25_t = S_t - \frac{1}{25}\sum_{i=0}^{24} S_{t-i} \qquad \text{dev\_mov}100_t = S_t - \frac{1}{100}\sum_{i=0}^{99} S_{t-i}$$

We expect that a decrease in the deviation of the daily TRL/USD spot rate from its moving average will increase the likelihood of buying intervention. In other words, for buying interventions we expect a negative sign for the coefficient of the deviation of the daily TRL/USD spot rate from its moving average.

b. Exchange Rate Volatility

The volatility of 3-day returns of TRL/USD spot exchange rate is included in the model since the Central Bank tells in its press releases that the volatility in the exchange rate is closely observed and the Central Bank may directly intervene in the markets in the event of an excessive volatility that might occur in either direction. The volatility of 3-day returns is estimated using a GARCH (1, 1) model with student-t distributed errors. We expect that an increase in the volatility of 3-day returns of TRL/USD spot exchange rate will increase the likelihood of a buying and a selling intervention. In other words, we expect a positive sign for the coefficient of the volatility of 3-day returns of TRL/USD spot exchange rate for both buying and selling interventions.

c. Volume of Foreign Exchange Trading

The volume variable is the total volume of foreign exchange in the local markets and is added in the model to count for the liquidity in the domestic foreign exchange market. Even though the level of the TRL/USD is determined by the supply and demand conditions in the market, the Central Bank might think that abrupt changes in the foreign exchange liquidity might trigger unwanted volatility and act in a way to avoid this condition. For a selling intervention, we can expect that an increase in

the volume variable will decrease the probability of intervention, because when the demand for foreign exchange is higher than average, the local currency loses value against USD, in a condition like this the Central Bank might want to inject foreign exchange liquidity in the local markets. So, we expect a negative sign for the coefficient of the volume variable for selling interventions. In the same manner but opposite direction as described above, we can expect that, an increase in the volume variable will increase the probability of a buying intervention, because when the supply of foreign exchange is higher than average, the local currency gains value against USD, in a condition like this the Central Bank might intervene to prevent appreciation in the local currency or sterilize excessive liquidity that might cause unwanted volatility. In other words we expect a positive sign for the coefficient of volume variable when we consider a buying intervention.

d. Measures of Exchange Rate Level

This paper considers three different measures of the exchange rate level. The first one is the real effective exchange rate level (reer). The real effective exchange rate is obtained by deflating the nominal effective exchange rate with price indices. According to the definition used by International Monetary Fund (IMF), the reer[4] is computed as the weighted geometric average of the consumer price of the domestic country relative to the consumer prices of its trade partners. An increase in the index means appreciation of the Turkish New Lira whereas a decrease means depreciation. Since, a decrease in the reer means a depreciation of the Turkish New Lira, we expect a negative sign for the reer variable when we consider the selling interventions. Likewise, since an increase in the reer means an appreciation of the Turkish New Lira, we expect that an increase in the reer variable will increase the probability of a buying intervention.

[4] Further information on REER can be found at: http://www.tcmb.gov.tr/yeni/evds/yayin/reel_efktf/file2.html

The second measure of the exchange rate level is the basket variable. This variable is included in the model because the local markets think that the Central Bank takes this measure as the basis for the nominal value of the Turkish New Lira. The market believes that the basket variable is composed of 1 U.S. dollar plus 0.71 Euros. An increase in the basket variable means a depreciation of the Turkish New Lira whereas a decrease means an appreciation. We expect that an increase in the basket variable will increase the probability of a selling intervention, in other words, we expect the coefficient of the basket variable to be positive when we consider selling interventions. We expect that an increase in the basket variable will decrease the probability of a buying intervention, so we expect the coefficient of the basket variable to be negative when we consider buying operations.

