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What is the impact of coups and exchange rate volatility on the trade balance? A Case study of Turkey.

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Abstract

The purpose of this paper is to empirically investigate the role of coups on the export and import flows of Turkey, and to address the impact of the 'high' exchange rate volatility with a gravity model approach. Panel data for the period of 1990 to 2020 across 187 countries is employed in the analysis.

The deteriorated relationship between the European Member States and Turkey after the coup in 2016 sparks the discussion whether there is a decrease in the trade flows. The results of this study suggest no significant effect of the coup in 2016 on trade flows among Turkey and European Member States.

Furthermore, the results reveal that the volatility of the exchange rate had a negative effect on the import flows and a positive effect on the export flows. However, the results also show a significantly negative effect on export and import flows due to the volatility in the exchange rate in coup times.

Keywords: Coup, Exchange rate volatility, gravity model

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Chapter 1 Introduction

On February 28, 1997, the military power removed Erbakan from his office and took power over Turkey. A financial crisis occurred after this successful coup attempt. Another coup was attempted on July 15, 2016. Turkey witnessed one of the bloodiest coup attempts in their political history. A section of the Turkish military launched a coordinated operation in several major cities to topple the government and unseat President Recep Tayyip Erdogan. The coup failed. After this period of political conflict, the country faced high inflation, rising borrowing costs and their national currency, the Turkish Lira, lost its value significantly.

These events are relevant as Turkey occupies an unique geographic position, a country lying partly in Europe and Asia, which gives the country a major role in the world of international trade. Throughout history it has acted as both a barrier and bridge between the two continents. Turkey has emerged as a significant actor in the Middle East with strong military capabilities. Additionally, it has relations with Western or global institutions (NATO membership, EU Customs Union membership, G20 membership).

The Western world, and in particular Europe has been Turkey's central trading partner everlastingly. Regardless, Turkey did not feel adequately supported by the West after the failed coup in 2016. Erdogan criticized Europe for not condemning the coup, whereas the Turkish-Russian ties seemed to be getting vigorous post-coup period. Consequently, Turkey purchased a Russian S-400 missile-defence system, which caused controversy in the Western World. Turkey's post-coup behaviour sparks the discussion whether there is a shift to trading with more 'friendly' countries after the coup in 2016 or whether Turkey is becoming more autarkic, because of a lack of 'reliance' in other countries and therefore trading less.

This study contributes to existing literature regarding international trade by examining the effect of coups on trade flows. The two coups between 1990 and 2020 allow for investigating the impact of coups on trade flows of Turkey. The exchange rate during this period was a topic of debate as volatility in the market could be caused by political monetary and international policies. Regarding the development of Turkey over the years, exchange rate volatility will be addressed as it has a possible effect on the import and export flows in coup times.

In addition, the aim of this study is also to investigate whether the political tensions among European member states and Turkey influenced trade relations in coup times. It is relevant to

mention that the coups had opposite political outcomes, therefore the possible political impact of the coups of 1997 and 2016 on trade flows will be presented and compared.

In this study, the traditional gravity model is adjusted to estimate coefficients for coup and exchange rate volatility, this will provide insights regarding trade flows of Turkey. This study will be executed with data that consists of quarterly export and import flows of Turkey between 1990-2020.

An explicit distinction is made between the effect of coups and exchange rate volatility. A coup can influence the trade balance due to the exchange rate volatility, but there can also be direct effects of coups. In Turkey's case, the political pressure of the coup could cause Turkey to be moving away from Europe and trade with 'friendlier' countries or could even result in autarkic behaviour in general. Therefore, coups go beyond pure exchange rate risk and this makes it appropriate to estimate the effects of both exchange rate volatility, the direct effect of a coup (dummy) and an interaction term exchange rate volatility x coup (to determine the impact of a coup via exchange rate volatility) on the export and import flows of Turkey.

Furthermore, it is believed that the tense political relationship between Turkey and European Member States could have affected the trade flows after the coup in 2016. By examining 187 trading partners of Turkey with quarterly data, the direct effect of a coup on trade flows among European Member States will be addressed. This is realized by including a dummy for European Member States and its interaction with coup in the gravity equation of this analysis.

Lastly, it is anticipated that both coups differ in the cause of political pressure in Turkey, as Erbakan was removed, while in contrast Erdogan remained after the coup. Therefore, the coups will be estimated by separate dummies to obtain the direct effect on trade flows of the coups in 1997 and 2016. In addition, the interaction term of both coups with exchange rate volatility will provide the indirect effect of the coup in 1997 and 2016 on trade flows.

The estimated coefficients of the gravity model of this study show that the exchange volatility had a significantly positive effect on export flows and a significantly negative effect on import flows. However, the results also show a significantly negative effect on both export and import flows due to the volatility in the exchange rate in coup times. The coup only appears to negatively affect Turkey's trade through volatility, as the direct effect of the coup has an

unexpected significantly positive effect on trade flows. Lastly, no significantly political effect was found on trade flows among Turkey and European Member States.

It seems appropriate to include the volatility of the exchange rate in this study as it is closely linked to the coup and the 'strong' fluctuations in the exchange rate is a phenomenon Turkey is dealing with for a substantial period. However, there is still no consensus among economists on how exchange rate volatility influences trade volume from either a theoretical or an empirical perspective. There are theoretical models supporting both a positive and a negative relationship between exchange rate volatility and export and import flows. Profoundly, most of the empirical models discovered a significantly negative relationship. In contrast some found no significant relationship when various methods of estimation are utilized, for instance a VAR-analysis or GARCH.

Dell'Ariccia (1999) analysed the effect of exchange rate volatility on bilateral trade flows. By the utilization of the gravity model and a panel data that covers 20 years, he found a negative relationship. Cho et al (2002) also found a negative relationship, with their empirical work in agricultural trade. Their sample contained bilateral trade flows across 10 developed countries between 1974 and 1995. Another paper estimated the effects of exchange rate volatility on exports with pooled, fixed and random effects models for a panel of 19 COMESA member countries. By applying two alternative measures of exchange rate volatility, their empirical results reveal that exchange rate volatility tends to depress both intra and extra-COMESA trade (Njoroge, 2020). Aristotelous (2001) examined the effect of the exchange rate volatility on the UK-US exports. His empirical findings suggest that there is no significant effect at all. In contrast, others have utilized a GARCH-M estimator in their study and did not find a statistical relationship (Wang and Barrett, 2007).

The mentioned studies provide different results due to differences in the time frame of analysis. Underlining the relevance between short- and long-term fluctuations provides deeper insights on the effect of the exchange rate on the trade balance. A common argument is that exporters can easily insure themselves against short-term exchange rate fluctuations through financial markets, while it is more challenging and expensive to hedge in the long term. Various studies have shown that the effect of exchange rate volatility on trading is mainly long-term because fluctuations can be hedged for short-term fluctuations (Pere and Steinherr, 1989; Cho, Sheldon and McCorriston, 2002).

Nevertheless, exchange rate fluctuations affect the premium risk for the exporting and importing firms. Vianne and Vries (1992) showed that even when hedging instruments are available, short-term exchange rate volatility still affects trade, because it increases the risk premium in the forward market. Therefore, insurance against high exchange rate fluctuations does not seem to be the solution to the problem. Hedging is imperfect and expensive; accordingly, it will not be considered as the solution for exchange rate risk (Mundell, 2000)

1.1 Study overview

The structure of the paper is organized as followed. In Chapter 1, the introduction is presented. In Chapter 2, the hypotheses development, methodology, and empirical approach are discussed. In Chapter 3, a general overview on stylized facts relating to trade of Turkey with its trading partners is presented. Subsequently, in Chapter 4, the data will be discussed. In Chapter 5, a discussion of the specification and justification for the gravity model of this study will be provided. In Chapter 6, the results and analysis are reported. In Chapter 7, the conclusion and implications are discussed. In Chapter 8, the reference list is reported.

Chapter 2 Theoretical framework

This chapter consists of hypotheses development, empirical approach, and methodology. Firstly, the hypothesis of this study will be constructed. In addition, the methodology of this study will be explained and justified by following prior literature regarding the gravity model. Lastly, definitions and chosen variables will be discussed.

2.1 Research hypothesis

Prior literature shows that the effect of exchange rate volatility on trade flows is mixed. The different methods of estimation lead to various results (Dell'Ariccia, 1999; Cho et al, 2002; Njoroge, 2020; Aristotelous, 2001; Wang and Barrett, 2007). However, in this study, a negative relationship among exchange rate volatility and the Turkish trade flows is anticipated. As exchange rate fluctuations affects the premium risk of exporting and importing firms (Vianne and Vries, 1992).

Research regarding the effect of coups on trade flows is a topic that has not yet been investigated. In this study, it is assumed that the occurred coups which caused political pressure could have resulted in Turkey being more autarkic.

The value of the Turkish currency decreased sharply after the coup in 2016. Therefore, it is anticipated that coups strengthen the volatility in the exchange rate. In conclusion, the first hypothesis of this study will be:

1. Increased exchange rate volatility and the occurred coups have inhibited the growth of the export and import flows between Turkey and its trading partners.

The Western World, specifically Europe, is one of Turkey's major trading partners. As stated in the introduction, Erdogan criticized Europe for not condemning the coup and felt limited support. The post-coup behaviour of both sides sparks the discussion whether there is a negative effect on trade flows among Turkey and European Member States. Consequently, the second hypothesis of this study will be:

2. The effect of the coup in 2016 has a stronger effect on the export and import flows with European Member States than other trading countries of Turkey.

In this paper, the effects of the coups of 1997 and 2016 will be estimated and compared. It is relevant to mention that the coups had opposite political outcomes. In 1997, Erbakan was

removed by the military forces, whereas Erdogan remained after the coup. Presumably, the removal of a political leader causes more political pressure than a political leader that remains. And therefore, the third and ultimate hypothesis of this study will be:

3. The coup in 1997 inhibits growth of the export and import flows more than in 2016, because there is more political pressure, which can ultimately result in a higher degree of autarkic behaviour.

2.2 Theoretical foundation

The gravity equation of trade predicts that the volume of trade between two countries will be proportional to their Gross Domestic Products (GDPs) and inversely related to any trade barriers between them. Typically, bilateral trade flows between country j and country k have been explained by Tinbergen (1962) by the following specification:

$$(1) \quad V^{jk} = \beta_0 (Y^j)^{\beta_1} (Y^k)^{\beta_2} (D^{jk})^{\beta_3} (A^{jk})^{\beta_4} u^{jk}$$

Where V is the value of export/import from country j to k. Y is the nominal value of GDP. D is the distance from j to k. A is a vector of other factors than can influence trade negatively or positively. Whereas u is a log-normally distributed error term with $E(\ln u_{jk}) = 0$.

