CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Department of European Economic Integration and Economic Policy

Bachelor's Thesis

2024   **Tomáš Pientka**

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Evaluating the Euro's Impact on Slovak Trade: An Empirical Analysis

Bachelor's Thesis

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In Prague on the 29th of April 2024   Tomáš Pientka

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Abstract

This thesis uses a gravity model of trade to examine the effect of the Euro on international Slovak trade flows. It aims to assess whether the Euro has been beneficial for Slovak trade 15 years after its entry into the Eurozone. Using the Poisson Pseudo-Maximum Likelihood (PPML) method to address the issue of zero flows and heteroskedasticity, this thesis ensures precision and robustness in its analysis. It will work with panel data from 1995 to 2021 for all bilateral trade relations and then focus solely on the exports of the automotive sector. The main findings indicate no statistically significant immediate effect of the Euro on Slovak trade. Although these results suggest that Slovakia is no exception to the findings of recent literature by suggesting negligible effects of the Euro, this thesis still reveals some favorable results. Slovakia displays more positive results than the rest and reports a statistically significant and positive 4-year and subsequent delayed effect, a positive effect on the exports of petrol vehicles, and lastly, the Euro does not seem to have trade diverting effects for Slovakia.

Abstrakt

Tato bakalářská práce využívá gravitační model mezinárodního obchodu ke zkoumání vlivu eura na mezinárodní obchodní toky Slovenska. Jejím cílem je posoudit, zda bylo euro 15 let po vstupu Slovenska do eurozóny pro jeho obchod přínosem. Použitím Poissonovy metody pseudomaximální věrohodnosti (PPML) k řešení problému nulových toků a heteroskedasticity tato práce zajišťuje přesnost a spolehlivost své analýzy. Tato studie bude pracovat s panelovými daty z let 1995 až 2021 pro všechny bilaterální obchodní vztahy a následně se zaměří pouze na vývoz automobilového průmyslu. Hlavní zjištění nenaznačují žádný statisticky významný okamžitý vliv eura na slovenský obchod. Ačkoli tyto výsledky naznačují, že Slovensko není výjimkou ze zjištění nedávné odborné literatury, která naznačují zanedbatelné účinky eura, tato práce přesto odhaluje několik příznivých výsledků. Slovensko vykazuje pozitivnější výsledky než ostatní země a uvádí statisticky významný a pozitivní čtyřletý a následný opožděný efekt, pozitivní vliv na vývoz benzinových vozidel a na neposledním místě Euro podle všeho neodklání slovenský obchod.

Keywords

international trade, gravity model, Euro effect, Slovakia, European integration, monetary unions, PPML, exports

Klíčová slova

mezinárodní obchod, gravitační model, efekt eura, Slovensko, evropská integrace, měnové unie, PPML, vývoz

Title

Evaluating the Euro's Impact on Slovak Trade: An Empirical Analysis

Název práce

Evaluace dopadu eura na slovenský obchod: Empirická analýza

Acknowledgement

Contents

Introduction

Ever since Slovakia entered the Eurozone in 2009, it has served as a pivotal case study for its neighboring countries that joined the EU in this millennium. Therefore, this thesis will assess how the past 15 years of EMU membership have impacted the Slovak trade, offering valuable insights to other countries deciding whether to enter the EMU or maintain their monetary sovereignty. The critical tool for this research will be the gravity model of trade, which holds a strong reputation in trade analyses and has just as strong methodological background.

The first chapter of this thesis will provide a literature review of the use of gravity models in measuring the Euro's effect on trade, detailing the extensive results from Rose's initial unexpected findings to the more pessimistic estimates obtained with the use of micro-founded modern gravity models such as PPML. This chapter will also briefly discuss the meta-analyses of these results, therefore grasping the broader knowledge of these articles in identifying more concrete estimates and potential biases. The second chapter, examining the historical context of Slovakia, will discuss the estimates of the Euro's effect on Slovak trade, looking at the predictions and then the assessments on the direct effect on trade, as well as the connections to stability and investment. The second part of chapter two discusses the development of Slovak exports over the years, thus providing the reader with the context of Slovak trade, which helps understand this thesis's results. Chapter three will introduce the methodological history of the gravity model, and then the second part will introduce the gravity model used by this thesis. Additionally, the final section of Chapter Three introduces the data employed in this research. Chapter four presents the estimates of the Euro's effect on the overall Slovak trade, and then will examine more specific regressions, which will investigate whether the Euro had either a delayed effect or a preceding ef-

fect, whether it had trade-creating or diverting effects, and how the Euro affected Slovakia's vehicle industry which represents the largest share of Slovak exports.

The findings of this thesis follow the most recent literature that employs a methodology similar to this thesis, which finds an insignificant effect of the Euro on Slovak trade. However, this thesis reports a positive delayed effect of the Euro beginning after four years of Slovakia's entry into the EMU. Furthermore, the results of chapter four show that the Euro also increases the imports from non-EMU countries and doesn't have trade-diverting effects. Lastly, this thesis uncovers a positive effect of the Euro on the exports of Slovak combustion engine vehicles. These results confirm the findings of recent literature; however, they also suggest that upon closer inspection, the Euro's effect on trade can be positive in some situations.

1. Literature Review of the Euro's Effect on Trade

1.1 Use of Gravity Models to Estimate the Euro Effect

Gravity models have become crucial in analyzing international trade flows, leading to them being nicknamed a workhorse trade model. (Head & Mayer, 2014, p. 2) Therefore, it is no surprise that they play such a critical role in discussing the effects of the Euro on trade. This debate traces back to discussions of exchange rate volatility and its effect on trade, which then inspired research on currency blocs. Rose published a study which officially began the debate on how currency unions and the EMU affect trade. Rose's initial extremely positive estimates indicated high expectations for the Euro; however, they steadily decreased with the further development of gravity models' methodology and the introduction of actual EMU data. The ultimate blow to Rose's findings occurred with the introduction of PPML estimators to gravity models, which rendered some EMU effects statistically insignificant, therefore casting some doubt on the positive effects of the Eurozone on trade.

1.1.1 Use of Simple Gravity Models

The origins of the discussion on the effects of currency unions and, subsequently, the Euro on international trade flows trace back to the debates that examined the effects of exchange rate volatility. Here, the scholar community begins to apply Tinbergen's basic 1962 gravity model. This model was relatively simple and only

augmented with the help of dummy variables. The results from this era suggest that eliminating exchange rate volatility can encourage bilateral trade and thus imply that currency unions should have this effect, too.

Abrams (1980) was among the first scholars to attempt to measure the effects of exchange rate uncertainty on trade performance using gravity models. In this work, he uses a gravity equation inspired by Tinbergen's (1962) model, including the basic gravity variables and dummies, to determine the impact of exchange rate volatility. By examining 19 different countries, the author confirms that exchange rate uncertainty would have adverse effects on trade flows by comparing the data of the pre-1973 period and of the 1973-1976 period, which was marked by the abolition of the collapse of the Bretton Woods system and the subsequent "shift from fixed to floating exchange rates." (Abrams, 1980, p. 3) Abrams's results suggest that his hypothesis is correct, and he concluded that if the 1970 exchange rate conditions remained intact the "world trade would have expanded considerably more than it actually did," and that in general "other things equal, increased exchange rate volatility is detrimental to trade." (Abrams, 1980, p. 10)

Frankel, Wei, Canzoneri, and Goldstein (1995, p. 10) subsequently focused a part of their work on currency blocs with stable exchange rates, where they considered Asia and Europe. In the latter, they found that the EC countries had a less volatile exchange rate than those of EFTA. However, both European organizations fared better than the countries of APEC, which still had a relatively stable exchange rate. The authors believe that this difference transpired because the APEC countries pegged their currencies not in the Yen but in the US dollar. They then measured how Europe's increasing exchange rate stability affected bilateral trade. Their findings on the currency bloc's performance indicated that "while less robust than most of the other gravity equation findings, are generally consistent with the hypothesis that real exchange rate volatility depresses bilater-

al trade." (Frankel et al., 1995, p. 18) While these results revealed only a small effect, they still support the claim "that the stabilization of exchange rates within Europe has helped to promote intra-European trade." (Frankel et al., 1995, p. 18)

Although Feldstein (1997, p. 33) takes more of a negative attitude towards the economic effects of currency unions, in this article directed towards EMU, he concludes that the elimination of "the need for purchasing and selling foreign exchange in spot and forward markets," and the reduction of currency risks would increase the trade between EMU countries. However, he states that these effects will be weaker in the future since technological advancements are already solving these problems without the need to implement a currency union. Feldstein also compared EMU to the North American Free Trade Agreement (NAFTA), which would increase exchange rate stability, "trade and investment without any movement toward a single North American currency."

1.1.2   Rose

Andrew Rose, is one of the most discussed scholars who studied the effects of currency unions on trade. Rose published works on currency unions in 1998, discussing the endogeneity of optimum currency areas, where he discovered that a country is much more likely to fulfil the requirements to join a monetary union after it has already become a member. (Frankel & Rose, 1998, p. 3) However, his most notable work in the context of this thesis is his paper on the effects of currency unions on trade, which sparked a lively debate that continues to this day.