The third and the last measure of the exchange rate level is the level of the nominal TRL/USD exchange rate. An increase in the level variable means a depreciation of the Turkish New Lira whereas a decrease means an appreciation. We expect that an increase in the level variable will increase the probability of a selling intervention, in other words, we expect the coefficient of the level variable to be positive when we consider selling interventions. We expect that an increase in the level variable will decrease the probability of a buying intervention, so we expect the coefficient of the level variable to be negative when we consider buying operations.

In order to build a reaction function for the Central Bank's interventions, we will make use of combinations of the above described independent variables. Since we consider three different measures of the exchange rate level and two different measures of deviations from the trend, we present six different models to capture the Central Bank's response function. Each model includes a different measure of exchange rate level and a different measure of deviation from the trend.

Before any estimation is made, it is reasonable to present a correlation matrix of the data set used in the models, which will enable the reader to gain insight on the data

set. Table 4 shows the correlation matrix of the data set used in the analysis. The correlation between "level" variable, which stands for the nominal exchange rate level and "reer" variable, which stands for the real effective exchange rate level is -0.895 whereas it is 0.856 between "level" variable and "basket" variable, which stands for the value of Turkish New Lira against a specific basket of currencies.

Table 4: The Correlation Matrix of the Data Set

	level	*dev_mov25*	*dev_mov100*	*reer*	*basket*	*volatility*	*volume*
level	1.000						
dev_mov25	0.251	1.000					
dev_mov100	0.535	0.664	1.000				
reer	-0.895	-0.169	-0.432	1.000			
basket	0.856	0.169	0.431	-0.741	1.000		
volatility	0.248	0.532	0.353	-0.279	0.213	1.000	
volume	0.209	0.121	0.061	-0.277	0.024	0.123	1.000

To avoid the problem of endogeneity in our model, all explanatory variables are introduced in lags of one time interval (one working day). The coefficients are estimated using SAS. Table 5 presents the estimated reaction functions for the buying interventions whereas Table 6 presents the reaction functions for the selling interventions.

8 The Empirical Results

When we look at the estimated reaction functions for the buying interventions, we see that the measures of deviations from the trend (both dev_mov25 and dev_mov100) are highly statistically significant even at the one percent significance level. The signs of estimates for the measures of deviations from the trend for the buying interventions are negative as expected earlier. Since both kinds of measures of exchange rate level are significant, we can say that for the buying interventions the Central Bank's reaction function should include a measure of deviation from the trend.

All three measures of exchange rate level, reer, basket and level can be used in the reaction function for buying interventions. However we should mention that estimates of the reer variable are more significant than the estimates of the basket and level variables. In four out of six models the estimates of the measures of exchange rate level are significant at least at the ten percent significance level. The signs of the measures of exchange rate level are also consistent with our expectations. The estimates of the reer variable have positive signs, which means that an appreciation in the Turkish New Lira will increase the probability of a buying intervention (buying USD and selling Lira) compared to a no intervention stance. The estimates of the basket and the level variables have negative signs, which means that an increase in the basket variable or level variable (depreciation of the Turkish New Lira) decreases the probability of a buying intervention compared to a no intervention stance.

The estimates of the volatility variable are not statistically significant in any of the models, and the estimates all have negative signs, which contradicts our expectations. According to the Central Bank's press releases, we expect the Central Bank to respond to higher volatility. However our reaction functions predict that an increase in the volatility decreases the probability of a buying intervention compared to a no intervention stance. However, this result may be partly due to the increased number of interventions after the year 2005 (a relatively low volatility period), which reflects the Central Bank's interest in accumulating reserves through buying interventions.

The estimates of the coefficient on the volume variable have positive signs, which means that an increase in the foreign exchange trading volume will increase the probability of a buying intervention compared to a no intervention stance. Although the sign of the volume variable estimates are consistent with our expectations, the statistical significance of the estimates varies among models. In three out of six models, the volume variable is statistically significant at least at the ten percent

level. This shows that even though the volume variable is not as significant as the other explanatory variables, it has explanatory power in explaining buying interventions and should not be excluded from the reaction function.