Through linearizing equation (1) by natural logarithm, equation (2) is obtained:

$$(2) \quad \ln(V^{jk}) = \beta_0 + \beta_1 \ln(Y^j) + \beta_2 \ln(Y^k) + \beta_3 \ln(D^{jk}) + \beta_4 \ln(A^{jk}) + u^{jk}$$

After Tinbergen's development of the gravity model, there have been various studies with its application. Various researchers have continued to build on the gravity model with the aim of showing the relevance of underlying micro-foundations in explaining trade between countries using a panel data analysis and by adding extra variables, such as common language and free trade agreements (Lee and Park, 2007; Bergstrand and Baier, 2009; Abedini and Péridy, 2008).

Through adding variables to equation (2), equation (3) is obtained:

$$(3) \quad \ln(V^{jk}) = \beta_0 + \beta_1 \ln(Y^j) + \beta_2 \ln(Y^k) + \beta_3 \ln(D^{jk}) + \beta_5 FTA^{jk} + \beta_6 ComLan + u^{jk}$$

Where FTA is a dummy, equals one if there is a free trade agreement between country j and k and 0 otherwise. ComLang equals one if country j and k share the same language and zero otherwise.

Different studies have already applied the gravity model to Turkey. Antonucci and Manzcocchi (2006) have shown that the gravity model provides a good fit of Turkey's trade patterns. Their results suggest that the Association Agreement in 1963 and the Customs Union did not result in additional trade between Turkey and the European Union. However, Bilici et al (2008) stated that the Customs Union has increased EU's importance marginally in determining Turkey's trade flows, and that EU countries have always been important for Turkey and its trade flows. Karagoz and Saray (2010) have shown that the trade flows between Turkey and Asia-Pacific countries are positively affected by the economic size of the countries, whereas distance negatively affects the trade flows, and population seem to have no effect at all.

Others went even further with this model and attempted to provide evidence that the political environment of a country could play a significant role in explaining trade flows. Bilgin et al (2017) studied the relationship between political environments and the exporting performance. By using a panel data of 166 countries, their gravity model predicts that stronger democratic political institutions provide a higher level of exports (Bilgin, Gozgor, & Lau, 2016). In contrast, other studies have tried to search for a relationship between the quality of institutions on international trade but failed in their task (Lin, 2018).

2.3 Methodology

The theoretical foundation of the gravity specification of this study is presented by following prior literature. The major objective of this study is to investigate what impact coups and exchange rate volatility had on the trade flows of Turkey between 1990 and 2020. In this study, a distinction is made between the effect of coups and exchange rate volatility. A coup can influence the trade balance due to the exchange rate volatility, but there can also be direct effects of coups. In Turkey's case, the political pressure of the coup could cause Turkey to be moving away from Europe and trade with 'friendlier' countries or could even result in autarkic behaviour in general (political effect). Therefore, coups go beyond pure exchange rate risk and this makes it appropriate to estimate the effects of both exchange rate volatility, the direct effect of a coup (dummy) and an interaction term exchange rate volatility x coup (to determine the impact of a coup via exchange rate volatility) on the trade flows of Turkey.

Thus, the effect of coups has two channels, a direct effect and an indirect effect. To estimate both these effects as accurately as possible, a number of lags for coup and coup x exchange

rate volatility are added. The reason is that effects on trade pattern might need some time to materialize. An example could be the existence of contracts in the world of international trade regarding import and export agreements, which are subjected to international law. If trade between two companies from different nations is contractual and the export and import flows are periodically fixed in the long term, then coups and exchange rate volatility will not affect trade flows. This does not mean that every trade flow between Turkey and its trading partner is contractual and periodically fixed in the long term, there could be a possible short-term effect. The more time passes, the more trade contracts expire. Thus, the direct and indirect effect of coups on trade flows could also occur in the long term. Therefore, the lags for the coefficient coup and coup x exchange rate volatility will be included.

This study also aims to investigate whether the relationship between Turkey and the EU has an impact on trade flows in coup times, especially after the coup in 2016. Therefore, a dummy for European Member States is created and an additional interaction term coup x EU is included. Coup x EU will capture the possible direct effect of coups on trade flows among Turkey and European Member States. As trade contracts could determine the timing of this possible political effect on trade flows, the lags for the interaction coup x EU will be included to estimate this effect as accurately as possible.

Through adding the relevant variables of this study to equation (3), equation (4) is obtained:

$$(4) \quad \ln(V^{jk}) = \beta_0 + \beta_1 \ln(Y^j) + \beta_2 \ln(Y^k) + \beta_3 \ln(D^{jk}) + \beta_4 EU^k + \beta_5 FTA^{jk} + \beta_6 ComLan^{jk} + \beta_7 ERV^j + \gamma_1 coup^j + \gamma_2 (coup^j \times ERV^j) + \gamma_3 (coup^j \times EU^k) + u^{jk}$$

Where EU^k is a dummy, equals one if the trading country is an European Member State and zero otherwise. ERV^j is the proxy exchange rate volatility of Turkey. Coup is also a dummy, equals one if there is a coup and zero otherwise. Several lags of coup, interaction term coup x ERV^j and coup x EU^k are going to be added to the main specification in the analysis of this study.

2.4 Proxy for Exchange Rate Volatility

Researchers have applied various kinds of techniques to define a proper proxy for exchange rate volatility. However, a general accepted proxy for exchange rate volatility is lacking.

Vergil (2002) investigated the effect of exchange rate volatility on the export flows of Turkey. To construct a fitting measure for exchange rate volatility for Turkey, he computed two different measures of exchange rate volatility, which had very strong correlations for each country. Following work of Kenen and Rodrik (1986), Thursby and Thursby (1987) and Vergil (2002), the standard deviation of the percentage change in the real exchange rate for the twelve preceding months is computed as the proxy for the exchange rate volatility.

2.5 Coups 1997 and 2016

This possible effect of coups is further investigated by a sensitivity analysis. It is also anticipated in this analysis that coups have direct and indirect effects (via exchange rate volatility) on trade flows. The coefficients for the coups of 1997 and 2016 are going to be created by a separate dummy and their interaction with exchange rate volatility will be added. This approach will allow to estimate both coups separately to compare the direct and indirect effect of coups on trade flows.

In addition, the interaction term $\text{coup1997} \times \text{EU}$ and $\text{coup2016} \times \text{EU}$ are included. This approach will allow to investigate whether there is a possible political effect on trade flows among European Member States and Turkey after the coup in 1997 and 2016.

Through distinguishing the coups in 1997 and 2016 in equation (4), equation (5) is obtained.

$$(5) \quad \ln(V^{jk}) = \beta_0 + \beta_1 \ln(Y^j) + \beta_2 \ln(Y^k) + \beta_3 \ln(D^{jk}) + \beta_4 EU^k + \beta_5 FTA^{jk} + \beta_6 ComLan^{jk} + \beta_7 ERV^j \\ + \gamma_1 Coup1997^j + \gamma_2 Coup2016^j + \alpha_1 (Coup1997^j \times ERV^j) + \alpha_2 (Coup2016^j \times ERV^j) \\ + \theta_1 (Coup1997^j \times EU^k) + \theta_2 (Coup2016^j \times EU^k) + u^{jk}$$

Lastly, a triple interaction term of $\text{coup} \times \text{EU} \times \text{volatility}$ is added to equation (4) and (5) in the analysis of this study. This will allow for gaining additional information regarding exchange rate volatility among European Member States in coup times. Specifically, this triple interaction term will provide knowledge whether Turkey has become more autarkic towards European Member States via exchange rate volatility in coup times. This triple interaction will also be utilized as a form of robustness check in this analysis.

2.6 Definition and chosen variables

2.6.1 Response variables

Trade flows

This study uses the value of quarterly export and import flows in U.S. dollars as proxy of trade flows. Although the determinants factors of export and import flow may be different, this study uses similar explanatory variables for export and import flows due to comparison purpose.

2.6.2 Main explanatory variables

Exchange rate volatility

In this study, the standard deviation of the real exchange rate is used to estimate the effect of exchange rate volatility on trade flows. Prior literature shows mixed results, however, it is anticipated that a high volatility in the exchange rate is driving the premium risk for exporting and importing firms. Therefore, a significantly negative effect for both export and import flows is expected.

Coup

In this study, a dummy for coup is constructed to investigate the direct effect of the coup. It is assumed that the coup negatively affects trade flows, as political pressure could drive a country autarkic.

Coup x exchange rate volatility

In this study, the coup has two channels, the direct effect of a coup and the indirect effect of a coup via exchange rate volatility. It is assumed that the coup strengthened the volatility in the exchange, as the Turkish Lira decreased significantly after the coup in 2016. Therefore, a significantly negative effect on both export and import flows is expected.

Coup x EU

Europe has been Turkey's trading partner everlastingly, therefore it is expected that the European Member States are important in explaining trade flows of Turkey. A dummy for EU is created to include this interaction.

Various studies already showed the relevance of European Member States in explaining trade flows of Turkey. However, the results are mixed, as different estimation techniques in the gravity model are used by various studies. Antonucci and Manzocchi (2006) showed that European Member States do not affect trade flows of Turkey. In contrast, Bilici, Erdil, and Yetkiner (2008) showed a significantly positive effect. Their results suggest that if a country is a European Member State then the trade flows of Turkey increase by 21.6 percent. However, this study provided analysis on the effect of EU on total trade flows. The results for the coefficient EU could be different for this analysis, because the total trade flows are divided by exports and imports

The interaction term $\text{coup} \times \text{EU}$ estimates the direct effect of coups on a subgroup of countries, specifically European Member States. Turkey did not feel adequately supported by Europe after the coup in 2016. This could affect trade flows negatively if exporting and importing firms of Turkey are offended by the attitude of the European Member States. Therefore, a possible negative effect on trade flows is anticipated.

2.6.3 Control variables

In this study, a set of control variables are used in the main specification and sensitivity analysis. Control variables enhance the internal validity of a study by limiting the influence of confounding and other extraneous variables. In particular, control variables support in establishing a correlational or causal relationship among variables of interest.

GDP of Turkey and Trading Partner

The term of GDP that is used in this study is GDP in U.S. dollars. According to World Bank, "GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products".

Various studies already showed a significantly positive effect of the coefficient GDP on the trade flows of Turkey. A single percent increase in GDP results in an increase of trade flows by 3.03

percent (Karagoz and Saray, 2010). In addition, a different study regarding Turkey showed that a single percent increase in the GDP results in an increase of trade flows by 1.60 percent (Antonucci and Manzocchi, 2006).

The mentioned studies estimated GDP of Turkey and GDP of trading partners combined. Bilici, Erdil, and Yetkiner (2008) studied the role of EU in Turkey's trade flows and estimated the GDP coefficient separately for both Turkey and its trading partner. Their gravity model estimation show that an one percent increase in GDP of Turkey results in an increase of trade flows by 2.04 percent and the GDP of trading partners show an increase by 1.02 percent. The mentioned studies used the total trade flows of Turkey in their gravity model, however this paper will distinguish the trade flows by export and import. The GDP of Turkey and its trading partner will be estimated separately following the benchmark gravity model proposed by Tinbergen (1962).