Inspired by the research of Frankel et al. (1995), Rose adopts the gravity model that they employed and modifies it to measure the effects of currency unions. (Rose, 2000, p. 9) His methodology, however, became heavily criticized for his ad-hoc approach to the gravity model, which failed to capture the MTRs and his data, which even he claims will not be able to fully translate to a prediction on

the performance of the EMU. (Rose, 2000, p. 15) Nevertheless, Rose finds that the effect of currency unions on trade is "statistically significant and economically large". His results imply that countries with a common currency will likely trade three times more than countries without one. (Rose, 2000, p. 31) Furthermore, in this work, Rose also compares his results to the previous research on the relationship between exchange rate volatility and trade, where he concludes that "[t]he impact of a common currency is an order of magnitude larger than the effect reducing moderate exchange rate volatility to zero but retaining separate currencies." (Rose, 2000, p. 31)

A year later, Rose and Van Wincoop (2001) published an improved study on the effects of currency unions on trade, which corrected Rose's original methodology by including fixed effects. They again find that the increase in trade caused by an entry into a currency union is about 400 percent when not accounted for country-fixed effects, and even when accounting for them, his findings suggest an increase of over 230 percent, where both results are robust and statistically significant. (Rose & Van Wincoop, 2001, p. 387) Rose also found that "[n]ational money seems to be a significant trade barrier," which again argues in favour of a country entering a currency union. (Rose & Van Wincoop, 2001, p. 387) Furthermore, Rose adds to his previous research by trying to understand why this effect is so significant, assuming that eliminating transaction costs cannot be the only reason. (Rose & Van Wincoop, 2001, p. 387) He also develops another theory into a relationship between welfare and trade where "welfare rises the most in currency unions where trade rises the least," since if countries entering a currency union already have strong trade relations before their membership, they gain more funds from the savings they incur by eradicating transaction costs. (Rose & Van Wincoop, 2001, p. 387) Rose then concludes with an optimistic prediction of a trade increase for the EMU by about 50 percent, stating that "[i]t will

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be unexpected. And it will be beneficial." (Rose & Van Wincoop, 2001, p. 390)

Rose's articles on the immense effect of currency unions on trade have unsurprisingly sparked many replies from the academic field. One such response came from Thorsten Persson, who took a more sceptic position on Rose's work. Persson (2001, pp. 442-443) identified flaws with Rose's methodology, especially his data, since the currency unions, until that period, included small and poor countries located near each other and often with a shared history. According to Persson (2001, pp. 437-438), these imperfections thus probably create a bias in Rose's results. After correcting them, he found that the effect of currency unions on trade is much less than the 235 percent increase, as argued by Rose, but rather than only about 66 percent.

Furthermore, Persson states that "the prediction that a common currency increases trade is qualified by substantial uncertainty", and thus, his study is not even able to confirm whether such an effect is actually real. (Persson, 2001, p. 446) Nevertheless, the 66 percent increase is still relatively significant, and thus, Persson calls for more research on the topic. Rose responded to Persson's work by acknowledging that all of the estimates still predict a substantial effect on trade, which even he believes is too large. Rose concludes by writing: "a year ago, I thought (and certainly heard!) that an estimate that currency union would increase trade by more than say 10 or 15% was implausibly large," however, now even Persson's smallest estimate is 13 percent. (Rose & Honohan, 2001, p. 457)

1.1.3 Work with Actual EMU Data

After the articles published by Rose, numerous others have tried to research the impact of currency unions on trade; however, some scholars already started to apply their own gravity models to the actual data of the EMU countries' trade performance. These papers signal a new wave of research focusing on the effec-

tiveness of the EMU, where the authors believe that their research is valuable for the countries still considering entry into the EMU. This period is also marked by the steady increase in the use of high-dimensional fixed effects in order to account for multilateral resistance terms.

One such paper published by Micco, Stein, and Ordoñez (2003) looks into this matter and finds a more minor but still significant positive effect. The estimates these authors found "for the euro's impact on trade, using different samples and different methodologies, range between 4 and 16%" still imply a decent increase. (Micco et al., 2003, p. 318) Furthermore, the authors also discovered that "the euroland's adoption of a common currency has not harmed euroland's trade with other nations," on the contrary, they found that such trade actually increased by 9%. (Micco et al., 2003, p. 335)

Faruqee's (2004) paper also works with data on EMU, but his paper further examines how the union affects specific member states. Firstly, Faruqee also finds that EMU positively affected "both intra- and extra-area trade on a comparative basis under the single currency," strengthening the notion that EMU does not divert trade. (Faruqee, 2004, p. 11) In the second part of his paper, Faruqee focuses on the effect on individual states, finding that Austria, Belgium, Netherlands and Spain have seen an above-average increase in their trade by joining the Eurozone compared to the rest. However, this was not the case for Portugal and Finland, while Ireland lagged only in intra-area trade. (Faruqee, 2004, pp. 13-15)

The paper published by Flam and Nordström (2006) studies data published until 2005 where in the period from 1999, when EMU was starting to function, until 2005, the data suggests an all-around positive effect on the trade of the 13 EU members, but even more positive effect on the 20 OECD members. (Flam & Nordström, 2006, pp. 8-11) The authors found that "the largest effects are estimated for exports within the eurozone, where the effect is 26 percent in

the OECD-20 country sample and 21 percent in the EU- 13 country sample,"
which they find surprising as they do not find the costs of exchange rate volatili-
ty to be that substantial to see such an increase in trade after their elimination.
(Flam & Nordström, 2006, pp. 13-14) Flam and Nordström look further at what
type of products drive this positive effect on trade. They found a significant posi-
tive effect on the exports of semi-finished and finished products, while the trade of
raw materials remained relatively unaffected. (Flam & Nordström, 2006, p. 30)

Baldwin and Taglioni (2007, p. 814) published a paper looking at Rose's
methodology and correcting for his mistakes, finding "that intra- EU trade flows
are boosted by 24.6%," thus still confirming the positive effect of the Euro. Thus,
this finding still confirms the positive effect of the Euro, even when examined by
Rose's most notable critics, who published well-received papers on gravity models.

Berger and Nitsch (2008, p. 2) take a different approach to the topic, and
they study the creation of the EMU and its effects from the historical perspective,
looking back from the Marshall Plan in 1948 through the Treaty of Rome to the
Maastricht treaty, which helped to set EMU up. Their findings suggest that due
to the European community, its members were already trading much more than
the rest of the developed world. Furthermore, the early EMU members showed a
significant propensity to trade with each other even before establishing a currency
union. The authors thus conclude that "the increase in intra-EMU trade that
we... observe after the formation of EMU is largely a continuation of a remarkable
longer-term trend." (Berger & Nitsch, 2008, p. 11) Nevertheless, they still found
that the EMU most likely increased the trade of its members by about 10 percent;
however, a "significant part of this trend can be explained by measures of economic
integration preceding the introduction of the euro." (Berger & Nitsch, 2008, p. 29)

1.1.4 Use of PPML

Another revolution in the use of gravity models and, therefore, in the research on the impact of the Euro on trade was initiated by the paper published by Silva and Tenreyro (2006) that criticized the OLS estimation method and instead recommended the use of PML estimators (for reasons see Section 3.1). This Poisson PML gravity model has subsequently become the primary mode of estimating trade flows, and it also caused a substantial change in the results of the Euro's effects on trade, significantly decreasing their effects. The meta-analysis published by Glick and Rose (2016) triggered further research in this area, where the scholars tested their data with PPML estimators and shrank their estimates of the Euro effect.

Silva and Tenreyro (2010, p. 16) published a paper arguing that their PPML method delivers very different results. Applying this method to the data of Micco et al. (2003), the formerly positive effect of the Euro becomes minuscule and statistically insignificant. The authors explain these results by stating that the trade between the EU members was already relatively high compared to other regions. This considerable economic integration of this region before 1999 would thus explain the negligible effect of the Euro on trade.

In his paper, De Sousa (2012, p. 2) looks at how the positive effect of currency unions on trade fares over the long run, inspired by the research by Rose (2000), which would imply that the effect is stable or even intensifying. De Sousa employs both the OLS and PPML estimators in his methodology, and while the OLS produces results implying stable effects, PPML does the contrary. According to PPML, De Sousa found that back in 1948, members of a currency union traded eight times more than if they used different currencies; this effect was "decreasing sharply from 1948 to 1998. It even becomes significantly negative at the beginning of the nineties," this effect was however statistically insignificant. (De Sousa,

2012, p. 5) The reason for this decreasing trend is enigmatic to the author, and he suggests that this is happening due to globalization, where trade within a region might become less intensive. (De Sousa, 2012, p. 6)

Larch, Wanner, Yotov, and Zylkin (2019) make use of the PPML high dimensional fixed effects Gravity Model on the data used in the Meta-analysis by Glick and Rose (2016). Their findings suggest that the effects of the Euro become much smaller with the use of PPML, and when they add multiway clustering to their methods, it also becomes insignificant. The other currency unions still emit positive statistically significant results, while in the case of the EMU, some regressions would even denote a negative coefficient, although statistically insignificant. (Larch et al., 2019, pp. 11-12) Furthermore, Larch, Wanner, and Yotov (2018, p. 232) again confirm the small and insignificant effect of the Euro on trade; however, they note that in the case of controlling for globalization and including intra-national trade observations into their data the effect of the Euro becomes considerable relative to their previous findings at around 20 percent increase. These findings suggest that the Euro caused EMU countries to move away from domestic trade and focus on the international exchange of goods between EMU members (Larch et al., 2018, p. 232). Furthermore, the authors believe that the Euro increased trade openness between EMU and non-EMU members; consequently, if they remove such observations from the data, the bilateral effect of the Euro would double.

Another PPML analysis by Mika and Zymek (2018, p. 81) also follows the trend of finding no significant Euro effect on trade. The authors observe two different periods for their data, where the one which ended in 2002 was supposed to compare PPML results with the OLS findings of the authors from that time. The PPML decreased and even erased the positive and statistically significant findings of previous research that employed the OLS estimator. (Mika & Zymek, 2018,

pp. 79-80) When the authors examined the period between 1992 and 2013, their PPML findings turned slightly negative and remained statistically insignificant, therefore implying a null overall Euro effect on trade.

A study by Gunnella, Lebastard, López-García, Serafini, and Mattioli (2021) published with the help of the European Central Bank goes with the trend of applying the PPML method to their models. Their results imply that the Euro's effect on the export of final goods is statistically insignificant; however, they differentiate their study from others by also taking account of the trade of intermediate goods. This formulation of their data uncovers a 5.3 percent positive and statistically significant effect of the Euro on the trade of intermediate goods. (Gunnella et al., 2021, p. 23).

Kopecky (2024, pp. 175-176) also finds statistically insignificant results for the Euro's effect on trade in the regression, which accounted for multiway clustering as used by Larch et al. (2019). He, however, finds consistent positive and statistically significant results on other forms of data. Nevertheless, none would translate to a positive effect of over 10 percent.

1.2 Meta-Analyses

The meta-analysis, in the context of this debate, plays a vital role in providing valuable insights due to its broader and more complex comprehension of all the studies published. Notably, it also played an important role in identifying publication bias in the estimates and identifying a more concrete value of the Euro's effect on trade. The meta-analyses published by Rose imply a much more positive effect of the Euro than the other two authors, whose findings are much more pessimistic in this perspective.