However, the reader might have concerns about the validity of the volume variable in the model. In fact, we can see from the estimation results that the volume variable has some explanatory power for both types of intervention decisions. As another alternative, when the model is re-estimated excluding the volume variable, we see that the significance of the other explanatory variables are not effected by this exclusion. We should mention that the volume variable, while often significant, can be dropped from the model without having much effect on the coefficients of the other variables.

Table 5: Estimated Reaction Functions for the Buying Interventions

		Deviations From Moving Averages						*Measures of Exchange Rate Level*											
		constant		**dev_mov25**		**dev_mov100**		**reer**		**basket**		**level**		**volatility**		**volume**		**Likelihood Ratio**	
	Type of Intervention	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**	**Esti-mate**	**P-value**
Model 1	Buy (USD)	-15.4806	**0.0008**	-45.1906	**0.0008**			0.0683	**0.0121**					-0.6496	0.2785	4.5400	**0.0200**	44.698	<0.001
		(4.628)		(13.546)				(0.027)						(0.599)		(1.951)			
Model 2	Buy (USD)	-12.0271	**0.0126**			-15.2984	**0.0029**	0.0474	**0.0991**					-0.7075	0.2207	3.9230	**0.0701**	38.052	<0.001
		(4.823)				(5.137)		(0.029)						(0.578)		(2.166)			
Model 3	Buy (USD)	18.9018	**0.0317**	-44.2229	**0.0006**					-8.9159	**0.0092**			-0.7402	0.2364	2.7247	0.1829	44.915	<0.001
		(8.797)		(12.956)						(3.421)				(0.625)		(2.046)			
Model 4	Buy (USD)	6.9633	0.3420			-12.2119	**0.0065**			-4.2958	0.1253			-0.7734	0.1811	2.7321	0.1981	36.418	<0.001
		(7.3278)				(4.490)				(2.802)				(0.578)		(2.123)			
Model 5	Buy (USD)	6.7829	0.1635	-37.2001	**0.0016**							-8.3323	**0.0237**	-0.8618	0.1623	4.0752	**0.0412**	42.506	<0.001
		(4.868)		(11.792)								(3.683)		(0.617)		(1.996)			
Model 6	Buy (USD)	0.3296	0.9450			-12.1116	**0.0063**					-3.4615	0.3256	-0.8662	0.1361	3.2758	0.1210	36.058	<0.001
		(4.7816)				(4.437)						(3.521)		(0.581)		(2.1126)			

Note: The numbers in parenthesis below the estimated coefficients are the standard errors of the estimates. The p-values printed in bold represent at least a significance level of 10%. The Likelihood Ratio test is computed upon taking the difference between the log-likelihood functions of the restricted and unrestricted models. The LR test statistic is χ^2 distributed with degrees of freedom equal to the number of imposed restrictions.

Buy (USD): The Central Bank is buying USD against TRL
Sell (USD): The Central Bank is selling USD against TRL