In conclusion, prior literature show a positive effect of GDP on trade flows, therefore a significantly positive effect of GDP of Turkey and its trading partner is expected.

Distance

The distance variable represents transportation costs faced by Turkey to export or import. The further the distance, the higher the transportation costs, the lower the trade flows. Gravity model results for Turkey by other studies show that a single percent increase in distance results in a decrease of trade flows by -0.64 and -2.42 percent respectively (Bilici, Erdil, and Yetkiner, 2008; Karagoz and Saray, 2010). In conclusion, a significantly negative effect is expected.

Common language

The same language by trading countries facilitates communication and makes transactions more accessible and transparent, which makes it an important determinant to stimulate additional trade between two countries. Profoundly, most studies estimate the coefficient common language as a dummy in their gravity model. A ten percent increase in common language results in an increase in trade flows by 19.53 percent (Martinez Z., 2003). A different study showed that a ten percent increase in common language results in a 20.65 percent increase in trade flows (Kien, 2009). Carrere (2006) also included common language in her gravity model. The results of her study suggest that a ten percent increase in common language results in an increase of trade flows by 19.71 percent. The results of the mentioned studies show that the magnitude of the effect of

common language on trade flows is strong and prominent. Therefore, a significantly positive effect for common language is expected in this study.

FTA

A free trade agreement between trading countries reduces export and import costs. However, the results of prior literature are mixed regarding this topic. Abedini and Péridy (2008) studied the relationship between FTA's and trade flows. They found a significantly positive effect of FTA on trade flows. In contrast, Bergstrand and Baier (2009) found a significantly negative relationship regarding FTA's and trade flows. Antonucci and Manzocchi (2006) showed that the Custom Union did not result in additional trade for Turkey and Europe. The magnitude of the effect of FTA's on trade flows seem to be unclear in prior literature.

In contrast to the study of Antonucci and Manzocchi (2006), not only the Custom Union will be investigated, but all FTA's of Turkey combined in order to capture the total effect of FTA's. It is anticipated that FTA's reduces export and import costs, therefore a significantly positive effect is expected.

Chapter 3 Stylized Facts

Various charts and tables are used in this section to demonstrate the possible effect of the coups and the volatility of the Turkish currency on the trading balance of Turkey. Firstly, a general overview of the GDP, total export and import flows of Turkey are represented, and then a deeper look at what role the coups had, is provided.

To gain more insight into the possible effect of the coup on the EU countries in 1997 and 2016, the percentage change in the export and import flows in the quarter of the coup and the percentage changes in the export and import flows of the quarters after the coup are presented.

Lastly, the value of the Turkish currency against the US dollar and the evolution of Turkey's Real Exchange rate over time are observed to gain more information about how the Turkish currency reacted to the coup of 1997 and 2016.

3.1 Coup 1997 and 2016

This analysis starts with the observation of the trend of Turkey's GDP. The coup is expected to have a negative impact on Turkey's GDP. However, according to Figure 3.1, there seem to be no prominent effect of the coup on Turkey's GDP. The coups seem to have some negative short-term effects on GDP. However, the decrease in GDP around coup times is not that dramatic to distinguish itself from the periodic rises and falls in the trend.

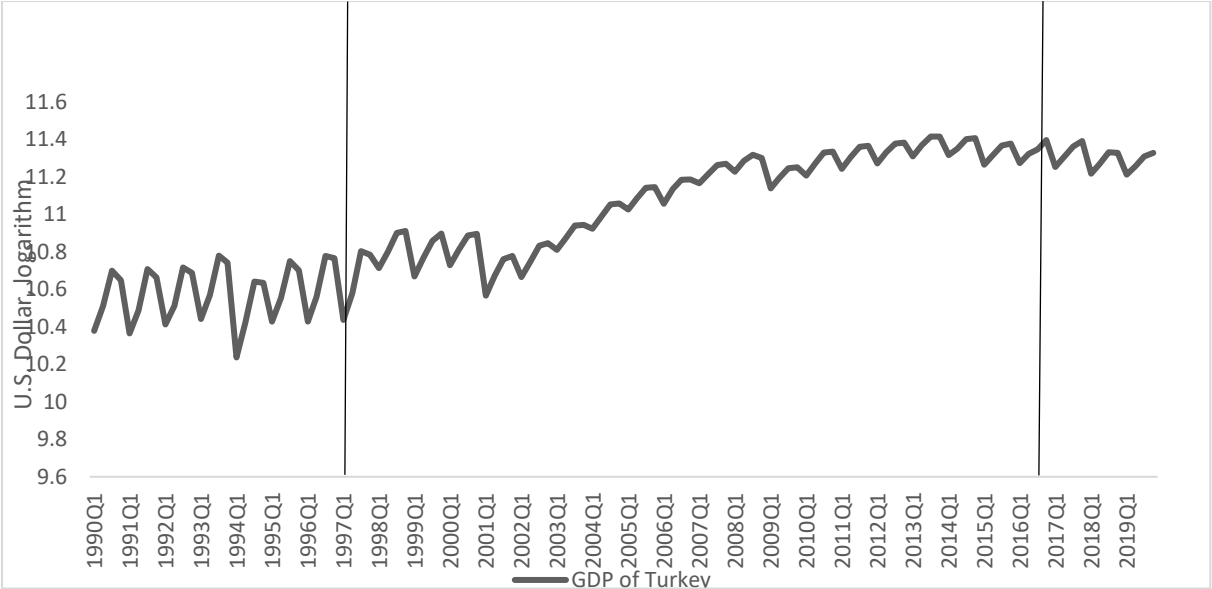


Figure 3.1 GDP of Turkey in Logarithm '1990-2020', the first vertical line represents the first coupe (1st quarter 1997) and the second one represents the most recent coup (3rd quarter 2016)
Source: IMF

In Figure 3.2, An effect of the coup on the trade flows only seems to apply to the coup from 2016. A decline in trade flows is observable in the quarter of the coup, however a rapid recovery follows the quarter after the coup.

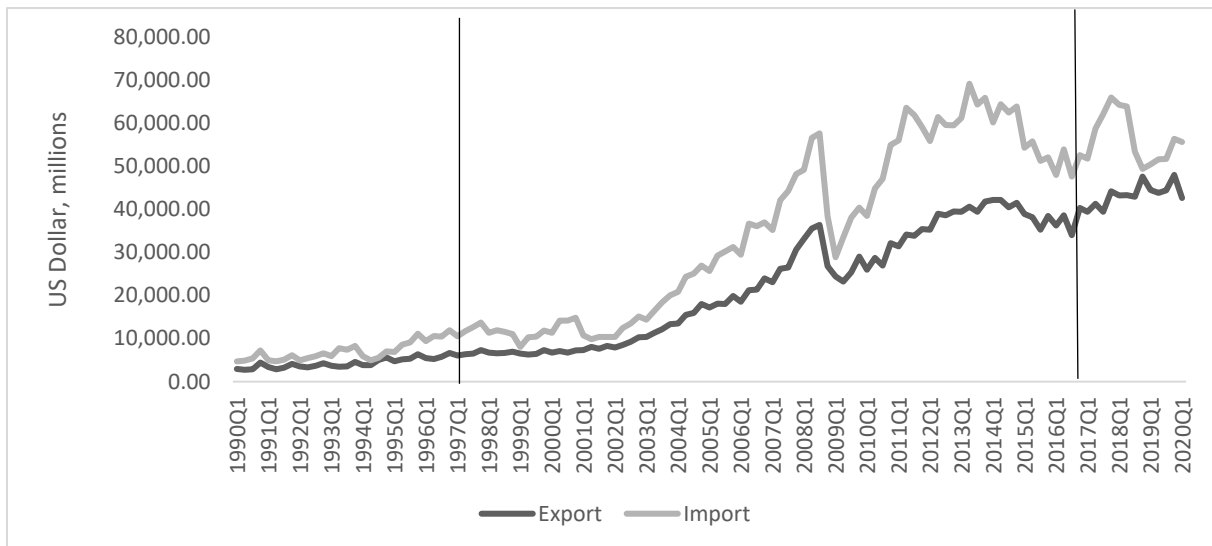


Figure 3.2 Export and Import flows of Turkey in U.S. Dollar, Millions '1990-2020'. The first vertical line represents the first coupe (1st quarter 1997) and the second one represents the most recent coup (3rd quarter 2016)
Source: IMF

However, the coup does seem to influence European countries in the quarter of the coup. Table 3.1 shows that approximately all export flows between Turkey and European countries have diminished within the same quarter in which the coup occurred. Finland, Luxembourg, Slovenia and Denmark are the only countries not showing a decline compared to the quarter before the coup, while for the import flows, only Portugal shows no decline.

However, all flows appear to be increasing a quarter later, with most countries showing positive gains. These results indicate that there was a negative effect of the coup in the short run. However, the decrease in the trade flows with European member states in the quarter of the coup, is followed by a rapid recovery the quarter after. This indicates that there was no long-term effect of the coup in 2016 on trade flows of Turkey.

In Table 3.1, the flows of Russia and United States were added to compare the flows with European Member States. In the quarter of the coup, the trade flows between Turkey and USA show a decrease followed by a recovery. However, the flows between Turkey and Russia show a different result. In the quarter of the coup, the exports to Russia show a small increase, whereas the imports show a small decrease.

Table 3.1 Percentage change of the quarterly trade flows among Turkey and European Member States/Russia/USA between '2016Q3-2017Q1'

Country	Percentage change compared previous quarter					
	Export 2016Q3	Export 2016Q4	Export 2017Q1	Import 2016Q3	Import 2016Q4	Import 2017Q4
Austria	-11.92%	7.88%	-7.12%	-10.19%	3.54%	-19.79%
Belgium	-12.46%	18.64%	12.06%	-22.17%	17.32%	-0.65%
Estonia	-6.98%	29.92%	-15.49%	-22.58%	-4.14%	3.29%
Finland	51.03%	-25.04%	3.96%	-13.87%	-18.49%	25.61%
France	-11.83%	14.13%	0.25%	-12.83%	40.05%	-18.59%
Germany	-7.71%	14.68%	-5.51%	-13.76%	3.73%	-16.45%
Greece	-5.06%	-4.83%	9.37%	-21.40%	58.25%	-15.28%
Ireland	-24.96%	93.41%	-29.24%	-19.25%	3.14%	15.78%
Italy	-12.74%	26.57%	-2.45%	-17.75%	8.66%	-8.03%
Latvia	-43.98	11.84%	-33.54%	-14.08%	-43.17%	-24.41%
Lithuania	-13.71%	11.28%	16.70%	-57.33%	69.33%	65.99%
Luxembourg	9.21%	-61.47%	-1.29%	-1.08%	-17.70%	-4.15%
Malta	-10.17%	37.46%	131.29%	-72.70%	141.09%	43.66%
The Netherlands	-12.59%	11.21%	-0.63%	-14.56%	16.31%	-4.45%
Portugal	-12.96%	31.45%	17.22%	9.92%	-0.01%	-13.62%
Slovak Rep.	-11.09%	5.35%	-3.60%	-13.18%	-3.29%	-4.70%
Slovenia	8.29%	10.11%	-0.80%	-8.12%	22.15%	-8.16%
Spain	-5.79%	6.86%	14.04%	-7.64%	8%	-12.37%
United Kingdom	-13.02%	17.97%	-0.34%	-8.55	14.13%	-3.21%
Bulgaria	9.19%	3.09%	-8.96%	-13.38%	21.15%	6.89%
Croatia	-30.75%	22.73%	17.62%	-26.40%	3.30%	31.10%
Hungary	-4.39%	37.54%	-10.41%	-18.12%	27.77%	-11.11%
Poland	-17.15%	11.60%	17.52%	-22.31%	25.69%	-11.68%
Romania	-13.60	3.86%	7.78%	-8.79%	17.69%	6.12%
Denmark	4.83%	13.35%	-18.36	-2.12%	3.98%	-22.78%
Sweden	-5.90%	16.97%	1.74%	-11.17%	0.36%	11.46%
Russia	0.63%	59.69%	18.84%	-3.78%	6.96%	14.80%
USA	-13.02%	17.97%	-0.34%	-44.11%	4.13%	-6.81%

Source: IMF

3.2 Turkish Domestic Currency

The decline of the Turkish currency is a phenomenon that has been going on everlastingly. Figure 3.3 shows that the Turkish domestic currency has fallen significantly against the US dollar. The possible effect of the coup in 1997 on the Turkish domestic currency is not

observable in Figure 3.3, but after the coup in 2016, a decrease in the value of the Turkish currency is observed.