The first authors to perform a meta-analysis on the currency union's effects on

trade were Rose and Stanley (2005, p. 350), who recorded 34 articles containing 754 estimates; however, only seven articles account for the Euro. The authors note that these studies are all substantially heterogeneous, with estimates extensively fluctuating. The simple mean would suggest an increase in trade of 136 percent, and even with Rose's findings unaccounted for, the effect would remain this high. However, the authors uncover a significant publication bias in the estimates they use, which alters the results of their meta-analysis. Rose and Stanley (2005, p. 359), thus, have to correct for this bias by implementing solutions that "successively lower the trade effect – from 136% (simple mean) to 90% (random-effects) to 47% (corrected estimate)." These results are robust and more likely to be authentic than Rose's (2000) estimates. Nevertheless, the authors are still optimistic about their findings stating that even"[t]he lower bound for the lowest estimate is 0.10, implying an effect of currency union on trade of over 10%." (Rose & Stanley, 2005, p. 353) The authors, however, are unable to explain the apparent heterogeneity of their results which, they label as unenthusiastic, however, they remain optimistic that future research will discover the reasons for this fluctuation.

Havránek (2010) then extended the meta-analysis of Rose and Stanley (2005) by adding 27 new research papers, out of which 21 measured the effects of the Euro, thus reviewing 61 studies in his analysis. The author also uncovers two significant publication biases where there is a strong preference for positive results in one, and in the other, there is a strong preference for statistically significant results. The data in this analysis show a clear presence of both types of biases with the use of the funnel test and the Galbraith plot, which presents, in the author's "opinion, a serious problem for the literature on the Euro's Rose effect" (Havránek, 2010, pp. 246-249) Furthermore this problem is much more prevalent in the studies that are looking only at the Euro while studies on other currency unions suffer from this bias much less. Havránek (2010, p. 245) also finds that in the

meta-analysis of Rose and Stanley (2005), the Eurozone and other currency unions were pooled together, producing inappropriate results as the estimates for both categories significantly vary. The author finds "the true Rose effect of currency unions other than the eurozone to lie between 65 and 115% with 95% probability," which relatively aligns with the existing literature. (Havránek, 2010, p. 250) In the case of the Eurozone, however, this number is much lower and insignificant, according to the author. Nevertheless, he concludes that this is not true for all the countries and economic sectors, where some may perceive benefits while others do not. (Havránek, 2010, p. 254)

Glick and Rose (2016) published their re-assessment of their studies 16 years after the publication of Rose's well-known paper. The authors echo the findings of Havránek (2010) in that the effect of the Euro on trade differs from the effect of other currency unions. (Glick & Rose, 2016, p. 14) Nevertheless, the authors found numerous insights into the topic; for example, the effects of the EMU are usually much smaller than the previous findings on the effects of other currency unions. (Glick & Rose, 2016, p. 2) A significant conclusion of the authors is that the "EMU is now estimated to raise exports by an economically significant... 54%," thus still implying a significant positive effect. (Glick & Rose, 2016, p. 15) Glick and Rose (2016, p. 16) explain this by arguing that their dataset was much larger than that of other scholars such as Baldwin and Taglioni (2007). The authors also attempted to use the PPML estimation method but claimed they could not get proper results.

Polák (2019) uses 57 studies and 3323 estimates observing only the effects of the Euro, making it one of the most extensive economic meta-analyses of that time. The author investigates the publication bias and finds that the studies published after Havránek (2010) are more symmetrical in the funnel test, thus implying a decrease over time. Nevertheless, some bias is still present in these studies.

(Polák, 2019, p. 114) Additionally, after looking at the estimates which avoid the gold medal mistake, Polák (2019, p. 117) finds that the effect of the Euro on the trade of the Eurozone countries was statistically significant and positive, ranging from 2 to 6 percent. These results conflict with the findings of Glick and Rose (2016), especially in the case the author would consider "just the new evidence (studies published after Havránek (2010)) or used best-practice predictions... [he] would not find any effect of Euro on bilateral trade at all. "(Polák, 2019, p. 118)

2. Historical Context of Slovakia

The historical context of Slovakia prior to its entry to the Eurozone is vital to understanding whether the Euro reached its expectations. This section, therefore, will examine the expectations and subsequent findings of the Euro's effect on Slovak trade. Both scholars and government institutions discussed the direct effect of EMU membership on Slovak trade; however, some also connected their expectations of Slovak trade performance to the country's increased political and economic stability and rising FDI flows that resulted from Slovakia's entry into EMU.

2.1 Direct Effect on Trade

The literature measuring the direct effects of the Euro on Slovak trade splits into two groups: before 2009, which predicts the effects, and after 2009, which works with concrete data. The literature published before Slovakia's entry into the Eurozone would predict relatively positive effects on trade; however, some authors still expected that Slovakia's closest trading partners would also join the EMU, which could have increased these effects. The literature measuring the actual performance of Slovak trade with the Euro is much more pessimistic in its estimations, suggesting a low positive effect or statistically insignificant effect.

Maliszewska (2004) was among the first to consider the effects of the entry into the EU and the EMU on the countries that became members in 2004; therefore, this article included the countries of central Europe. Her work's methodology was inspired by the work of Rose (2000), which also motivated her research. The author found that since the Czech Republic, Slovakia, Slovenia, Hungary, and Estonia were already considered open economies, their potential increase

in trade was not as significant as Poland's, for example, which was then relatively closed. (Maliszewska, 2004, p. 13) Nevertheless, the potential increase in trade to an average new member of the EMU would be around 26 percent. However, using fixed effects for country pairs provides decreased results, suggesting that the expectations of trade increase might be overestimated. (Maliszewska, 2004, pp. 14-16) The work also noted the special relationship between the Czech Republic and Slovakia, which extensively trade with each other. (Maliszewska, 2004, pp. 14-16)

The National Bank of Slovakia was captivated by the findings of Rose, where, in its journal, Šuster et al. (2006, p. 2) expected the impact on trade to be relatively high at about a 50 percent increase. However, the author expected this effect to be in the long term, 20 years to be exact. Trade within the Eurozone was also supposed to rise by up to 90 percent; however, this analysis expected that, at that time, Hungary and the Czech Republic would also join the Euro. Since these are Slovakia's very close economic partners, this has had significant effects on these predictions.

Another study by Belke and Spies (2008, p. 18), which uses a gravity model with time-variant pair fixed country effects, finds results opposite to the study of Maliszewska (2004), where there is a "negative prediction for the less-open Polish, Latvian and Lithuanian economies." Out of all of the new EU members, only Slovakia was predicted to see an increase in its trade due to the adoption of the Euro and an increase in EMU imports by about 11 percent. (Belke & Spies, 2008, p. 18) Furthermore, the authors conclude that their results "indicate that the Czech Republic, Estonia, Slovenia, Hungary (and Slovakia in the out-of-sample estimation) can expect further gains in the EMU-12 import share once they adopt the Euro." (Belke & Spies, 2008, p. 20)

In a work made for the National Bank of Poland, a group of authors exam-

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ined how trade was affected by Slovenia's and Slovakia's adoption of the Euro. Here, they found that the decision of both countries to join the Eurozone and thus reduce their exchange rate volatility had no impact on their exports. Cieslik, Michalek, and Mycielski (2012, pp. 20-21) also examined the effect on exports of other memberships in international organizations where "[t]he participation in the EU and GATT-WTO positively affected Slovenian exports and had no effect on the exports of Slovakia," while the OECD only positively impacted Slovakia (Cieslik et al., 2012, p. 21)

Another research finds that the effects of the Eurozone on trade are still positive, even in the case of the smaller and poorer newer EU members. However, the main problem of this paper is that it uses OLS estimation, which can provide biased results. Nevertheless, the positive effect signifies the increase in bilateral trade at 9 percent. (Jagelka, 2013, pp. 55-56) The Eurozone might, therefore, look attractive to non-members; however, this rise in trade only accounts for about a 1 per cent increase in GDP, which is not very substantial. (Jagelka, 2013, p. 62)

Polyák (2016) also examined the performance of the Slovak exports, comparing it to the Czech Republic. In the case of Slovakia, "a regression analysis estimating the impact of the euro adoption on the country's export development did not lead to statistically significant results." (Polyák, 2016, p. 442). The author, therefore, also discusses potential reasons for these findings, concluding that the adoption of the Euro for Slovakia occurred during the financial crisis. Therefore, the dummy might not measure the Euro effects accurately. (Polyák, 2016, p. 442)

2.2 Stability and Investment as Means of Increasing Trade

The scholarly debate also discussed the effects of the Euro on Slovak trade from the perspective of increased FDI and enhanced stability, which it saw as detrimental to rising Slovak exports. The FDIs could have a notable effect on Slovak exports if they were complementary to trade. Additionally, as Slovakia became more politically and economically stable, other countries would be more interested in trading with it. Furthermore, stability would also increase investment inflows, thus boosting production and exports.

One of the political reasons for Slovakia's entry into the Eurozone was its experience during the Mečiar government and the resulting international isolation. This shift towards integration started in 1997 when the EU dropped Slovakia from its accession negotiations due to failing to achieve the political aspects of the Maastricht criteria, which was then one of the factors for a government change. Pechova (2012, pp. 786-787) argues that this isolation developed an attitude in Slovakia's population never to be isolated again and to eliminate any doubt that Slovakia wanted to be at the centre of European integration. The new Dzurinda government has echoed these attitudes and aimed to get back on track towards European integration. Therefore, one of the more significant political benefits of the Euro for Slovakia was anchoring the country deeply in the Western but, more importantly, democratic part of Europe.

From the economic perspective, scholars also believed that Slovakia's entry into the Eurozone would suit its high number of exports oriented to the EU countries. Before joining the Eurozone, Slovakia had the highest proportion of exports compared to the rest of the EU, implying a high trade dependency on the EU markets. (Haughton & Malová, 2007, p. 15) According to Haughton and Malová (2007, p.

16), "joining the eurozone… is of particular importance to countries with high levels of trade dependence given the impact on risk premiums of joining the single currency," therefore Slovakia was a very suitable candidate for the Euro. Increased economic stability, especially connected to eliminating any exchange rate volatility was thus another strong reason for adopting the Euro.