Table 6: Estimated Reaction Functions for the Selling Interventions

		Deviations From Moving Averages						*Measures of Exchange Rate Level*											
		constant		dev_mov25		dev_mov100		reer		basket		level		volatility		volume		Likelihood Ratio	
	Type of Intervention	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value	Esti-mate	P-value
Model 1	Sell (USD)	4.4532	0.4816	41.3307	**0.0486**			-0.0796	0.1106					0.0827	0.5455	-14.7412	**0.0645**	44.698	<0.001
		(6.327)		(20.961)				(0.050)						(0.1368)		(7.974)			
Model 2	Sell (USD)	4.5065	0.5677			6.5830	0.4610	-0.0741	0.2146					0.2629	**0.0314**	-13.6391	**0.0895**	38.052	<0.001
		(7.885)				(8.929)		(0.060)						(0.122)		(8.033)			
Model 3	Sell (USD)	-16.2705	0.3850	38.7206	**0.0384**					3.6305	0.5827			0.0588	0.6401	-11.8487	0.1506	44.915	<0.001
		(18.728)		(18.699)						(6.6067)				(0.1258)		(8.2425)			
Model 4	Sell (USD)	-21.8051	0.2997			12.0619	0.1403			5.6852	0.4386			0.1994	**0.0627**	-11.3423	0.1594	36.418	<0.001
		(21.024)				(8.180)				(7.340)				(0.107)		(8.061)			
Model 5	Sell (USD)	-23.5640	**0.0913**	39.8296	**0.0470**							11.4034	0.1858	0.0718	0.5822	-13.8036	**0.0800**	42.506	<0.001
		(13.955)		(20.057)								(8.619)		(0.131)		(7.885)			
Model 6	Sell (USD)	-23.4860	**0.0921**			9.3003	0.2200					11.7610	0.1811	0.2369	**0.0316**	-13.5088	**0.1006**	36.058	<0.001
		(13.944)				(7.583)						(8.793)		(0.1103)		(8.228)			

Note: The numbers in parenthesis below the estimated coefficients are the standard errors of the estimates. The p-values printed in bold represent at least a significance level of 10%. The Likelihood Ratio test is computed upon taking the difference between the log-likelihood functions of the restricted and unrestricted models. The LR test statistic is χ^2 distributed with degrees of freedom equal to the number of imposed restrictions.

Buy (USD): The Central Bank is buying USD against TRL
Sell (USD): The Central Bank is selling USD against TRL

When we consider the estimated reaction functions for the selling interventions, we see that the measures of deviations from the trend are not as significant as they are in the buying interventions. Between the two measures of deviations from the trend, estimates for the deviations from the 25-day moving average give better results than that for the deviations from the 100-day moving average. At the ten percent significance level, all estimates for the deviations from 25-day moving average are significant whereas the estimates for the deviations from the 100-day moving average are not significant at all. The signs of estimates for the measures of deviations from the trend for the selling interventions are positive, which is consistent with our expectations.

Surprisingly, for the selling interventions, among six models none of the estimated coefficients on measures of the exchange rate level are significant at the ten percent significance level. Looking at the estimated reaction functions for the selling interventions, can we say that the Central Bank is not responsive to local currency depreciation? There is no certain answer for that, because in our intervention data we have only three observations for selling intervention, which is a very small number of occurrences. In order to rely on the results of our estimated models for the selling interventions and to make inferences, we need to have more observations of selling interventions but for the time being we are restricted to only three observations.

However, the signs of the measures of exchange rate level are consistent with our expectations. The estimates of the reer variable all have negative signs, which means that an appreciation in the Turkish New Lira will decrease the probability of a selling intervention compared to a no intervention stance. The estimates of the basket and the level variables have both positive signs, which means that an increase in the basket variable or level variable (depreciation of the Turkish New Lira) increases the probability of a selling intervention compared to a no intervention stance.

Another surprising result is observed when we look at the estimated coefficients of the volatility variable. As mentioned before, estimated coefficients of volatility variable were not significant in the buying interventions. However, when we look at the estimates of volatility variable in the selling interventions, we see that three out of six estimates are significant at the ten percent significance level. We can say that Central Bank is more responsive to volatility in the case of a depreciating currency environment. The signs of estimates for the volatility variable when we consider the selling interventions are positive, which means that an increase in the volatility variable increases the probability of a selling intervention by the central Bank compared to a no intervention stance. This result is consistent with our expectations and is also consistent with the Central Bank's press releases.

The estimated coefficients of the volume variable have negative signs, which means that an increase in the foreign exchange trading volume will decrease the probability of a selling intervention compared to a no intervention stance. This result is consistent with our expectations. Similar to the results of buying interventions, when we consider selling interventions, four out of six estimates of the volatility variable are significant at the ten percent significance level. The volume variable is significant in both buying and selling operations, which tells us that the volume variable can be used in explaining both kinds of interventions.