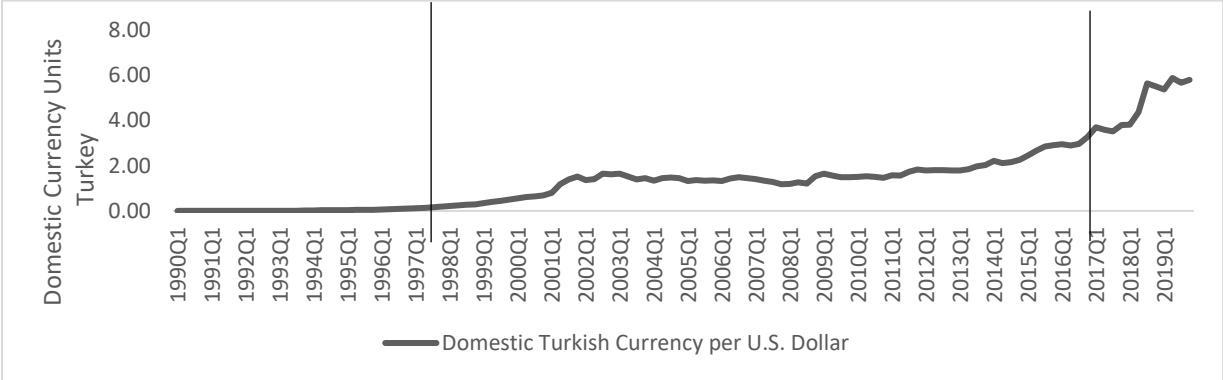


Figure 3.3 Domestic Turkish currency per U.S. dollar, 1990-2020, the first vertical line represents the first coupe (1st quarter 1997) and the second one represents the most recent coup (3rd quarter 2016). Source: IMF

In Figure 3.4, the effect of the coup in 1997 is also not observable. In contrast, the effect of the coup in 2016 shows a decline. However, this decline is not exceptional in the trend, because the volatility in the real exchange rate is substantial in non-coup times also. This indicate that there are even stronger forces driving the real exchange rate than coups.

In conclusion, these graphics indicate that the coup in 1997 had less effect on the value of the Turkish domestic currency than the coup in 2016.

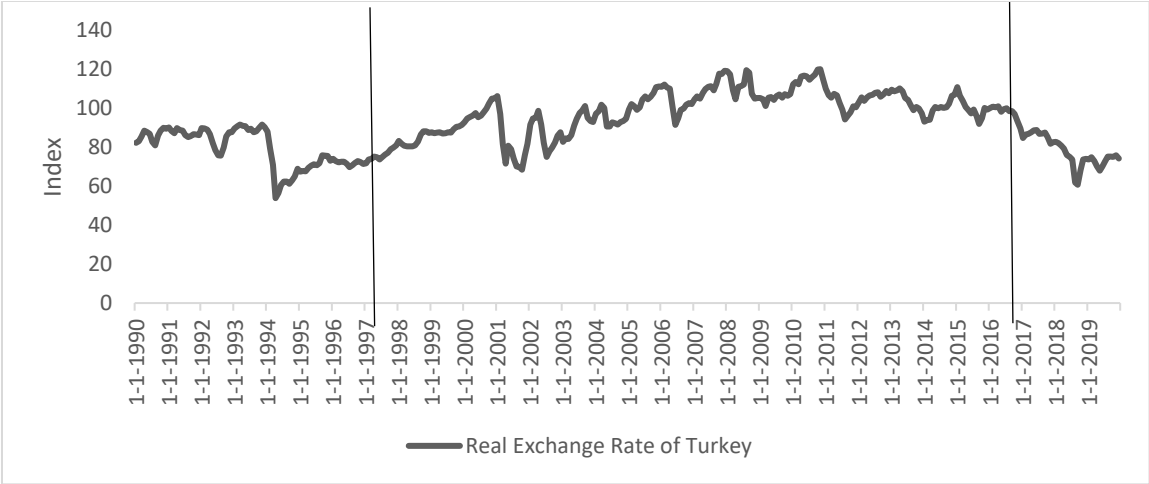


Figure 3.4 Real exchange rate of Turkey (index=2005), 1990-2020, the first vertical line represents the first coupe (1st quarter 1997) and the second one represents the most recent coup (3rd quarter 2016). Source: Federal Reserve Economic Data

Chapter 4 Data

In order to obtain reliable estimates for the coefficients of the gravity model, various sources of government institutions and international database are utilized. The necessary variables needed are the export and import flows of Turkey, GDP of trading partners, GDP of Turkey, distance between Turkey and trading countries, common language, exchange rate, free trade agreements and whether exactly when a trading partner of Turkey became a member of the European Union.

4.1 Response Variables

Export and Import flows

Quarterly data of export and import flows from Turkey are obtained from the International Monetary Fund between 1990 and 2020. This dataset contains the export and import flow per trading country in US Dollars. In this paper, transformations in the export and import flows are made to restore some of the flows between Turkey and its most important trading partners, especially European Member States.

The import and export flows of Belgium between 1990Q1 and 1996Q4 are missing, because Belgium was a united country with Luxembourg. To restore the data in this time frame for Belgium, the data of Belgium and Luxembourg combined are going to be used and Luxembourg is dropped out of the sample. The reason for using Belgium and Luxembourg combined is justified, because the first observable flows between Turkey and 'independent' Luxembourg are very small, indicating that the early Belgium-Luxembourg flows mostly consist of 'Belgium flows'.

The Soviet Union ended on 24th of December 1991, however, in the dataset, for some inexplicable reason the import and export flows of Russia between 1990Q1-1992Q4 and 1995Q1-1995Q2 are missing and registered as trade flows of the Soviet Union. The missing values of trade flows of Russia are going to be restored with the flows of the Soviet Union.

The import and export flows of Czech Republic and Slovakia between 1990Q1-1993Q4 and 1995Q1-1995Q2 are missing, because their flows are reported combined in that period (the two countries were united and named as Czechoslovakia, which is also included in the dataset). To restore the flows for both countries, their percentage share in the total export

and import with Turkey after the countries separated, are going to be used to determine their share in the flows between Czechoslovakia and Turkey.

The import and export flows of Slovenia, Croatia, North-Macedonia, Serbia, Montenegro and Bosnia between 1990Q1-1992Q4 and 1995Q1-1995Q2 are missing, because early flows of these countries are reported under the name Yugoslavia. After the separation of Yugoslavia, Serbia and Montenegro were united between 2003 and 2006, but eventually separated too. These events make it hard to determine the share the separated countries had in trade flows between Turkey and Yugoslavia, therefore no restorations are made. The registered trade flows in the data set of these six countries will be included in this paper. However, trade flows of Yugoslavia are dropped out of the sample.

The import and export flows of Cyprus are also dropped out. Turkey is the only country in the world that has officially recognized Northern Cyprus as a sovereign state. The United Nations recognizes it as territory of the Republic of Cyprus under Turkish occupation. Turkey’s position in this matter, raises questions about the precision of the export and import flows between Cyprus and Turkey. Furthermore, a significant amount of the data consists of zero flows. Therefore, they are dropped out.

After all transformations and further data trimming, the dataset ended up with 187 trading countries. 22400 observations of export flows, of which 4290 are zero flows and 22400 observations of import flows of which 6618 are zero flows as presented in Figure 4.1

Trade Flows	Before Data Trimming		After Data Trimming	
	Observations	Zero Flows	Observations	Zero flows
Export Flows	28800	7067	22440	4290
Import flows	28560	8716	22440	6618

Figure 4.1 Total quarterly export and import observations with zero flows included, 'before and after data trimming'.

4.2 Main Explanatory Variables

Coup

The variable coup will be constructed by a dummy in the quarter it occurred. The first coup attempt was in the first quarter of 1997 and the second coup attempt was in the third quarter of 2016.

Exchange Rate volatility

The data on monthly real exchange rates are collected online from Federal Reserve Bank of St. Louis, Organization for Economic Co-operation and Development. The real effective exchange rates are based on manufacturing consumer price index. The standard deviation of the percentage change in the real exchange rate for the twelve preceding months is computed as the proxy for the exchange rate volatility.

European Member States

The European countries are defined as European Member States precisely in the quarter of the year that they have joined the European Union. The data on European Union members are collected online from the official website of the European Union.

The European Union consisted of 28 countries in the time frame of this paper: Austria, Belgium, Croatia, Republic of Cyprus (not included in this paper), Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

4.3 Control Variables

GDP of Trading Partners

The data on GDP is obtained from World Development Indicators (WDI) database of the World Bank. This dataset contains the annually GDP of 264 countries. In this study, the annually observations of GDP of all the trading partners of Turkey are preferred over quarterly observations, as quarter observations of GDP for most 'less developed' countries are lacking. Quarter GDP data of the most developed countries are available, however, these quarter observations of the 'developed' countries are not going to be used, to maintain a consistent approach regarding GDP of the trading partners of Turkey.

GDP of Turkey

The data on GDP of Turkey in domestic currency is obtained from World Development Indicators (WDI). To adjust to U.S. dollars, the average annual exchange rate between the Turkish Lira and the American US Dollar is used. The average annual exchange rate is obtained from the exchange rate archives of the IMF.