The business lobby was particularly influential in advocating integration into the Eurozone, of which the most prominent were the automotive industry and technology lobbies. These lobbies impacted national policy towards the Euro ever since the change of governments. Their main goal was to attract more foreign investment through government incentives, which were especially considerable during 2006, with $100 million for Kia and tech producers such as Samsung, Dell and Sony. (Haughton & Malová, 2007, p. 16) Another way of attracting investors was by signalling economic stability "to investors through low long-term inflation and interest rates which, particularly given Slovakia's high level of trade openness, was forecasted to bring positive results for the economy." (Pechova, 2012, p. 786) It is important to say that this could have only been done by outsourcing Slovakia's monetary policy to the European Central Bank, which was at that time viewed as a negative by some since this would indicate a loss of sovereignty in this area. Nevertheless, this shows that most industries, especially the automotive industry, expected a positive effect of the Euro on Slovak trade as investors would perceive the country as more stable for trade and investments.

Šuster et al. (2006, pp. 1-2) found on behalf of the National Bank of Slovakia that the Euro would increase Slovakia's FDI by about 50 percent. These investments would come from the increased stability of Slovakia and the elimination of transaction costs. The most important consideration for trade is that the author expects the FDI to be critical in driving foreign trade. Furthermore, the author believes that eliminating transaction costs will also help the Slovak investors and,

in general, keep more money in the people's pockets. Therefore, due to both increases in FDI and trade, Šuster et al. (2006, pp. 1-2) expected a noteworthy GDP growth thanks to the Euro.

Brouwer, Paap, and Viaene (2008) examined how an entry into the EMU would have affected the new EU member countries. By using a gravity model, they found "a complementarity between trade and investment. . . [and] a relationship between trade and exchange rate volatility that depends on the sign of bilateral trade balances" (Brouwer et al., 2008, p. 3). Furthermore, they found that the EU positively affects both the FDI and trade, while EMU membership is good for FDI and not harmful for trade. More specifically, the authors found that the EMU "trade effects vary between 0.84% for Lithuania to 13.3% for Malta," where for Hungary, Slovakia, and the Czech Republic, the effect was at around 8 percent while for Poland, it was closer to 11 percent. (Brouwer et al., 2008, pp. 21-22)

2.3   Development of Trade

Understanding the history of Slovak trade is vital for assessing the effects of the Euro on it. Therefore, this section will discuss the development of Slovak trade before adopting the Euro, which many praised for its growth in exports, which was the highest in its region at that time. The second part will examine Slovak trade with the Euro as its currency. This era witnessed two significant economic crises, alongside Slovakia's struggle to escape the middle-income trap and its competition with other non-EMU countries and their cheaper currencies.

2.3.1 Trade Before 2009

The performance of Slovak exports until 2009 was impressive compared to the other EU countries. In fact, the European Commission (2010, p. 23), found that out of the sample of EU countries, Slovakia experienced the highest average annual growth in its exports, which translated to a 10.4 percent annual increase. This statistic can result from numerous factors specific to Slovakia; one can be due to a significant change of governments in 1998 and the subsequent need to catch up to the rest of the post-communist countries.

During the 1990s, Slovakia produced a trade deficit due "to imbalances between domestic demand and domestic supply." (Pavličková, 2013, pp. 8-9) Furthermore, there were issues with the structure of its foreign trade that lacked a clear vision for its export strategy, marked by a focus on exporting products from industries with underfunded and outdated technology. The Slovak exports also suffered due to the appreciation of the Slovak Koruna in 1995. (Pavličková, 2013, pp. 8-9) Thus, there was an untapped potential in Slovakia's economy, including its exports, which, when accounted for mainly by eliminating the strains that caused the trade deficit and combined with integration into the EU market and the level of Slovak trade openness, was going to be substantial.

Therefore, the new Dzurinda government had to restructure the economy to prepare Slovakia for more sustainable economic growth. The lowering of taxes, change of its economic structure, progress in the talks with the EU, and more stable political environment led to an environment where Slovakia could fulfil its potential. The considerable increase in FDIs, especially in its automotive and technology sector and in its steel sector with the entry of US steel, only further emphasized the fulfilment of the potential the Slovak economy contained. (Pogátsa, 2009, pp. 381-384) The relationship between global value chain participation and FDI underlines Slovakia's case during this time, as it highlights how foreign invest-

ments can significantly accelerate a country's integration into the global economy. This relationship is especially accurate because Slovakia now has one of the highest global value chain participation among the EU countries. (Kersan-Škabić, 2019, p. 1205) The FDIs thus brought much-needed capital to the country, increasing its output significantly. The line graph in Figure 2.1 provides the development of Slovak exports, where the economic restructuring can explain the stagnation of exports between 1998 and 1999, which occurred because of government change and the subsequent growth resulting from the country fulfilling its potential.

Figure 2.1: Slovakia's exports of goods and services (% of GDP) 1995 - 2008
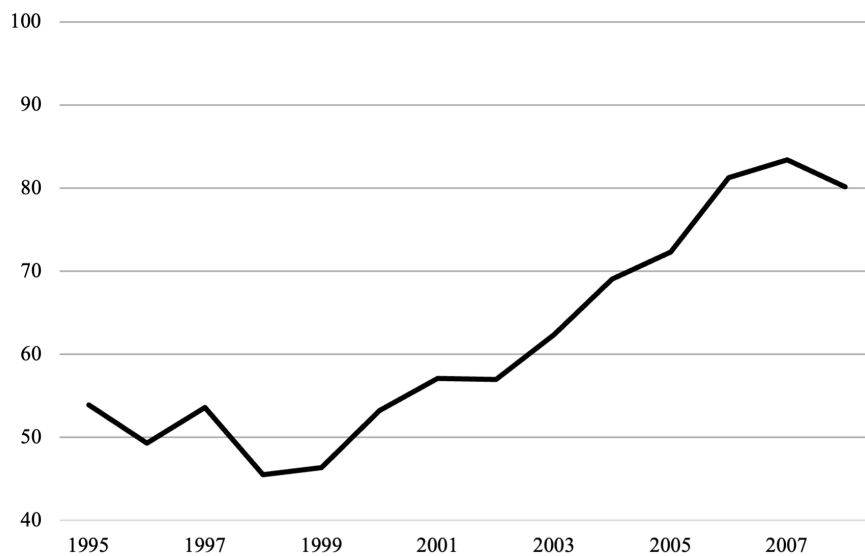
Source: Author's compilation based on World Bank national accounts data.

2.3.2 Trade After 2009

Slovakia's entry into the Eurozone in 2009 was almost parallel with a short but sizeable recession due to the 2008 financial crisis. The Slovak GDP declined by 5.5 percent, which was troubling when compared to the better-performing Czech

Republic and Poland, but still better than the other new Euro adopters, Slovenia and Estonia. Trade exports fell by about 15 percent (seen on the right side of Figure 2.1), and imports fell by 20 percent, suggesting a contraction in domestic demand. (Fidrmuc, Klein, Price, & Wörgötter, 2013, pp. 4-5) The economy of Slovakia was, however, quick to rebound, enjoying the monetary stability of the Euro. One reason Slovak exports could climb again until 2013 was that Slovakia effectively underwent a process of internal devaluation, which was marked by keeping the cost of labour low. Numerous factors were the cause of this: low inflation, low consumer domestic demand, low employment and relative growth in productivity all resulted in the Slovak real exchange rate depreciating by about 2 percent. (Fidrmuc et al., 2013, pp. 14-15) It is also important to note that the structure of FDIs into Slovakia has changed considerably during this time as the most significant type of FDI became the one directed to existing projects, possibly increasing Slovakia's productivity in its most essential sectors, mainly vehicles, TV screens and displays. However, the main goal of these investments was to keep such projects competitive amidst the real appreciation of the Slovak Koruna before the adoption of the Euro. (Fidrmuc et al., 2013, pp. 7-8)

The period after the financial crisis in Slovakia could be described by the middle-income trap situation, where, after rapid economic growth, the country has found itself unable to progress further. Figure 2 shows that Slovak exports were moving at about 90 percent of GDP value, which is plentiful for a small trade-oriented open economy; however, it could also indicate that this is due to the middle-income trap, where the country finds it difficult to continuously advance. The middle-income trap became visible after the financial crisis as the FDIs to the CEE countries slowed, and these countries, including Slovakia, experienced a shock since their economic model was accustomed to these FDI inflows. (Győrffy, 2022, pp. 93-95)

Furthermore, at the beginning of 2020, Slovakia faced the challenges of the COVID-19 recession, which had adverse effects on overall international trade. This crisis was especially damaging for trade in non-essential goods, including automobiles, which are critical for Slovak trade. (Hayakawa & Mukunoki, 2021, p. 2) Furthermore, this crisis also impaired countries that were dependent on international trade, including Slovakia, therefore implying significant adverse effects not only on its trade but also on its overall economy.

Figure 2.2: Slovakia's exports of goods and services (% of GDP) 2009 - 2021
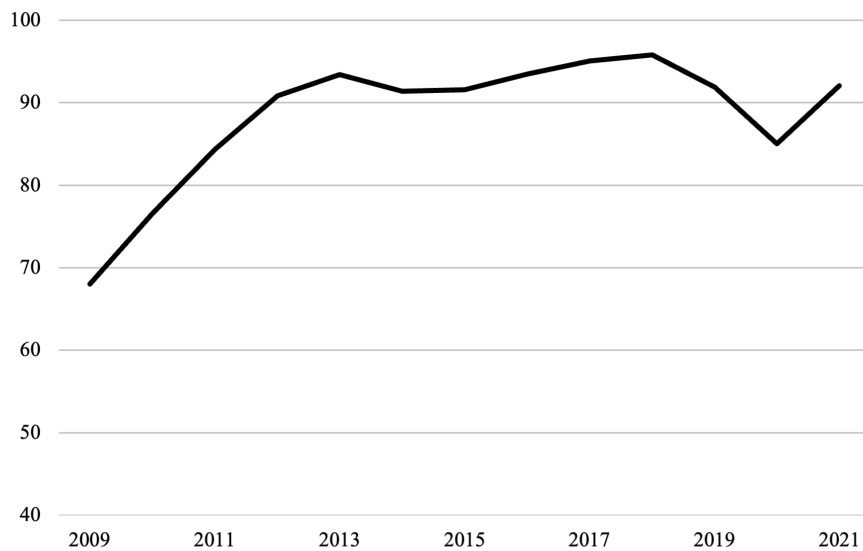
Source: Author's compilation based on World Bank national accounts data.