To sum up, we can say that our results for the buying interventions are more robust than the results of the selling interventions. The variables that have explanatory power for the buying interventions are the deviations from trend, the measures of exchange rate level and the volume. The volatility variable is statistically insignificant in explaining the buying interventions. For the selling interventions, the deviations from moving averages (only dev_mov25), volatility and foreign exchange market trading volume have explanatory power. The measures of exchange rate level are statistically insignificant in explaining the selling interventions.

A basic impulse response analysis is performed on the empirical results in order to observe how the probability of intervention changes with respect to one and two standard deviation changes in the significant variables in the models. To do this, we first find the standard deviations of the variables in the data set and then estimate the values of probabilities at the new levels.

For example, consider the first model for the buying interventions. The significant variables are dev_mov25, reer and volume. In the estimated regression function, the coefficient of dev_mov25 variable has a negative sign, the coefficient of reer variable has a positive sign and the coefficient of the volume variable has a positive sign. In order to apply a one standard deviation positive shock to this model, we subtract one standard deviation from the sample mean of dev_mov25, we add one standard deviation to the sample mean of reer and also add one standard deviation the sample mean of volume variable. After finding the new values, we put them in the original estimated reaction functions and then calculate the new probability values. This process is redone for all models and the shocks are only applied through the variables that are at least significant at the ten percent significance level.

Table 7: Reaction Function Responses to One and Two Standard Deviation Shocks

		Probability of Intervention		
	Type of Intervent	At the Means	1 Standard Deviation Shock	2 Standard Deviation Shock
Model 1	Buy(USD)	0.0029	0.0776	0.7107
	Sell(USD)	0.0001	0.0084	0.4659
Model 2	Buy(USD)	0.0037	0.0442	0.3660
	Sell(USD)	0.0003	0.0026	0.0215
Model 3	Buy(USD)	0.0022	0.0429	0.4788
	Sell(USD)	0.0002	0.0010	0.0044
Model 4	Buy(USD)	0.0042	0.0115	0.0310
	Sell(USD)	0.0004	0.0005	0.0008
Model 5	Buy(USD)	0.0030	0.0507	0.4834
	Sell(USD)	0.0001	0.0019	0.0422
Model 6	Buy(USD)	0.0046	0.0125	0.0336
	Sell(USD)	0.0002	0.0016	0.0126

Buy (USD): The Central Bank is buying USD against TRL **Sell (USD):** The Central Bank is selling USD against TRL

Table 7 shows the probabilities of intervention at the sample means and the new probabilities after one and two standard deviation shocks. Since our data span only the 2002 – 2006 period and we have only limited data, the probability estimates at the means and after the one standard deviation shock are quite low. However, we see that two standard deviation shock results are higher and these results can help us compare the models. According to the table, among all models, Model 1 is the one that gives the best results in terms of probabilities. If we apply a two standard deviation shock in Model 1 for buying interventions, Model 1 predicts the probability of a buying intervention by the Central Bank to be 0.71 and similarly if we apply a two standard deviation shock in Model 1 for selling interventions, Model 1 predicts the probability of a selling intervention by the Central Bank to be 0.47. This table also shows that we need more data to make dependable inferences using our models.

8 Conclusions

In this paper, we try to explore the reasons behind the Turkish fear of floating experience and use official data on the interventions in the TRL/USD market during the period 2002-2006 to estimate reaction functions for the Turkish Central Bank. Our results show that the TRL/USD exchange rate level, deviations from the trend and exchange rate market volume are all important factors in the Central Bank's reaction function. The Central Bank's response exhibits differences between selling USD interventions and buying USD interventions. Moreover, we also find that the Central Bank is more responsive to higher volatility in the case of depreciating Turkish New Lira environment.

When making use of the empirical results of this paper, the reader should use some caution. We are aware of the fact that our data set is limited in size and we need more data to reach more robust results. Depending on the availability of the future data, a second version of the paper may be released to improve the results of empirical work both economically and statistically.

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