Distance

The data on distance is collected online from CEPII, the GeoDist database. GeoDist provides data online for empirical economic research including geographical elements and variables. The proxy for distance among two countries is calculated on bilateral distances between the biggest cities of those two countries, those inter-city distances are being weighted by the share of the city in the overall country's population. The general formula developed by Head and Mayer (2002) and used for calculating distances between country i and j is:

$$d_{ij} = \left(\sum_{k \in i} (pop_k / pop_i) \sum_{l \in j} (pop_l / pop_j) d_{kl}^\theta \right)^{1/\theta}$$

where pop_k designates the population of agglomeration k belonging to country i . The parameter θ measures the sensitivity of trade flows to bilateral distance d_{kl} . To obtain the measure of distance for this study, the distance calculation sets θ equal to -1 , which corresponds to the usual coefficient estimated from gravity models of bilateral trade flows (Melitz & Toubal, 2014).

Common language

The data on common language is also collected online from CEPII, the GeoDist database. The variable 'common spoken language' (CSL) is going to be used. Melitz & Toubal (2014) constructed this proxy for common language. CSL is a probability (0-1) that a pair of people at random from two countries understands one another in some language. This proxy provides more explanatory power than the traditional common language variable, as it is a probability in the range between zero and one rather than zero or one like the traditional dummy variable, therefore this proxy for common language is going to be used.

Free Trade Agreements

The data on free trade agreements of Turkey are obtained online from statistics of Ministry of Trade, Republic of Turkey. Turkey has concluded free trade agreements with 38 countries, 11 of which were repealed due to the accession of these countries to the EU: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. The free trade agreement between Jordan and Turkey ended on 22 November, 2018, because it was repealed by Jordan, whereas the free trade agreement between Turkey and Syria was suspended on 6 December, 2011, because of the Syrian civil war.

4.4 Descriptive Statistics

In Figure 4.2, the descriptive statistics of the relevant variables of this study are presented. As stated before, a significant part of the data set consists of zero trade flows, however the control variables in the analysis are approximately complete.

Variables	Observations	Mean	Standard Error	95% confidence interval
Export Flows in millions	18150	130	2.773291	125 - 136
Import Flows in millions	15822	222	5.357948	211 - 233
Quarterly GDP of Turkey in millions U.S. Dollar	22,440	125000	511	124000 - 126000
Yearly GDP of Trading Partners in millions U.S. Dollar	21392	277000	8400	260000 - 293000
Distance	22400	6014.002	27.18	551.5976 - 16815.47
Common Spoken Language	22400	.0596022	.0006786	.058272 - .0609323
Free Trade Agreement	22400	.1478164	.0023693	.1431723 - .1524605
Exchange Rate Volatility	22400	.0314405	.0001256	.0311942 - .0316868
EU	22400	.1032531	.0020314	.0992715 - .1072347

Figure 4.2 Descriptive statistics regarding the variables of the gravity model of this study

Chapter 5 Methodology

In this study, a cross sectional time-series data is used to observe the trade behavior of Turkey and its trading partners between 1990 and 2020. Panel data allows for controlling for variables that are not observable or measurable like cultural factors or variables that change over time, but not across countries. Particularly, panel data of this study accounts for individual heterogeneity across trading partners of Turkey.

5.1 REM and FEM

Two techniques of analyzing panel data are utilized to perform the analysis. The random effects model (REM) would be more appropriate when estimating trade flows between randomly drawn samples of trading partners from a larger population. In contrast, the fixed effects model (FEM) would be more appropriate than REM when one is interested in estimating trade flows between a predetermined selection of nation (Egger, 2000).

The fixed effect estimator explores the relationship between dependent and explanatory variables within a country. Each country has its own individual characteristics that may or may not influence trade flows. For instance, Greece is geographically closer to Turkey than Serbia, or Germany has a better infrastructure than Venezuela. When using a FEM, it is assumed that a factor within country level could affect or bias the trade flows, therefore a control is necessary. This is the rationale behind the assumption of the correlation between country's error term and explanatory variables. FEM eliminates the effect of those time-invariant characteristics. Thus, the net effect of the explanatory variables on trade flows can be assessed for Turkey in this study.

REM assumes that the country's error term is not correlated with the explanatory variables which allows for time-invariant variables to play a significance. In REM, individual characteristics that possibly affect dependent variables should be specified. However, some variables may not be available therefore leading to omitted variable bias.

However, the objective of this study is investigating this relationship with the traditional gravity model and its coefficients, which are available. This study will also provide results of FEM with the aim of strengthening the robustness of the analysis by comparing both Models. However, the problem faced by FEM is that it cannot estimate variables that do not change over time, therefore variables that are normally used in the gravity model, such as distance

and common language are excluded. The exclusion of these variables is not important, as FEM is already controlling for these variables and these variables are already presented by the REM. A random effect estimator (REM) with yearly fixed effects and a fixed effect estimator (FEM) with a linear time trend are used to obtain reliable estimates for the relevant coefficients in this analysis. The yearly fixed effects in the REM control for factors changing each year that are common to all countries for a given year. The linear time trend controls for the steady increase or decrease of the trade flows over a period, the model analyzes previous data and predicts the future growth or pattern.

5.2 Main Specification

In this paper, the quarterly export and import volumes of Turkey will be parted, to give a stronger representation of the trading patterns.

Therefore, the first specification of this study, Model 5.1 (REM) based on quarterly trade flows data is specified as:

$$\begin{aligned} \ln Trade_{ij,t} = & \alpha_{ij} + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(dist_{ij}) + \beta_4 lan_{ij} + \beta_5 FTA_{ij,t} + \beta_6 U_{i,t} + \\ & \beta_7 EU_{j,t} + \gamma_1 Coup_{i,t} + \gamma_2 Coup_{i,t-1} + \gamma_3 Coup_{i,t-2} + \theta_1 (U_{i,t} \times Coup_{i,t}) + \theta_2 (U_{i,t} \times \\ & Coup_{i,t-1}) + \theta_3 (U_{i,t} \times Coup_{i,t-2}) + \varrho_1 (EU_{j,t} \times Coup_{i,t}) + \varrho_2 (EU_{j,t} \times Coup_{i,t-1}) + \\ & \varrho_3 (EU_{j,t} \times Coup_{i,t-2}) + \mu_1 (EU_{j,t} \times U_{i,t} \times Coup_{i,t}) + \mu_2 (EU_{j,t} \times U_{i,t} \times \\ & Coup_{i,t-1}) + \mu_3 (EU_{j,t} \times U_{i,t} \times Coup_{i,t-2}) + \delta_t + \varepsilon_{ijt} \end{aligned}$$

Where trade is import or export between country i , Turkey and trading partner j . GDP_{it} is the GDP of Turkey and GDP_{jt} is the GDP of a trading country. $Dist_{ij}$ is a measure of distance. Lan_{ij} is a probability (0-1) that a pair of people at random from Turkey and trading partner understands one another. $FTA_{ij,t}$ is also a dummy variable, which equals one if Turkey has a free trade agreement with its trading partner, or zero otherwise. $U_{i,t}$ is a proxy for exchange rate volatility. This will capture the effect of exchange rate volatility on trade flows. $EU_{j,t}$ is a dummy variable, which equals one if the trading partner of Turkey is an European member state, or zero otherwise.

Coup is a dummy variable which equals one if there was a coup or zero otherwise. This will capture the direct effect of coups on trade flows. To investigate the direct effect of coups on trade flows properly, several lags are included for the coup as effects on the trade pattern might need some time to materialize. $U_{i,t} \times Coup_{i,t}$ is the interaction effect between the coup

and exchange rate volatility. This will capture the indirect effect of coups, via exchange rate volatility. The lags of the interaction term between $U_{i,t}$ and $Coup_{i,t}$ are also included. $Coup_{i,t} \times EU_{j,t}$ is the interaction effect between the coup and EU countries. This will capture the possible political effect on trade flows among Turkey and European Member States. The lags of the interaction term of $Coup_{i,t} \times EU_{j,t}$ are also included to capture the effect properly. $EU_{j,t} \times U_{i,t} \times Coup_{i,t}$ is the triple interaction effect between EU countries, exchange rate volatility and coup. This will allow for gaining additional information regarding exchange rate volatility among European Member States and Turkey in coup times. In addition, this triple interaction will also be utilized as a form of robustness check for all Models in this study. The triple interaction effect of $EU_{j,t}$, $U_{i,t}$ and lags of the coup are also included. δ_t are year fixed effects. ε_{ijt} is the error term.

The second specification of this study, Model 5.2 (FEM) based on quarterly trade flows data is specified as:

$$\begin{aligned} \ln Trade_{ij,t} = & \alpha_{ij} + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 FTA_{ij,t} + \beta_4 U_{i,t} + \beta_5 EU_{j,t} + \beta_6 Year + \\ & \gamma_1 Coup_{i,t} + \gamma_2 Coup_{i,t-1} + \gamma_3 Coup_{i,t-2} + \theta_1 (U_{i,t} \times Coup_{i,t}) + \theta_2 (U_{i,t} \times \\ & Coup_{i,t-1}) + \theta_3 (U_{i,t} \times Coup_{i,t-2}) + \varrho_1 (EU_{j,t} \times Coup_{i,t}) + \varrho_2 (EU_{j,t} \times Coup_{i,t-1}) + \\ & \varrho_3 (EU_{j,t} \times Coup_{i,t-2}) + \mu_1 (EU_{j,t} \times U_{i,t} \times Coup_{i,t}) + \mu_2 (EU_{j,t} \times U_{i,t} + \\ & Coup_{i,t-1}) + \mu_3 (EU_{j,t} \times U_{i,t} \times Coup_{i,t-2}) + \varepsilon_{ijt} \end{aligned}$$

Where Year is the linear time trend.

5.3 Sensitivity analysis

Models 5.1 and 5.2 estimate the effect of the two coups in 1997 and 2016 combined. Their effects may be different from each other and the aim of this study is to investigate whether there is a political effect of the coup in 2016 on trade flows among Turkey and European Member States to provide an answer to the second hypothesis. In addition, the effect on trade flows for two coups will be compared to obtain a clear answer to the third hypothesis. Thus, it is necessary to distinguish the effects of the coups. Therefore, the third specification of this study, Model 5.3 (REM) based on quarterly trade flows data is specified as:

$$\begin{aligned}
\ln Trade_{ij,t} = & \alpha_{ij} + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(dist_{ij}) + \beta_4 lan_{ij} + \beta_5 FTA_{ij,t} + \beta_6 U_{i,t} + \\
& \beta_7 EU_{j,t} + \gamma_1 Coup1997_{i,t} + \theta_1 (U_{i,t} \times Coup1997_{i,t}) + \varpi_1 (EU_{j,t} \times Coup1997_{i,t}) + \\
& \mu_1 (EU_{j,t} \times U_{i,t} \times Coup1997_{i,t}) + \rho_1 Coup2016_{i,t} + \tau_1 (U_{i,t} \times Coup2016_{i,t}) + \vartheta (EU_{j,t} \times \\
& Coup2016_{i,t}) + \omega_1 (EU_{j,t} \times U_{i,t} \times Coup2016_{i,t}) + \delta_t + \varepsilon_{ijt}
\end{aligned}$$

Where $Coup1997_{i,t}$ is the coup in 1997 and $Coup2016_{i,t}$ the failed coup in 2016. This will allow to capture the direct political effect of both coups separately. The interaction of exchange rate volatility and both coups separately will capture the indirect effect of both coups, via exchange rate volatility. In addition, the interaction between European Member States and both coups are also estimated separately to catch the possible political effect on trade flows in 1997 and 2016. Both coups are defined as one in the quarter it occurred and one the quarter after and zero otherwise. This will be further explained by the section: 'Econometric Issues in Gravity Model' in Chapter 6.