3. Methodology

This Chapter outlines this thesis's methods. It starts with the rich history of gravity models, then introduces the gravity model that will provide estimates for the following Chapter, and concludes with a description of the data that this thesis will use.

3.1 History of Gravity Models in Trade

This section will discuss the history of the gravity models over the years, which is essential for understanding the following section that introduces the model used by this thesis. First, it will describe Tinbergen's first iterations and subsequent attempts to make this model popular in trade analyses. Then, it will present the multilateral resistance terms and possible methods of capturing them in the models. Lastly, this section will introduce the PPML estimator, which aims to correct the downfalls of the OLS. It will then discuss the country pair fixed effects and the multiway clustering as valuable enhancements to the model.

3.1.1 Origins of the Gravity Model

The gravity model has come a long way since it was introduced by Tinbergen (1962, p. 264), who was inspired by Newton's gravity equation in attributing the trade flows as dependent to the size of a country in terms of GDP and the distance between the pair. Tinbergen produced the equation by adding the value of exports between countries i and j signified by X_{ij} as a dependent variable and independent variables of the GDP of a country i and j which are denoted by Y_i and Y_j respectively, the distance between them, represented by D_{ij}, and a constant G. Then, by taking the log of exports, GDPs and distance, Tinbergen

got the following equation:

$$ln(X)_{ij} = \beta_1 ln(Y_i) + \beta_2 ln(Y_j) + \beta_3 ln(D_{ij}) + G \qquad (3.1)$$

However, many ignored this model as it was perceived to be more connected with physics rather than economics. Even after the attempt of Anderson (1979), who enhanced Tinbergen's gravity model by providing it with a theoretical basis, simplifying it into a model that mirrored Tinbergen's but skipped some variables and imposed limits on elasticity. Although this reaserch was highly significant and valuable, it remained overlooked by the economic community.

(Frankel et al., 1995, pp. 3-4) published a study on currency blocs where they employed a gravity model that became a foundation of gravity models developed by later academics in that field. They modify the basic model measuring bilateral trade by adding dummy values "to represent when both countries in a given pair belong to the same regional grouping." Such dummy variables would then allow the authors to compare and infer trends in time or level of trade across different regions, giving them more concrete estimates of how a region with currency unions or fixed exchange rates fares against one without such arrangement. By 1995, most of the scholars started to examine the gravity model again; however, it still faced many criticisms since, according to some scholars, it lacked theoretical foundations. [1].

3.1.2 MRT Revolution and the Three Medals

Nevertheless, this did not stop scholars from using gravity models in their research, producing surprising results for some of them. For example, McCallum (1995, p.

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[1]see, for example, Leamer and Levinsohn 1995, p. 1387

616) found that the national border between Canada and the USA decreases trade by about 20 times. Furthermore, Rose (2000, p, 31) also found an unexpectedly high effect of currency unions on trade. Anderson and van Wincoop's (2003, pp. 176-178) article identifies the reason for such overestimated results, which makes it one of the most valuable contributions to the literature on gravity models. In this work, they found that the users of gravity models often do not account for the so-called multilateral resistance terms and, therefore, produced a bias that would explain the unusually large results of McCallum and Rose. Multilateral trade resistance terms are now a critical component of the gravity trade model since they help to incorporate the broader, generalized trade resistance that each country faces when engaging in international trade. These terms account for the fact that trade barriers are not only bilateral but also influenced by the global trading environment. They also control for the influence that all other countries exert on the bilateral trade flow between two specific countries, essentially correcting for the interconnected nature of global trade.

Feenstra (2004, p. 161) would define a way to account for these multilateral terms by using the fixed effects method. Here, the author suggests measuring the unobserved multilateral terms as coefficients of fixed effects in the equation for both the importer and the exporter. This method is much more consistent in providing robust results and was already used by (Rose & Van Wincoop, 2001, p. 387), which has, however, still given them relatively high estimates for the effect of currency unions. These findings would go on to spark the "MR/fixed effects revolution", according to Head and Mayer (2014, p. 136), where most scholars started using fixed effects for importers and exporters, which led to more consistent findings of the gravity model. Therefore, this marks the shift from the basic OLS without fixed effects estimation and moves towards the least-squares dummy variables (LSDV) estimation method as the most common estimator for

gravity models.

The paper by Baldwin and Taglioni (2006) is most successful at describing the three most common mistakes that occur with the use of gravity models. The authors introduce the gold medal mistake, which applies to the studies that do not control for the multilateral resistance terms, as Anderson and van Wincoop (2003) argued. (Baldwin & Taglioni, 2006, pp. 7-9) The silver medal mistake concerns the mistake of wrongly averaging trade flows, where the author committing the mistake would take the log of the sum of trade flows rather than the sum of the log of trade flows. This mistake can create bias in the case the bilateral trade is imbalanced, and more importantly, this error is exacerbated when used in panel data. (Baldwin & Taglioni, 2006, pp. 9-11) Lastly, the bronze medal mistake occurs when scholars deflate the prices of a trade by using a price index, which in most cases is the US price index. This bronze mistake, however, is fixed when the study accounts for the multilateral resistance terms. Thus, any user of the gravity model can easily avoid this problem if he accounts for the gold medal mistake. (Baldwin & Taglioni, 2006, p. 9)

3.1.3   Introduction of PPML and Recent Developments

The paper by Baldwin and Taglioni (2006, p. 2) also understood but didn't research the problem of zeros in the dataset used for gravity models, which significantly biases the results when using the OLS estimator. Fortunately, Silva and Tenreyro (2006) would go on to publish their paper, which looks into precisely this problem. The authors uncovered two setbacks of the OLS estimator when used in the gravity models. The first mistake concerns heteroskedasticity, which can be very common in the log of trade values. The OLS estimator assumes that the error terms are rather homoskedastic; thus, heteroskedasticity causes bias in the standard error estimates. (Silva & Tenreyro, 2006, p. 641) The combination

of heteroskedasticity and the logarithmic specification of the OLS gravity model also leads to a danger of producing biased coefficients, thus biasing the overall results. The same problem applies to the LSDV estimator, which cannot solve this by using fixed effects. The second mistake concerns the presence of zeros, which the OLS method cannot estimate since it takes logs of trade values. Therefore, these zero values are dropped, which can sometimes ignore a situation where there might be trade barriers that completely halt trade and, thus, can lead to bias. (Silva & Tenreyro, 2006, pp. 642-643) To solve both of these issues of the OLS estimator, the authors suggest using a pseudo-maximum-likelihood (PML) estimator, and they emphasize the Poisson variation (PPML), which is the best in dealing with heteroskedasticity due to its robustness. (Silva & Tenreyro, 2006, p. 653)

The gravity equation faced another criticism as it could not capture factors like cultural preferences in bilateral trade, which also play a big part in the direction and size of trade flows. This issue couldn't be captured by including fixed effects for importers and exporters. It thus could introduce various types of endogeneity biases, including selection bias, simultaneity bias and measurement error bias. (Baier & Bergstrand, 2007, pp. 77-80) Baier and Bergstrand (2007, p. 87) therefore recommend including 'bilateral fixed effects', which are also known as country-pair fixed effects, to the importer-year and exporter-year fixed effects, which helps to account for the unobserved heterogeneity between the variables, especially when using panel data. This adjustment significantly affects the results of the gravity models by mitigating most of the biases. The authors also recommend their method to deal with these biases and the problem of multilateral resistance terms, a bonus vetus OLS. However, employment of country-pair fixed effects alongside importer-year and exporter-year fixed effects remains the most popular method. (Baier & Bergstrand, 2007, pp. 80-81)

The modern PPML variation of the gravity model, therefore, takes the following form:

$$X_{ijt} = exp(\gamma_{it} + \eta_{jt} + \lambda_{ij} + \beta' z_{ijt}) + G_{ijt} \qquad (3.2)$$

Here, one can infer that the dependent variable X is the value of exports from an exporter i to an importer j in a specific year t. Symbol η_{jt} represents time-varying fixed effects for the exporter while the symbol η_{jt} does the same but for an importer, and lastly, the country pair fixed effects are represented by λ_{jt}. The vector value z_{ijt} includes the necessary covariates of the equation, which in the context of this research would contain currency unions or free trade agreements, among other things. Error terms would be denoted by the symbol G_{ijt}.

The strength of pair-fixed effects is underlined by a study by Agnosteva et al. (2014, p. 18), which finds that the performance is even better than the standard gravity variables such as distance or contiguity. These pair-fixed effects can, therefore, control for the time-invariant trade costs. The authors, however, also discuss that this technique leads to issues with multicollinearity, which may cause some variables to be dropped. Therefore, they recommend dropping the time-varying portion of the equation. Head and Mayer (2014, p. 31) additionally found that adding pair-fixed effects gives much different results than gravity models without them.

Cameron et al. (2011, pp. 238-239) propose using multiway clustering in nonnested dimensions, leading to correctly estimated standard errors in regressions. This approach is especially recommended for gravity models as scholars often use one-way clusters, which wouldn't estimate the standard errors correctly. In contrast, when the authors use this method in Rose's study, they find that multiway

clusters give about 36% larger standard error estimates. (Cameron et al., 2011, p. 246)

3.2 The Gravity Model Specification Used in This Thesis

All of these methodologies resulted in the constant development of the gravity model in researching the effect of currency unions on trade. Rose's (2000) article was, for example, critiqued by most of the authors mentioned above. Rose used a model inspired by Frankel et al. (1995), which he then augmented by adding his dummy variables, thus using an old model with numerous biases. For example, Baldwin and Taglioni (2007, pp. 790-791) argued that Rose failed to control for multilateral terms, thus committing the gold medal mistake. Furthermore, Silva and Tenreyro (2010, pp. 12-13) uncover the presence of heteroskedasticity and zero trade flows in Rose's data. As explained above, both occurrences bias the results, and thus, the authors would recommend using PPML for the gravity model. Silva and Tenreyro (2010, p. 9) and before them, Persson (2001, pp. 437-438) critique Rose's data in which he assumes that currency unions are formed randomly. The authors believe the opposite, that they are formed between countries that share characteristics, which results in them trading more with each other, and that Rose doesn't account for this, which biases his results.