Finally, the effect of both coups is also going to be estimated separately with the fixed effect estimator (FEM). Therefore, the fourth specification of this study, Model 5.4 (FEM) based on quarterly trade flows data is specified as:

$$\begin{aligned}
\ln Trade_{ij,t} = & \alpha_{ij} + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_5 FTA_{ij,t} + \beta_6 U_{i,t} + \beta_7 EU_{j,t} + \beta_6 Year + \\
& \gamma_1 Coup1997_{i,t} + \theta_1 (U_{i,t} \times Coup1997_{i,t}) + \varpi_1 (EU_{j,t} \times Coup1997_{i,t}) + \mu_1 (EU_{j,t} \times U_{i,t} \times \\
& Coup1997_{i,t}) + \rho_1 Coup2016_{i,t} + \tau_1 (U_{i,t} \times Coup2016_{i,t}) + \vartheta (EU_{j,t} \times Coup2016_{i,t}) + \\
& \omega_1 (EU_{j,t} \times U_{i,t} \times Coup2016_{i,t}) + \varepsilon_{ijt}
\end{aligned}$$

Chapter 6 Result and analysis

The first and main hypothesis of this study is regarding the effect of exchange rate volatility and coups on trade flows. The relevant results of the coefficients for exchange rate volatility and coups in the main specification will be presented and analyzed to provide an answer to the first hypothesis. In addition, the second hypothesis of this study is regarding the political effect on trade flows after the coup in 2016 among Turkey and European Member States. The relevant coefficient EU x coup in the main specification will provide insights regarding this hypothesis. However, in this effect, the coup in 1997 is included, therefore a sensitivity analysis is provided to further analyze the effect of both coups separately to also provide a clear answer to the second and third hypothesis.

6.1 Main Specification

Table 6.1 Gravity model results for the random effect estimator (REM) with yearly fixed effects for the relationship between independent variables: coup, exchange rate volatility and dependent variables: trade flows of Turkey

Independent variables	(I)	(II)	(III)	(IV)
GDP_j	0.79*** (0.02)	0.79*** (0.02)	0.77*** (0.03)	0.77*** (0.03)
GDP_i	0.32*** (0.04)	0.32*** (0.04)	0.31*** (0.06)	0.31*** (0.06)
Distance	-1.39*** (0.10)	-1.39*** (0.10)	-1.21*** (0.13)	-1.21*** (0.13)
Common spoken language	3.65*** (0.81)	3.65*** (0.82)	3.26*** (1.03)	3.26 (1.03)
EU	-0.01 (0.05)	-0.07 (0.06)	0.50*** (0.07)	0.54*** (0.08)
Free trade agreement	-0.06* (0.04)	-0.06 (0.04)	-0.01 (0.05)	-0.01 (0.05)
Exchange rate volatility	3.01*** (0.67)	2.79*** (0.68)	-4.14*** (1.00)	-4.00*** (1.01)
Coup	0.56** (0.25)	0.46* (0.26)	1.16*** (0.37)	1.08*** (0.38)
L. Coup	1.31*** (0.43)	1.19*** (0.45)	2.12*** (0.63)	2.14*** (0.65)
L2. Coup	0.39 (0.28)	0.29 (0.29)	0.66 (0.41)	0.59 (0.43)
Coup x Exchange rate volatility	-27.52*** (10.93)	-22.95** (11.31)	-51.57*** (16.11)	-47.71*** (16.81)
L. Coup x Exchange rate volatility	-63.35*** (22.90)	-56.80** (23.67)	-121.56*** (33.38)	-122.29*** (34.70)
L2. Coup x Exchange rate volatility	-16.47 14.33	-11.31 (14.84)	-36.98* (20.78)	-33.22 (21.62)
Coup x EU	0.10 (0.14)	1.03* (0.58)	-0.01 (0.19)	0.60 (0.81)
L. Coup x EU	-0.11	1.06	0.20	0.06

	(0.14)	(1.01)	(0.20)	(1.41)
L2. Coup x EU	-0.05	0.87	0.11	(0.94)
	(0.14)	(0.68)	(0.20)	0.47
Coup x ERV x EU		-41.34		-28.24
		(25.96)		(35.73)
L. Coup x ERV x EU		-61.04		6.79
		(53.59)		(74.73)
L2. Coup x ERV x EU		-45.71		-29.50
		(33.72)		(47.24)
Constant	-1.19	-1.08	-1.71	-1.68
	(1.41)	(1.41)	(1.95)	(1.95)
R-squared	0.67	0.67	0.57	0.57
Wald test	35749.10***	35769.14***	11914.56***	11913.61***

Notes: (I) Export flows (II) Export flows with triple interaction (III) Import flows (IV) Import flows with triple interaction
Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6.2 Gravity model results for the fixed effect estimator (FEM) with a linear time trend for the relationship between independent variables: coup, exchange rate volatility and dependent variables: the trade flows of Turkey

Independent variables	(I)	(II)	(III)	(IV)
GDP_j	0.84***	0.84***	0.70***	0.70***
	(0.02)	(0.02)	(0.03)	(0.03)
GDP_i	0.37***	0.37***	0.50***	0.50***
	(0.03)	(0.03)	(0.04)	(0.04)
EU	(0.00)	-0.04	0.51***	0.55***
	(0.05)	(0.06)	(0.07)	(0.08)
Free Trade Agreement	-0.12***	-0.12***	-0.01	-0.02
	(0.04)	(0.03)	(0.05)	(0.05)
Exchange rate volatility	0.76**	0.59	-1.87***	-1.73***
	(0.37)	(0.39)	(0.55)	(0.58)
Coup	0.48***	0.39**	1.09***	1.00***
	(0.18)	(0.19)	(0.27)	(0.29)
L. Coup	1.20***	1.09***	1.53***	1.53***
	(0.32)	(0.34)	(0.47)	(0.50)
L2. Coup	0.19	0.10	-0.11	-0.19
	(0.21)	(0.22)	(0.31)	(0.33)
Coup x Exchange rate volatility	-27.78***	-23.52***	-50.18***	-46.01***
	(8.40)	(8.87)	(12.54)	(13.41)
L. Coup x Exchange rate volatility	-62.51***	-56.38***	-90.86***	-90.80***
	(17.29)	(18.29)	(25.40)	(27.09)
L2. Coup x Exchange rate volatility	-10.84	-5.93	1.71	6.13
	(10.97)	(11.64)	(16.00)	(17.07)
Coup x EU	0.10	0.96*	-0.01	0.66
	(0.14)	(0.58)	(0.19)	(0.81)
L. Coup x EU	-0.11	0.95	0.20	0.21
	(0.14)	(1.01)	(0.19)	(1.41)
L2. Coup x EU	-0.05	0.80	0.10	0.78
	(0.14)	(0.67)	(0.20)	(0.94)
Coup x Exchange rate volatility x EU		-38.51		-31.30

		(25.64)		(35.71)
L. Coup x Exchange rate volatility x EU		-55.92		-1.50
		(53.50)		(74.68)
L2. Coup x Exchange rate volatility x EU		-41.85		-35.43
		(33.66)		(47.21)
Constant	-	-	-72.91***	-73.20***
	135.44***	135.71***		
	(4.01)	(4.01)	(5.88)	(5.89)
R-squared	0.48	0.48	0.47	0.47
F-stat	499.25***	499.30***	265.58***	265.53***

Notes: (I) Export flows (II) Export flows with triple interaction (III) Import flows (IV) Import flows with triple interaction
Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Explanatory Power

Most applications of the gravity model are applied to the export flows, but this study also applies it to the import flows to further analyze the effect of coups and the exchange rate volatility on trade flows of Turkey. Table 6.1 show that the R-squared for the export flows is 0.67, while the R-squared for the import flows is 0.57. Table 6.2 show that the R-squared for the export flows is 0.48 and for the import flows 0.47. The random effect estimator (REM) is providing more explanatory power, however this is not unexpected, as it includes more control variables in the estimation. The fixed effect estimator (FEM) controls for attributes that do not change over time, thus the variables for distance and common spoken language are not included and therefore dropped out.

6.1.1 Main Explanatory Variables

Exchange Rate Volatility

In Table 6.1, the estimated exchange rate volatility shows a significantly positive effect on export flows, but a significantly negative effect on import flows. A single percentage point increase in the standard deviation of the percentage change in the real exchange rate over the previous twelve months results in an increase of exports by 3.01 percent and a decrease of imports by 4.14 percent.

In Table 6.2, a single percentage point increase in the proxy of exchange rate volatility results in an increase of exports by 0.76 percent. However, this effect is implausible, as the estimated coefficient for exchange rate volatility shows no significance with the triple interaction. The import flows are negatively affected; however the magnitude is smaller than

presented in Table 6.1. A single percentage point increase in the proxy of exchange rate volatility results in a decrease of imports by 1.87 percent.

These results indicate that Turkey's exports have increased by higher volatility, while import decreased by higher volatility. Importantly, for export flows this effect is doubtful, because of the results of Table 6.2. The proxy for exchange rate volatility shows how volatile the exchange rate has been over the 12 preceding months, but provides no information regarding the appreciation or depreciation of the currency. This effect of this proxy differs for export and import. This probably depends on the declining Turkish domestic currency over the past 30 years. Figure 2.3 presents the trend of the Turkish domestic currency against the dollar, an astonishing decrease over time is visible. This would imply that high volatility on domestic currency (depreciating in value) has a positive effect on exports, because it has become relatively cheaper to other countries. In contrast, there is a negative significantly negative effect on import flows, because import has become more expensive. Overall, the effect of the exchange rate volatility seems to affect import flows more than export flows, as the magnitude is of larger proportions and presents stronger significance.

Exchange rate volatility in coup times

However, the exchange rate volatility seems to affect trade flows differently in coup times. In table 6.1 and 6.2, the interaction exchange rate volatility and coup shows a significantly negative effect on export and import flows approximately six months post-coup period. In table 6.1, a single percent point increase in exchange rate volatility results in a decrease of export flows by 27.52 percent and a decrease of import flows by 51.57 percent in the quarter after coups. In the second quarter after coups, a one percent point increase in exchange rate volatility decreases export flows by 63.35 percent and imports flows by 121.56 percent. In table 6.2, a single percent point increase of exchange rate volatility decreases export and import flows by respectively 27.78 percent and 50.18 percent in the quarter after the coup. In the second quarter, a single percent point increase of exchange rate volatility decreases export and import flows respectively by 62.51 percent and 90.86 percent.

Thus, the total effect of exchange rate volatility in coup times is negative for the export and import flows of Turkey. The reason is that the effect and the magnitude of the interaction

between exchange rate volatility and coup on trade flows is far greater than the coefficient for exchange rate volatility. These results indicate that higher uncertainty have a negative impact on trade flows.

In conclusion, exchange volatility inhibited the growth of trade flows for Turkey. The import flows are negatively affected. In contrast, the export flows are positively affected by exchange rate volatility, however this effect is doubtful regarding results of Table 6.2. In addition, the results of Table 6.1 and 6.2 show that the total effect of exchange rate volatility in coup times is negative for both export and import flows of Turkey.

Coup

In the analysis, the effect of coups in the main specification consists of direct and indirect effects, respectively coup and coup x exchange rate volatility. Firstly, results of the direct effects will be analyzed followed by the indirect effects. Lastly, the total effect of coups will be discussed. Before the analysis proceeds with the interpretation of the coups in the main specification, it is relevant to briefly discuss the interpretation of dummies in log models. The percentage change in the export or import flows associated with switching coup from zero to one is: $100 \times (e^{\gamma} - 1)$. This is also known as the Halvorsen-Palmquist correction (Halvorsen & Palmquist, 1980).

Direct Effect

In Table 6.1 and 6.2, The estimated coefficient for coup shows a significantly positive effect on export and import flows in the quarter the coups occurred and in the quarter after. However, this effect is not significant in the second quarter after the coup. Based on these results, the direct effect of a coup lasts approximately six months. Table 6.1 show that in coup times, exports increase by 75.07 percent in the first quarter, and in the second exports increase by 270.62 percent. In contrast, imports increase by respectively 219 percent and 733 percent. Table 6.2 show that in coup times, exports increase by 61.61 percent in the first quarter, and in the second exports increase by 232.01 percent. In contrast, imports show an increase of respectively 197.43 percent and 361.82 percent. Table 6.1 and 6.2 show similar results, however the magnitude of this direct effect is a fraction smaller in Table 6.2.

Indirect Effect

The interaction term $\text{coup} \times \text{exchange rate volatility}$ in the main specification provides knowledge regarding the effect of the proxy for exchange rate volatility on trade flows in coup times. In particular, the effect of a percentage point change in the standard deviation of the real exchange rate on trade flows in coup times. To estimate the total effect of coups, via exchange rate volatility, the sample mean of the exchange rate volatility will be used, as presented in Figure 4.2. This means in Table 6.1, a decrease of export flows via exchange rate volatility by 86.52 percent and import flows by 162.14 percent in the quarter of the coup. One quarter after the coup, the export flows decrease via exchange rate volatility by 199.18 percent and the import flows by 318.18%. In addition, Table 6.2 presents similarities, as the estimated values are approximately in the same range. Table 6.2 show that in the first quarter in coup times, export and import flows decrease via volatility by respectively 87.34 percent and 157.77 percent. In the second quarter, the export and import flows decrease via volatility by respectively 196.53 percent and 285.67 percent.

Total Effect

Based on the results of the direct and indirect effects of coups, the total effect is assessed. The positive direct effect of coups on trade flows exceeds the negative indirect effect of coups via exchange rate volatility for the import flows in coup times based on Table 6.1 and 6.2. This indicate that coups have a positive effect on import flows. However, the export flows are affected slight differently. In the first quarter of coup times, the indirect effect of coups via exchange rate volatility is greater than the direct effects of coups for the export flows. This indicate that the coups have a negative total effect on export flows in the first quarter. In the second quarter after the coup, the direct effects are greater than the indirect effects. Thus, there is a positive effect on export flows in the second quarter after coups. This positive effect on trade flows in the second quarter is greater than the negative effect of coups via exchange range volatility in the first quarter. This indicate that the total effect of coups on export and import flows is positive.

The results of the main specifications show that coups have a significantly positive effect on trade flows. Overall, it could be concluded that coups did not result in Turkey being more autarkic, as the total effect of coups on trade flows is positive. However, the results show

that coups inhibit trade flows via exchange rate volatility, therefore the first hypothesis of this study is carefully not rejected.

Political effect of coups among EU and Turkey

In Table 6.1 and 6.2, the coefficient for EU shows a different effect on export and import flows. It has no significant effect on exports, in contrast, it does have a significantly positive effect on imports. If a country is a member of the European Union, Turkey's imports rise by 75.07 percent. Prior studies already showed a significant positive effect of EU on trade flows regarding Turkey (Bilici, Erdil, and Yetkiner, 2008). However, the magnitude is not as great and significant as the results of this analysis. However, Bilici et al (2008) estimated the effect of EU on total trade flows and it showed a significantly positive effect by 21.6 percent. In contrast to their study, this analysis estimated the trade flows separately by export and import flows. Furthermore, the differences in results could also be explained by the fact that their analysis regarding trade flows is till 2008 and it could be possible that Europe has become more important in explaining trade flows of Turkey. The results of this study show that Turkey is more dependent on trade with Europe than vice versa.

In table 6.1 and 6.2, the estimated coefficient for the interaction term between coup and EU has no significant effect on trade flows. The triple interaction term, which captures the effect of exchange rate volatility on trade flows among European Member States in coup times also presents no significance. Thus, it can be concluded that coups did not have a greater effect on trade flows among European Member States. Importantly, the possible political effect after the coup in 2016 will be further discussed in the sensitivity analysis, as the effect of coups are estimated combined in Table 6.1 and 6.2. However, based on the results of the main specification the second hypothesis is rejected.

6.1.2 Control Variables

Prior literature already provided the knowledge that the gravity model is strong in explaining the trade patterns of Turkey (Antonucci and Manzocchi, 2006; Bilici, Erdil, and Yetkiner, 2008). In Table 6.1 and 6.2, the control variables regarding the coefficients of the traditional gravity model: GDP of Turkey, GDP of trading partner and distance present an expected relationship with export and import flows. The signs of the relevant coefficients are equal

compared to prior studies, however, the magnitudes are slightly different than the results of this study.

In Table 6.1 and 6.2, the estimated coefficient for the GDP of trading partners shows a significantly positive effect on trade flows. In Table 6.1, a single percent increase in the GDP of the trading partner results in a 0.79 percent increase in exports and a one percent increase in GDP is related to a 0.77 percent increase in imports. Table 6.2 show that a one percent increase in GDP result in an increase of export flows by 0.84 percent and increase of import flows by 0.70 percent. This indicate that the higher the GDP of other countries, the higher the exports and imports from Turkey to those countries.

In Table 6.1 and 6.2, the estimated coefficient for the GDP of Turkey shows a significantly positive effect on trade flows. In Table 6.1, a one percent increase in Turkey's GDP results in a 0.32 percent increase in exports, in contrast, this effect is 0.31 percent for imports. In Table 6.2, a one percent increase in GDP results in an increase of export flows by 0.37 percent and an increase of import flows by 0.50 percent. This indicates that the higher the GDP of Turkey, the higher the export and import flows of Turkey.

In Table 6.1, the estimated coefficient distance shows a significantly negative effect on trade flows. A one percent increase in distance decreases exports by 1.39 percent and imports decrease by 1.21 percent. The further the distance, the lower are the import and export flows of Turkey.

In Table 6.1, the estimated coefficient for common spoken language shows a significantly positive effect on trade flows. A one percentage point increase in the chance that a pair of people at random from Turkey and another country understands one another results in an increase of export flows by 3.65 percent and an increase of import flows by 3.26 percent. This indicates that communication between Turkey and trading partners facilitates additional trade.

In Table 6.1, the coefficient for Free Trade Agreement shows a significantly negative effect on the export flows at a significance level of 0.10, but the effect is not significant if a triple interaction term is added in the specification. In Table 6.2, the estimated coefficient for FTA has a significantly negative effect on export flows by 11.31 percent. This is an unexpected result. However, Antonucci and Manzocchi (2006) also concluded in their study that the

Customs Union did not result in additional trade between European Member States and Turkey.

Based on these results, the free trade agreements did not lead to an increase in the trade flows of Turkey, however, these results should be interpreted with the greatest caution. There could be a reverse causality problem when estimating the effect of an FTA on the trade flows. Countries that often trade with each other are more likely to establish an FTA. This will be further discussed in the section 'econometric problems of the gravity model'.

6.2 Sensitivity analysis

A sensitivity analysis is provided to further study the political effect after the failed coup in 2016 and to provide a clear answer to the second hypothesis. The relevant coefficient $\text{coup}_{2016} \times \text{EU}$ will provide insights whether there is a direct effect of the coup in 2016 on trade flows among Turkey and European Member States. In addition, the results of this analysis will also provide answers regarding the third hypothesis. In this analysis, the effect of both coups are estimated separately, therefore the coefficients: coup_{1997} , coup_{2016} and their interaction with exchange rate volatility can be used for the comparison of direct and indirect effects of both coups on Turkish trade flows.

Table 6.3 Gravity model results for the random effect estimator (REM) with yearly fixed effects for the relationship between independent variables: coup of 1997, coup of 2016, exchange rate volatility and dependent variables: the trade flows of Turkey

Independent variables	(I)	(II)	(III)	(IV)
GDP_j	0.78*** (0.02)	0.78*** (0.02)	0.77*** (0.03)	0.77*** (0.03)
GDP_i	0.30*** (0.04)	0.30*** (0.04)	0.33*** (0.06)	0.33*** (0.06)
Distance	-1.39*** (0.10)	-1.39*** (0.10)	-1.21*** (0.13)	-1.21*** (0.13)
Common spoken language	3.65*** (0.80)	3.65*** (0.81)	3.25*** (1.03)	3.25*** (1.03)
EU	0.00 (0.05)	-0.06 (0.06)	0.50*** (0.07)	(0.54)*** (0.08)
Free trade agreement	-0.05 (0.03)	-0.05 (0.03)	-0.00 (0.05)	-0.01 (0.05)
Exchange rate volatility	2.91*** (0.67)	2.69*** (0.68)	-4.09*** (1.00)	-3.94*** (1.01)
Coup1997	-4.63* (2.64)	-5.40** (2.78)	3.67 (3.92)	3.63 (4.15)
Coup2016	0.49 (0.44)	0.58 (0.47)	-0.83 (0.65)	-1.07 (0.70)