This thesis is aware of the developments mentioned above and, therefore, attempts to take them all into account when configuring its gravity model for the effects of the Euro on Slovak trade. The model will, therefore, utilize the PPML estimator, which will take into account the high dimensional fixed effects as used by Larch et al. (2019). This method has been proven reliable in providing the most unbiased estimates. It has been attempted by numerous scholars, includ-

ing Glick and Rose (2016, p. 14), who, however, concluded that they "have been unable to estimate an appropriate model for a reasonably large panel for purely computational reasons." Precisely this was achieved by Larch et al. (2019), where this method allows the author of this thesis to account for multilateral terms, as mentioned by Anderson and Van Wincoop (2003), by including country-pair fixed effects in the so-called three-way specification of fixed effects which will include exporter-time, importer-time and exporter-importer fixed effects. Furthermore, this methodology will include multiway clustering to estimate standard errors correctly as described by Cameron et al. (2011)

This method will, therefore, address the inherent limitations of the OLS estimator in handling zero trade values and heteroscedasticity by focusing only on the regressions with the PPML estimator, which overcomes such challenges. Therefore the equation of the gravity model used for this thesis will be in the following form:

$$X_{ijt} = exp(\gamma_{it} + \eta_{jt} + \lambda_{ij} + \delta euro\_no\_svk_{ijt} + \phi euro\_svk_{ijt} + \beta' z_{ijt}) + G_{ijt} \quad (3.3)$$

The equation is similar to equation 3.2, but it includes the two dummies *euro_svk* and *euro_no_svk* that will allow this thesis to interpret the effects of the Euro on Slovak trade. Furthermore *z* includes dummy variables *contig, comlang_off,* and *col45* and variables *ln_dist, ln_gdp_o,* and *ln_gdp_d.* It also includes dummies that help isolate the effects for the two main variables: *cu_no_emu, eu,* and *fta_no_eu.* The variables for other regressions will slightly change, but the structure of this equation will be untouched in terms of fixed effects or the contents of *z.*

However, using the three-way specification of fixed effects will lead to the usual gravity variables becoming dropped due to multicollinearity. This is expected since such factors as distance or GDP will be accounted for by the fixed effects this model will include. The only exception to this is with the equation estimat-

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ing trade creation and diversion, where the results are more difficult to obtain as the variables necessary to estimate this effect correctly are also dropped due to multicollinearity. This thesis deals with this specific regression by including only the exporter-fixed effects, importer-fixed effects, and time-fixed effects, which would mean that to account for other factors influencing bilateral trade, the classic gravity variables won't be dropped and thus will prove beneficial for that specific regression.

3.3 Data

This section introduces the data used by the present author to estimate the regressions in Chapter 4. The data consists of numerous sources, including *CEPII*, *International Trade Commission*, and *DESTA*, which this thesis combines into a comprehensive panel dataset. Furthermore, the present author had to either fill in or add some dummy variables, especially the ones relating to the Eurozone, in order to obtain the most correct and complete information. The most important variables to the data used by this thesis are the following:

Export

The gravity model will use this as the dependent variable. It contains 730,045 observations and spans from 1995 until 2021. The value of exports was obtained from the *BACI* database, which contains information on the trade flows of 200 countries. (Gaulier & Zignago, 2010) This data concentrates on the product level of these trade flows. Therefore, it had to be aggregated for each country pair and year in order to be used in the calculations for the overall effect across all sectors. The *BACI* database will prove helpful for this essay by focusing on how specific areas were impacted, where its separation into products allows the author to filter

flows for the exports of vehicles. The exports are written in thousands, and the currency used is the US dollar.

Export of Vehicles

This dependent variable is obtained from the *BACI* database by filtering for the exports of vehicles; in this case, six different product categories indicate the vehicles, where three products (870321, 870322 and 870323) are designated to the petrol vehicles, where each category implies a different cylinder capacity.[2] The next three denote diesel or semi-diesel vehicles (870331, 870332 and 870333), where again, each category implies a different cylinder capacity.[3] This data spans the same period as the overall exports and contains 653,608 observations. The exports are also written in thousands, and the currency used is the US dollar.

European Union

The dummy *eu* is a dyadic variable, which indicates with the value of 1 whether each pair contains both countries from the EU. The author of this thesis has added this data to the dataset according to the EU members and the year of their entry.

Eurozone Dummy

The dummy *euro* is also a bilateral variable, which indicates with a value of 1 whether each pair contains both members of the Eurozone. The author of this thesis added this information to this data according to the Eurozone members and their year of entry.

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[2]below 1000cc, between 1000cc and 1500cc and over 1500cc.
[3]below 1500cc, between 1500cc and 2500cc and over 2500cc.

Slovakian Dummies

The *euro_svk dummy* is a bilateral variable that takes the value of one in the case Slovakia is either an exporter or an importer in a trade occurring between two eurozone members. The *euro_no_svk dummy*, on the other hand, takes the value of one in the case that Slovakia is not involved in a trade between two eurozone members.

Other Currency Unions

The dummy *cu_no_emu* is a dyadic variable that indicates, with a value of one, if a country pair in a specific year is in a currency union other than the Eurozone. The list of currency unions is inspired by the lists presented by Rose (2000, p. 41) [4] and Glick and Rose (2016), where the present author added all the values.

Other Free Trade Agreements

The dyadic variable *fta_no_eu* indicates, with a value of one, that the pair is in a free trade agreement for that specific year. This data is taken from two sources; one is *The Dynamic Gravity Dataset* from *The United States International Trade Commission*, which forms the base of the dummy. (Gurevich & Herman, 2018) However, since the data stops in 2019, this essay takes the rest from the *DESTA* database, which contains all the necessary information to fill in the rest of the data.

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[4]Although Rose's data has been criticized in the past, the reason was not due to its incompleteness but rather because it was used to predict the effects of the EMU. Since the EMU data already exists, the present author believes that it is appropriate to adapt his list of existing currency unions for this study.

The Gravity Variables

The classic gravity dummy variables used in this text include contiguity (*contig*), which takes the value of one in the case countries share a border, common official language (*comlang_off*), which takes the value of one if the country pair shares a common official language, common colony (*col45*) which takes the value of one if the countries were in a colonial relationship after 1945. Furthermore, this thesis also uses variables for the log of the distance between the country pair (*ln_dist*) and the logs of the exporter's GDP and the importer's GDP (*ln_gdp_o* and *ln_gdp_d* respectively). These values are obtained from the *CEPII gravity database.* (Conte et al., 2022)

4. Results

This section presents the final results of this thesis. It begins by examining the overall impact of the Euro on Slovak trade, followed by a detailed analysis of the Euro's delayed and preceding effects on trade. Subsequently, it examines whether the Euro had trade-creating or diverting effects and then examines the effects on the trade of the Slovak automotive industry.

These results uncover numerous limitations of the methodology and data used by this thesis. The timing of the financial crisis prevails as one of the most notable constraints for this research, as the extent of this event seriously impacted the data of this analysis. There are also more minor limitations for this study, especially the short time for the announcement of Slovakia's official entry into the EMU, which makes it hard to capture any preceding effects, or the "Dieselgate" scandal and the subsequent regulations directed for the diesel vehicles make it hard for this thesis to capture how its trade was affected by the Euro, and therefore they might shade the rest of the automobile export data. In order to overcome these challenges, the author of this thesis proposes using more specific regression methods. For example, the thesis suggests implementing delayed effects or examining only the exports of combustion engine vehicles.

4.1   The Impact of the Euro on Slovak Trade

This section analyzes the impact of the Euro on the overall Slovak trade, using the model described in Section 3.2, which should provide this thesis with the most accurate results. Furthermore, this section will also inspect the Euro's effect on overall trade in order to confirm that this thesis is getting results that are in line with the most recent literature, which uses comparable gravity models.

Table 4.1: Regression results

Variable	Exports	Exports
euro	−0.006	
	(0.028)	
euro_SVK		0.063
		(0.094)
euro_no_SVK		-0.022
		(0.031)
cu_no_emu	0.285***	0.286***
	(0.068)	(0.068)
eu	0.208***	0.204***
	(0.043)	(0.042)
fta_no_eu	0.045*	0.045*
	(0.025)	(0.025)
_cons	16.306***	16.308***
	(0.015)	(0.015)
N	723723	723723
pseudo R-sq	0.991	0.991

Note: This regression includes country-pair fixed effects and time varying fixed effects, and includes multi-way clustering. Robust standard errors in parentheses.*p<0.1; **p<0.05; ***p<0.01.

Table 4.1 shows the estimates for the effect of the Euro on overall trade in the first column, and then, in the second column, the effect is isolated to only Slovakia. According to this table, the overall effect of the Euro on trade is minimal and even negative; however, it is also statistically insignificant, instead suggesting a null effect of the Euro. The lone effect on Slovakia's trade would imply a roughly 6 percent increase in its trade, but this effect is again statistically insignificant. These results would confirm the findings of other authors using the recent panel data and PPML with multiway clustering like this thesis has done. The other variables suggest a positive impact on trade: the currency unions outside of the EMU increase trade of the member countries by about 32 percent, the EU membership increases trade by about 23 percent, and FTAs outside of the EU also suggest an increase in trade however much lower than the EU. The rest of these variables are

in line with the literature, and in the case of the currency unions outside of the EMU, the effects are much lower than what Rose has found; however, again, it follows what the other scholars have found in that this effect is lower than what Rose has believed.

4.2 The Delayed and Preceding Impact of the Euro on Slovak Trade

Although the insignificant effect of the Euro on the overall Slovak trade in Table 4.1 would suggest that there is no effect at all, there are numerous ways we can test the viability of these results. One way of doing this is by examining whether the effect of the Euro is delayed or perhaps had preceded the adoption of the Euro. Table 4.2 sheds more light on these effects by measuring whether the effects of the Euro were delayed by three years or six years, which is indicated by the variables *euro_SVK_lag3* and *euro_SVK_lag6*, respectively. Furthermore, there is a possibility of Slovakia integrating into the European supply chains before adopting the Euro with the anticipation of adopting the Euro after it was announced; this is shown by the variable *euro_SVK_lead1*.

Here, we can see that the 3-year delayed effect again shows statistically insignificant results for both the isolated effect on Slovakia and the rest of the Eurozone. However, the effect for Slovakia is still more positive than one of the other EMU countries, which follows the estimates of Table 5.1. The effect of the Euro on Slovak trade was statistically significant for the 6-year delayed effect, which would imply a positive effect of the Euro on Slovak trade of about 16.3 percent. The rest of the Eurozone countries don't show a statistically significant effect; however, this coefficient also rises, turning positive at last. In the case of the 1-year leading effect of the Euro on Slovak trade, this thesis finds no statistically signifi-

cant results for either Slovakia or the rest of the Eurozone, which is unsurprising as the one-year preceding effect is a short period to make a difference in the results.

Table 4.2: Delayed and preceding effect of the Euro

Variable	Exports	Exports	Exports
euro_SVK_lag3	0.080		
	(0.057)		
euro_no_SVK_lag3	-0.002		
	(0.028)		
euro_SVK_lag6		0.151**	
		(0.063)	
euro_no_SVK_lag6		0.007	
		(0.027)	
euro_SVK_lead1			0.046
			(0.111)
euro_no_SVK_lead1			-0.036
			(0.031)
cu_no_emu	0.310***	0.284***	0.297***
	(0.069)	(0.068)	(0.068)
eu	0.176***	0.205***	0.199***
	(0.042)	(0.044)	(0.042)
fta_no_eu	0.057**	0.046*	0.040
	(0.024)	(0.025)	(0.025)
_cons	16.351***	16.305***	16.290***
	(0.014)	(0.015)	(0.015)
N	571763	723723	632030
pseudo R-sq	0.991	0.991	0.991

Note: This regression includes country-pair fixed effects and time varying fixed effects, and includes multi-way clustering. Robust standard errors in parentheses.*p<0.1; **p<0.05; ***p<0.01.

This thesis examines the delayed effect of the Euro on trade every year, from a 4-year delayed effect to a 9-year delayed effect in the appendix. The results of such regressions would suggest that the effect of the Euro on Slovak trade becomes statistically significant since a 4-year delayed effect indicates a positive effect of about 10.5 percent. These estimates remain relatively consistent until the 9-year delayed effect, where the positive effect of the Euro stabilizes at around

15 percent since the 6-year delayed effect. The effect on the rest of the Eurozone remains statistically insignificant, with a minuscule positive effect.

The most straightforward answer for these results would be the timing of the Slovak entry into the EMU, which occurred parallel to the 2008 financial crisis and the subsequent European debt crisis, which slowed down the European economies. These events led to significant problems for Slovak exports and imports, where the former suffered from decreased global demand and investment, and the latter suffered from decreased domestic demand. The time-varying fixed effects included in the regression should, however, capture the influence of the 2008 financial crisis and subsequent problems in the Eurozone. Therefore, these results are not the direct consequence of the crisis. Nevertheless, this thesis would argue that indirectly, the crisis could have had an effect by increasing the risk aversion of the potential investors. Due to the essence of the European debt crisis, investors could have delayed their investments to identify what countries have their finances in order, which was motivated by the events in Greece. Consequently, during and after the financial crisis, the nature of investments changed to investors only funding existing projects instead of developing new ones.[1]

The idea that the effect is delayed by about four years would make sense since, around this time, the EU countries began recovering from the crisis. Investors could also have regained their confidence in EU markets, especially the new Eurozone markets, which would apply to Slovakia. These results could also suggest that the regressions inspecting the overall effect of the Euro suffer due to the timing of the crisis and thus show statistical insignificance.

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[1]as described in section 2.3.2

4.3 Trade Creation and Trade Diversion

This section will examine how the Slovak entry into the Eurozone affected its trade patterns. As indicated in Section 3.2, this gravity model will be slightly different in that it will have to use fixed effects only for the exporter, importer, and time to avoid issues with multicollinearity for the Eurozone dummies. Therefore, the model will not drop the classic gravity variables this time, allowing this thesis to include them in the final regression results.

Table 4.3 indicates the regression results that tested trade creation and diversion of the Euro for Slovakia. These results would indicate that the Euro has had no trade-diverting effects on the trade of Slovakia or the rest of the Eurozone countries, and they cannot rule out that the Euro doesn't have trade-creating effects. Both variables $both\_eurozone\_SVK$ and $both\_eurozone\_no\_SVK$ are statistically insignificant, and they would suggest an economically tiny effect; this goes in line with the previous findings of this thesis, which also suggest that the Euro has a statistically insignificant effect on the trade between EMU countries. The notable part of this regression is, however, revealed by the variables $one\_eurozone\_SVK$ and $one\_eurozone\_no\_SVK$, which show a statistically significant and positive effect on eurozone imports of extra-eurozone goods. This effect is relatively high for the Eurozone countries excluding Slovakia, which implies a 15 percent increase in imports for these countries. However, Slovak imports of extra-eurozone goods have seen a much higher positive increase of 54.1 percent, which implies a major effect on Slovak imports of possibly cheaper goods.

The rest of the variables follow the findings of other scholars, especially in the case of the classic gravity variables ln_dist, which confirms its negative effect on trade, and the power of GDP indicated by the variables ln_gdp_o and ln_gdp_d, which suggests a positive effect on trade. The only variable that behaves strangely is the cu_no_emu variable, which is on the edge of being statistically significant

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but becomes the contrary.

Table 4.3: Trade Creation and Diversion of the Euro

Variable	Exports
both_EMU_SVK	0.140
	(0.243)
both_EMU_no_SVK	-0.039
	(0.055)
one_EMU_SVK	0.433***
	(0.157)
one_EMU_no_SVK	0.171***
	(0.065)
cu_no_EMU	0.324
	(0.221)
EU	0.794***
	(0.082)
fta_no_EU	0.344***
	(0.045)
contig	0.493***
	(0.077)
comlang_off	0.119*
	(0.071)
col45	0.529***
	(0.165)
ln_dist	-0.608***
	(0.028)
ln_gdp_o	0.572***
	(0.028)
ln_gdp_d	0.573***
	(0.029)
_cons	-11.358***
	(1.186)
N	668904
pseudo R-sq	0.927

Note: This regression includes exporter, importer and time fixed effects, and includes multi-way clustering. Robust standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

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The fact that the countries bordering Slovakia, especially its closest trading partners such as the Czech Republic, Poland, and Hungary, remain outside of the EMU and manage their currencies, which allows them to depreciate at will, making them more desirable for imports can theoretically explain this positive effect of the Euro on Slovak imports of non-EMU goods. Furthermore, this could have possibly induced Slovak businesses to start importing from these markets, which could explain the results of Table 5.3. However, these results still do not include the circumstances where Slovak nationals living near the borders cross borders to shop for items such as Hungarian gas or Polish medications, thus avoiding them being officially reported as imports. This type of import is complex to capture by the data this thesis uses and, if accounted for, could change these results. Nevertheless the author of this thesis still believes that these results are still too high and is unable to find a concrete reason for this.[2]

4.4   Automotive Industry

The following section looks into how the most prominent sector of Slovak exports was affected. This research is even more interesting when considering the study of of Haughton and Malová (2007, p. 16), which found that the lobbies of vehicle manufacturers held a substantial role in pushing forward Slovak integration into the EU. As this industry holds such a critical position in the Slovak economy, having the wisdom of how the Euro affected it in Slovakia can explain more closely how the EMU membership impacted not only the Slovak exports but also the overall

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[2]Another possibility could be because of the change in the methodology, which, as Head and Mayer (2014, p. 31) found, changes the results. However, this method remains the most straightforward one for finding these effects, and thus shouldn't provide such different results

Slovak economy.

Table 4.4 implies that the Euro does not affect trade in the automotive industry. In the case of other EMU countries, the effect is statistically insignificant and economically minimal; however, in the case of the isolated effect only for Slovakia, the numbers are slightly different. Here, the results are still statistically insignificant; however, the number is much lower than with the rest of the EMU. Furthermore, the coefficient becomes much more positive, but the statistical insignificance still indicates that this effect is null.

Table 4.4: Effects on vehicle trade

Variable	Vehicle exports	Petrol vehicle exports	Diesel vehicle exports
euro_SVK	0.242	0.446*	-0.158
	(0.225)	(0.258)	(0.235)
euro_no_SVK	0.009	0.0135	-0.143
	(0.134)	(0.141)	(0.116)
cu_no_emu	-0.470**	-0.696***	-2.326***
	(0.234)	(0.267)	(0.527)
eu	0.441***	0.355**	0.364***
	(0.138)	(0.162)	(0.126)
fta_no_eu	0.120**	0.138**	0.0108
	(0.0576)	(0.0549)	(0.0663)
_cons	12.58***	12.81***	12.19***
	(0.0576)	(0.0531)	(0.101)
N	646679	336183	213723
pseudo R-sq	0.757	0.811	0.819

Note: This regression includes country-pair fixed effects and time
varying fixed effects, and includes multi-way clustering. Robust standard errors in parentheses.*p<0.1; **p<0.05; ***p<0.01.

However, the estimates significantly change if one distinguishes between the trade of petrol vehicles and diesel vehicles. For the regression considering only the trade of petrol vehicles, the effect of the Euro on Slovakia is now statistically significant and implies an economically positive effect of about a 56.2 percent increase in this sector. The effect for other EMU countries remains statistically insignificant;

however, countries focusing more on the automotive sector might behave similarly. In the case of diesel engine vehicles, the data remains statistically insignificant; however, its coefficients turn negative as opposed to combustion engine vehicles, which display the opposite effect. The most likely reason for this performance of diesel vehicles might be the 2016 Dieselgate scandal, which significantly affected the trade of diesel cars. The initial consumer distrust and the subsequent stricter regularization of this type of vehicle, which ended the diesel car boom in Europe, therefore, could explain diesel's poor estimates. (del Rosal, 2022, p. 190)

The variable denoting other currencies than the EMU is statistically significant, but in this case, it shows a negative effect of common currency on trade. This can have many explanations; however, the author of this thesis believes that this is because, most often, these currency unions include smaller and poorer countries which lack the infrastructure to manufacture vehicles. Therefore, this data could be insufficient to draw conclusions in this area. Furthermore, the EU variable suggests a positive effect of the European Union on the exports of vehicles in all categories, and the other FTAs are positive and statistically significant in both the overall exports and combustion engine exports but statistically insignificant in the trade of diesel vehicles.