Coup1997 x Exchange rate volatility	315.54*	366.53**	-225.82	-223.31
	(147.99)	183.90	(259.15)	(274.58)
Coup2016 x Exchange rate volatility	-23.46	-27.58	24.51	35.09
	(18.83)	(19.95)	(27.75)	(29.72)
Coup1997 x EU	0.23	8.32	0.18	0.47
	(0.16)	(8.87)	(0.23)	(12.35)
Coup2016 x EU	-0.14	-0.82	0.04	1.54
	(0.13)	(1.10)	(0.17)	(1.53)
Coup1997 x Exchange rate volatility x EU		-533.97		-20.23
		(587.98)		(818.40)
Coup2016 x Exchange rate volatility x EU		29.66		-64.47
		(46.75)		(64.86)
Constant	-0.21	-0.18	-2.49	-2.51
	(1.38)	(1.38)	(1.90)	(1.90)
R-squared	0.67	0.67	0.57	0.57
Wald test	36018.05***	36027.63***	12144.92***	121444.83***

Notes: (I) Export flows (II) Export flows with triple interaction (III) Import flows (IV) Import flows with triple interaction
Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6.4 Gravity model results for the fixed effect estimator (FEM) with a linear time trend for the relationship between independent variables: coup of 1997, coup of 2016, exchange rate volatility and dependent variables: the trade flows of Turkey

Independent variables	(I)	(II)	(III)	(IV)
GDP_j	0.84***	0.84***	0.70***	0.70***
	(0.02)	(0.02)	(0.03)	(0.03)
GDP_i	0.37***	0.37***	0.51***	0.51***
	(0.02)	(0.02)	(0.04)	(0.04)
EU	0.01	-0.03	0.51***	0.55***
	(0.05)	(0.06)	(0.07)	(0.08)
Free trade agreement	-0.12***	-0.12***	-0.01	-0.09
	(0.03)	(0.03)	(0.05)	(0.05)
Exchange rate volatility	0.69*	0.52	-1.74***	-1.58***
	(0.37)	(0.38)	(0.54)	(0.58)
Coup1997	-4.09	-4.87*	5.29	5.29
	(2.62)	(2.67)	(3.89)	(4.12)
Coup2016	0.38	0.48	-0.70	-0.94
	(0.38)	(0.41)	(0.56)	(0.62)
Coup1997 x Exchange rate volatility	279.80*	331.07*	-335.08	-332.76
	(173.68)	(182.63)	(257.56)	(273.05)
Coup2016 x Exchange rate volatility	-22.48	-26.85	18.18	28.54
	(16.24)	(17.52)	(24.00)	(26.25)
Coup1997 x EU	0.21	8.32	0.20	0.46
	(0.16)	(8.85)	(0.23)	(12.33)
Coup2016 x EU	-0.13	-0.84	0.02	1.48
	0.13	(1.10)	(0.17)	(1.53)
Coup1997 x Exchange rate volatility x EU		-536.05		-18.01

		(586.65)		(817.47)
Coup2016 x Exchange rate volatility x EU		30.72		-62.78
		(46.65)		(64.79)
Constant	-	-	-71.86***	-71.89***
	135.03***	134.99***		
	(3.93)	(3.93)	(5.76)	(5.76)
R-squared	0.48	0.48	0.47	0.47
F-stat	499.21***	499.18***	266.20***	266.14

Notes: (I) Export flows (II) Export flows with triple interaction (III) Import flows (IV) Import flows with triple interaction

Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Explanatory power

The R-squared results of this analysis provide identical similarities to the main specification. Overall, the REM provides more explanatory power than FEM. In addition, the results of both Models show more explanatory power for the export flows

Political effect on EU

To assess whether the coup in 2016 affected trade flows stronger with European countries than other countries, the coefficients coup1997 x EU and coup2016 x EU are utilized to provide a further analysis regarding the second hypothesis, which was rejected based on the results of the main specification of this study. Based on Table 6.3 and 6.4, the coup in 1997 and 2016 did not significantly affect trade flows among Turkey and European Member States. In addition, the triple interaction term, which captures the indirect effect of both coups on trade flows among European Member States also shows no significance. Therefore, the second hypothesis of this study is rejected.

Direct effect of coups

In Table 6.3, the coup in 1997 had a significantly negative effect on export flows. The export flows decreased by 99.02 percent six months post-coup period. However, this finding is questionable, as it is significant at the 0.10 level and the results of Table 6.4 shows that there is no significant effect on export flows. No effect of the coup in 1997 is found for the import flows based on Table 6.3 and 6.4

Based on the results of Table 6.3 and 6.4, the coup in 2016 did not affect trade flows, as it shows no significant effect. Importantly, this is the direct effect of the coup in 1997 and 2016.

Indirect effect of coups

The indirect effects reacts differently than the direct effects of coups. Table 6.3 and 6.4 show that the exchange rate volatility had a positive effect on export flows six months post-coup 1997. In Table 6.3, a one percent point increase in the exchange rate volatility results in an increase of the export flows by 315.54 percent six months post-coup 1997. In Table 6.4 shows an effect of 279.80 percent on export flows. In this analysis, the mean of the exchange rate volatility taken as perspective, the positive indirect effect of the coup in 1997 is far greater than the negative direct effect. This indicate that the circumstances after the coup in 1997 made Turkey less autarkic in terms of export flows, as the imports flows are not affected. Table 6.3 and 6.4 show no significant effect on import flows.

Furthermore, no significant effect has been found for the exchange rate volatility on trade flows post-coup in 2016 for both Table 6.3 and 6.4. Based on these results, it can be concluded that the coup in 1997 did not inhibit trade more than the coup in 2016, therefore the third hypothesis is rejected.

6.3 Econometric Issues in Gravity Model

6.3.1 The issue of endogeneity with FTA.

The problem with estimating the effect of FTAs on the gravity model is the problem of reverse causality. Countries tend to establish FTAs with other trading countries that they have already achieved high trade volumes with (Krugman, 1991).

Therefore, the dummy variable for FTAs is correlated with the error term because the unobserved characteristic of some pairs of countries explain why they trade a lot and at the same time they would establish a FTA. As a result, this could lead to biased estimates in the gravity model (Wooldridge, 2002).

However, this problem can be ignored for some degree. As stated before, each country in the data set has its own individual characteristics that may or may not influence trade flows. When using FEM, it is assumed that factors within the country could affect or bias the trade flows, therefore a control is necessary. This is the rationale behind the assumption of the correlation between country's error term and explanatory variables. FEM eliminates the effect of those time-invariant characteristics.

6.3.2 Zero trade flows

One of the major steps of the gravity model is the log linearization of the trade flows. Mathematically, it is not possible to take the log of zero. Therefore, without any adjustments, the gravity model is not able to predict zero trade flows.

The WTO (2012) proposes two ways to deal with this problem. Firstly, by omitting zero trade flows of the analysis or to add a very small number to the zero flows before taking logarithm (WTO, 2012).

In this study, the zero trade flows are omitted. The largest part of the trade volume of Turkey with its most important trading partners is included in the form of a panel data. Moreover, the aim of this research is exchange rate volatility and the coups, which can be estimated by excluding zero trade flows. However, omitting zero flows does have the disadvantage that the coup in 1997 is less accurate to estimate than 2016, as earlier data consist of more zero flows.

6.3.3 Collinearity Problem

The models in which the effect of the two coups is estimated separately has caused problems in the consistency of the methodology of this study. The goal of this study was to estimate the effect of coups by two channels. The direct effect by a dummy for coup and the indirect effect by an interaction term $\text{coup} \times \text{exchange rate volatility}$. However, the interaction term between exchange rate volatility and coups could not be estimated for the Models 5.3 and 5.4 in the sensitivity analysis, because of collinearity. This collinearity problem occurred for both FEM and REM.

This problem depends probably on several factors. The coup is defined by means of a dummy as one in the quarter that the coup occurs. Therefore, it is possible that only one coup is too small of a variation to estimate a proper coefficient for.

However, to overcome this problem, the coup is defined as one in the quarter it occurred and one in the quarter after, thus the effect of coups have a time span of six months in this analysis. This fix ensures that the necessary coefficients for this study can be estimated. However, the interpretation of the coefficient is different than in the main specification, in which the coup dummy defines one in the quarter of coups or zero otherwise. This solution for estimating both coups separately will provide an 'average effect' of both coup in two quarters. Therefore,

it is possible to compare the direct and indirect effect of both coups . Importantly, this is only applied for the Models 5.3 and 5.4 in which the coups are estimated separately.

Chapter 7 Conclusion

This paper is intended to examine the effect of coups on trade flows of Turkey. The total effect of coups on trade flows is investigated by distinguishing the effect of coups by direct and indirect effects, as it is anticipated that coups could possibly turn a country more autarkic and affect trade flows also via exchange rate volatility.

To be able to provide insights regarding this topic of interest, a gravity model estimation with quarterly panel data of export and import flows of Turkey involving 187 countries between 1990 and 2020 is presented by a random and fixed effect model.

In this study, coefficients for the direct and indirect effect of coups are added in the gravity equation by a dummy and the interaction term coup and the proxy for exchange rate volatility respectively.

Following prior work of Kenen and Rodrik (1986), Thursby and Thursby (1987) and Vergil (2002), the standard deviation of the percentage change in the real exchange rate for the twelve preceding months is computed as the proxy for the exchange rate volatility.

The results of the analysis of this study show that increased volatility in the exchange rate inhibited the growth of the import flows of Turkey, as foreign trade became relatively expensive, because of the decreasing value of the Turkish currency. Furthermore, exchange rate volatility shows a significantly positive effect on export flows. However, the magnitude of this effect is not as strong as for import flows and in addition, the FEM shows a smaller significance. This indicates that the import flows of Turkey are more dependent on the volatility in the exchange rate than the export flows.

Furthermore, the volatility in the exchange rate in coup times shows a significantly negative effect on export and import flows for approximately six months. The sign for the coefficient exchange rate volatility reverses for export flows in coup times. Thus, the coefficient exchange rate volatility on export flows is positive, however it turns negative in coup times. This indicates that higher uncertainty negatively impacts trade flows.

The results of the analysis also show that the total effect of coups is positive on trade flows. Unexpectedly, the direct effect of coups shows a significantly positive effect on trade flows. In contrast, the coup negatively affects trade flows via exchange rate volatility. Moreover, no statistical direct and indirect effect of coups on trade flows is found among Turkey and European Member States. This indicates that Turkey became autarkic via exchange rate volatility in coup times and not by direct 'political effects' of coups.

The results of the sensitivity analysis of this study indicate that the coup in 1997 had a significantly negative effect on Turkey's export flows, but it is not convincing, because the FEM does not show a significant effect. Furthermore, the volatility in the exchange rate after the coup in 1997 shows a significantly positive effect on trade flows. This increase in trade flows via exchange rate volatility after the coup in 1997 exceeds its negative direct effects. This indicates that Turkey became less autarkic via exchange rate volatility post-coup in 1997.

In addition, a significant effect of the failed coup in 2016 on trade flows is not found. Lastly, there is also no political effect on trade flows among Turkey and European Member States post-coup in 2016. This indicates that the deteriorated political relationship between Turkey and EU after the coup in 2016 did not result in a significantly negative effect on trade flows. Turkey is aware that it needs to avoid tarnishing strong economic ties with European Member States, as the results of the analysis also show that Turkey is dependent of Europe for their imports.

Chapter 8 References

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