Conclusion

The results of this thesis might at first suggest that the Euro does not significantly affect Slovak trade; however, a more detailed analysis indicates some positive effects after all. The delayed effects analysis implies that the downturn of the global economy that coincided with Slovak entry into EMU might impact the data this thesis uses. If the 6-year delayed effect that implies a 16.3 percent increase in Slovak trade is precise, then it would be hard to deny the fact that the Euro indeed positively affected Slovakia, especially in the context of the results for the rest of EMU countries for which this effect remains statistically insignificant. The 56.2 percent increase in the trade in petrol vehicles further implies that the Euro has had some benefit for Slovakia as it boosted the exchange of the most crucial sector for exports in Slovakia, which is critical for Slovak Economy. Lastly, the above 50 percent increase in the imports of non-EMU goods remains puzzling for the author of this thesis, especially when taking into account the contracted domestic demand that stemmed from the 2007 financial crisis and the subsequent Eurozone crisis. Nevertheless, the positive effect on this type of imports might be accurate but likely lower, resulting from Slovakia's contiguity to four countries that are not part of EMU.

Regardless, this thesis confirms what the recent studies found: that the effect of the Euro on overall trade is much lower than initially believed and that Slovakia is no exception to this. However, it is essential to note that in all of the regressions this thesis has observed, Slovakia performed better than the group of EMU countries excluding Slovakia. The insignificant Euro effect can be the outcome of numerous factors; however, this thesis would argue that this is only a confirmation of what even Rose and Van Wincoop (2001, p. 387) previously considered in that only eliminating transaction costs of currency exchange cannot have such a signifi-

cant effect. Additionally, Feldstein (1997, p. 33) believed that such weight given to these transaction costs would gradually diminish with the coming of globalization, and later De Sousa (2012, p. 6) found that the decreasing effect of the Euro might be exactly due globalization and a shift away from regionalization.

These explanations concerning globalization would seem plausible since the economic role of countries like China, Turkey, and Russia was significant during the 2000s and especially during the 2010s. This logic could even explain the positive effect on imports of non-EMU countries to Slovakia and the whole Eurozone. Therefore, globalization's impact is particularly notable in this perspective. However, the current era, catalyzed by the COVID-19 pandemic and the War in Ukraine, is more described by the term deglobalization. Hence, the critical question this thesis poses is whether this will have some impact on the Euro's effect on not only the Slovak trade but European trade in general. Furthermore, Samuel P. Huntington's (1993, pp. 27-29) article *The clash of civilizations?* predicts that cultural tensions will divide the global order into civilizations based on their region, thus also implying economic regionalization. If this prediction is correct, then the role of the Euro might still be significant in the future.

From the Slovak perspective, the Euro still provides many benefits, mainly political and economic stability, which is critical for the country's further development, as it can secure valuable FDIs and seem more legitimate to the rest of the world by wielding one of the most tradeable currencies. In recent years, the interest rates in Slovakia have also been lower than those of its non-EMU neighbours, thus contributing to more affordable financing options for both businesses and consumers. The Euro also provides easier travel and commerce for Slovaks within the Eurozone, thereby improving transparency. The Euro has numerous other benefits; however, the ones stated above should be enough to reject the notion that it has not benefited Slovakia since its effect on overall trade seems null.

The countries currently facing the decision on whether to join the Eurozone should nevertheless take into account that the initial beliefs that the Euro will have an advantageous effect on trade are unlikely to materialize. Instead, they should expect a more modest effect on specific sectors that will take some time to emerge and could even be insignificant.

Závěr

Výsledky této práce by mohly na první pohled naznačovat, že euro nemá na slovenský obchod výrazný vliv, nicméně podrobnější analýza přece přece jen naznačuje určité pozitivní dopady. Analýza opožděných efektů naznačuje, že pokles světové ekonomiky, který se časově shodoval se vstupem Slovenska do Evropské měnové unie, mohl ovlivnit data použitá v této práci. Pokud je šest let zpožděný efekt, který znamená nárůst slovenského obchodu o 16,3 %, přesný, pak by bylo těžké popřít skutečnost, že euro skutečně pozitivně ovlivnilo Slovensko, zejména v kontextu výsledků za ostatní země eurozóny, u nichž tento efekt zůstává statisticky nevýznamný. Nárůst obchodu s benzinovými vozidly o 56,2 procenta dále naznačuje, že euro mělo pro Slovensko určitý přínos, neboť posílilo výměnu v tomto pro slovenský export nejvýznamnějším odvětví, které je pro slovenskou ekonomiku klíčové. A v neposlední řadě zůstává pro autora této práce záhadou více než padesátiprocentní nárůst dovozu zboží mimo EU, zejména pokud vezmeme v úvahu sníženou domácí poptávku, která vyplynula z finanční krize v roce 2007 a následné krize v eurozóně. Nicméně pozitivní vliv na tento typ dovozu může být přesný, ale pravděpodobně nižší, což vyplývá z přilehlosti Slovenska ke čtyřem zemím, které nejsou součástí HMU.

Každopádně tato práce potvrzuje to, co zjistily nedávné studie: že vliv eura na celkový obchod je mnohem nižší, než se původně předpokládalo, a že Slovensko v tomto ohledu není výjimkou. Je však nezbytné poznamenat, že ve všech regresích, které tato práce sledovala, si Slovensko vedlo lépe než skupina zemí Evropské měnové unie bez Slovenska. Nevýznamný efekt eura může být důsledkem mnoha faktorů, nicméně tato práce si dovoluje tvrdit, že se jedná pouze o potvrzení toho, o čem dříve uvažovali i Rose a Van Wincoop (2001, s. 387), že pouhá eliminace transakčních nákladů měnové výměny nemůže mít tak významný efekt. Feldstein

(1997, s. 33) se navíc domníval, že taková váha přikládaná těmto transakčním nákladům bude s příchodem globalizace postupně klesat, a později De Sousa (2012, s. 6) zjistil, že klesající efekt eura může být způsoben právě globalizací a odklonem od regionalizace.

Tato vysvětlení týkající se globalizace se zdají být věrohodná, protože ekonomická role zemí jako Čína, Turecko a Rusko byla v průběhu roku 2000 a zejména v průběhu roku 2010 významná. Tato logika by mohla vysvětlit i pozitivní vliv na dovoz zemí mimo EU na Slovensko a do celé eurozóny. Vliv globalizace je tedy z tohoto pohledu obzvláště pozoruhodný. Současnou éru, katalyzovanou pandemií COVID-19 a válkou na Ukrajině, však spíše vystihuje termín deglobalizace. Proto je zásadní otázkou, kterou si tato práce klade, zda to bude mít nějaký dopad na vliv eura nejen na slovenský obchod, ale na evropský obchod obecně. Samuel P. Huntington (1993, s. 27-29) navíc ve svém článku Střet civilizací? předpovídá, že kulturní napětí rozdělí globální řád na civilizace podle jejich regionů, což znamená i ekonomickou regionalizaci. Pokud je tato předpověď správná, pak by role eura mohla být v budoucnu stále významná.

Z pohledu Slovenska euro stále přináší mnoho výhod, především politickou a ekonomickou stabilitu, která je pro další rozvoj země klíčová, neboť si může zajistit cenné přímé zahraniční investice a také se zbytku světa jevit více legitimní, protože disponuje jednou z nejobchodovatelnějších měn. V posledních letech byly také úrokové sazby na Slovensku nižší než u sousedů mimo EU, což přispělo k dostupnějším možnostem financování pro podniky i spotřebitele. Euro Slovákům také usnadňuje cestování a obchodování v rámci eurozóny, čímž zvyšuje transparentnost. Euro má řadu dalších výhod; ty výše uvedené by však měly stačit k odmítnutí názoru, že Slovensku neprospělo, neboť jeho vliv na celkový obchod se zdá být nulový. Země, které v současné době stojí před rozhodnutím, zda vstoupit do eurozóny, by nicméně měly vzít v úvahu, že původní přesvědčení, že euro bude

mít příznivý vliv na obchod, se pravděpodobně nenaplní. Místo toho by měly očekávat mírnější vliv na konkrétní odvětví, který se projeví až po určité době a který by mohl být dokonce nevýznamný.

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List of Abbreviations

Abbreviation	Definition
BACI	Base pour l'Analyse du Commerce International
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
DESTA	Design of Trade Agreements
EMU	Economic and Monetary Union
EU	European Union
FDI	Foreign Direct Investment
FTAs	Free Trade Agreements
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
LSDV	Least Squares Dummy Variable
MRT	Multilateral Resistance Terms
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPML	Poisson Pseudo-Maximum Likelihood
WTO	World Trade Organization

List of abbreviations used in the thesis.

List of Appendices

Appendix no. 1: Expanded lagged effects (Table)

Variable	Exports	Exports	Exports	Exports	Exports
euro_SVK_lag4	0.100*				
	(0.053)				
euro_no_SVK_lag4	0.006				
	(0.027)				
euro_SVK_lag5		0.125**			
		(0.052)			
euro_no_SVK_lag5		0.022			
		(0.026)			
euro_SVK_lag7			0.143***		
			(0.049)		
euro_no_SVK_lag7			0.028		
			(0.023)		
euro_SVK_lag8				0.144***	
				(0.047)	
euro_no_SVK_lag8				0.033	
				(0.023)	
euro_SVK_lag9					0.141***
					(0.047)
euro_no_SVK_lag9					0.027
					(0.023)
cu_no_emu	0.267***	0.028	0.000	0.000	0.000
0.000					
	(0.078)	(0.110)	(.)	(.)	(.)
eu	0.183***	0.201***	0.251***	0.303***	0.463***
	(0.042)	(0.042)	(0.043)	(0.047)	(0.062)
fta_no_eu	0.063***	0.069***	0.081***	0.089***	0.0890***
	(0.022)	(0.021)	(0.020)	(0.021)	(0.021)
_cons	16.362***	16.368***	16.382***	16.383***	16.365***
	(0.014)	(0.014)	(0.013)	(0.014)	(0.017)
N	542810	515261	460633	433675	406698
pseudo R-sq	0.991	0.991	0.992	0.992	0.992

Note: This regression includes country-pair fixed effects and time varying fixed effects, and includes multi-way clustering. Robust standard errors in parentheses.*p<0.1; **p<0.05; ***p<0.01.