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The Economic and Monetary Union's Effect on (International) Trade:
the Case of Slovenia Before Euro Adoption

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The Economic and Monetary Union's effect on (international) trade: the case of Slovenia before euro adoption

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Abstract:

The main objective of the following article is to present the key findings of the existent research in the field of the influence the introduction of the euro had on the trade of the member states of the Economic and Monetary Union (EMU). The intention of this article is also to inspire further research (especially concerning the effect of the euro on the Slovene foreign trade). Recent empirical researches show that the trade among the members of the EMU has grown on average by 10–15 % due to the use of a common currency and there was also an increase in trade with the non-member states. The trade benefits of the entry of new countries into the EMU will thus not be the same as the benefits of the initial formation of the EMU in the nineties. This claim has been tested on the example of Slovenia. A regression analysis of time series shows that there has been a positive effect on Slovenia's exports into and a negative effect on its imports from the eurozone precisely at the time of the creation of the EMU in 1999.

Summary

This article offers a broad overview of the main findings of the available literature which addresses the effect of the common currency (euro) on trade. As indicated by studies of the effects of currency unions on international trade, the effect of forming a currency union is relatively strong (about 30 percent), considering that the transaction costs of the currency switch and hedging in futures markets are low. Based on a thorough consideration of studies conducted in the last decade, which analyzed the relationship between the European common currency, i.e. the euro, and trade between the countries, we arrived at some interesting findings. A conclusion may be that the euro's introduction did positively affect trade within the eurozone given that intra-EMU trade rose by 10 to 15 percent on average. The effect on trade occurred very quickly, already in 1999 (according to some studies even a year before) and was supposed to grow gradually. This increase in intra-EMU trade was not at the expense of a smaller volume of trade with the non-members. Those countries which switched to the euro currency became generally more open to international trade and thus strengthened their trading also with countries outside the eurozone. Trade with non-members rose by 8 percent on average. This increase was considered to include

mainly non-members' exports to the EMU as the results of studies dealing with EMU members' exports to third countries are quite mixed, depending more on the particular sample used. The finding that the euro should also increase trade with EMU non-members (non-members' exports to the EMU) was verified for the case of Slovenia which was still not a member at that time. Employing an econometric analysis, we looked for the consequences of the euro's introduction in 1999 on Slovenia's trade with the eurozone. A short-term negative effect on Slovenia's imports from the eurozone was observed in the first three months after the euro's introduction (a 6.6 percent drop in imports) as well a positive effect on Slovenia's exports to the eurozone in the last two quarters prior to the euro's introduction. In the third quarter of 1998, exports were 5.6 percent higher than the average of the studied period, whereas in the last quarter they were 10.6 percent higher. Otherwise, no durable positive euro effects on Slovenia's trade were observed as in the years following the euro's introduction (up until Slovenia joined the EU) imports and exports were more or less constant. If the reason for all of the above is the euro's introduction and/or formation of the EMU, then Slovenia can primarily expect from the euro's introduction a surge in its imports from the eurozone and only a minimum rise in exports.

1   Introduction

At the beginning of 2007 Slovenia entered the eurozone and thus joined the 12 countries (Austria, Belgium, Finland, France, Greece, Ireland, Italy, Luxembourg, Germany, the Netherlands, Portugal and Spain) where the new common euro currency was already in use. Two other EU member states (Cyprus and Malta) joined the eurozone after Slovenia, whereas some have yet to follow in its footsteps (Slovakia in 2009). For each of these countries the abolition of their domestic currency and adoption of another official currency is clearly a huge and historic decision and therefore the key question is what benefits that will outweigh the costs they can expect from using the common currency. The principal cost, which is also a concern for these countries, is the loss of their monetary and exchange-rate policies which facilitate adaptation to economic conditions. The euro's introduction is also a burning issue for Great Britain and Denmark as they can either enter the eurozone or stay out of it.

The most frequently quoted benefit of introducing a common currency is an increase in trade between the countries forming the single currency area as a consequence of lower transaction costs and the elimination of the risk arising from exchange-rate fluctuations. In the past few years, the bulk of empirical research into the eurozone has focused on the analysis of consequences of the common currency, i.e. the euro, for trade. Previously, the consequences could only be inferred from older studies of the effect of eliminated exchange-rate volatility on trade and those studies assessing the effects of other, non-European monetary unions on trade. The article delves into the topical issue of how the common currency, i.e. the euro, affects the international trade. Did the euro's introduction boost the volume of trade between the countries of the eurozone? Did the eurozone countries, upon the introduction of the euro, divert their trade away from the currency union non-members or third countries where the euro currency is not used? How big is the effect of the euro on trade and why is this so? What is the reason for its existence or non-existence and which countries or economic activities have benefited the most from trade? Was there after 1999, when

the euro was introduced, any observable change in Slovenia's imports from and exports to the eurozone? The following article strives to answer these questions by drawing on the available literature and the study of the common currency effect on trade.

The article is organized as follows. The first part briefly presents studies of the currency union's effects on trade prior to the formation of the Economic and Monetary Union (EMU) and the exchange rate volatility effect on international trade. Additionally, this part also directly investigates the euro's effect on trade within the eurozone. This is followed by a description of key studies in this field of research, which has developed over the last decade, thus progressively answering the above questions. The last part is dedicated to an econometric analysis in which some observations about the consequences of the euro's introduction for trade in 1999 were empirically applied to the case of Slovenia, which at the time was not a member of the currency union, and its trade with the eurozone. The article concludes with the main findings.

2 The currency union effect on (international) trade – an overview of the theoretical and empirical literature

There are many consequences of a currency union. Emerson, Gros, Italianer, Pisani-Ferry and Reichenbach (1992) thoroughly (statically and dynamically) discuss the various potential benefits and costs brought about by the monetary integration effect for the following basic economic goals: microeconomic efficiency (in terms of resource allocation and economic growth), macroeconomic stability (in terms of inflation, product and employment) as well as proportionality in terms of the distribution of effects between countries and regions. Moreover, the general benefits and costs of participating in a currency union are extensively dealt with in the literature dedicated to the theory of an optimal monetary area which is practically the only theory discussing the issue of currency unions.[1]

2.1 Empirical literature prior to formation of the EMU

The benefits of introducing a common currency mainly stem from growth in trade, which is generally believed to be a consequence of the fixing of exchange rates and thus the elimination of foreign exchange risk. It is therefore understandable that prior to formation of the EMU economists mainly tried to forecast the potential effect of the euro on trade through the channel of exchange-rate volatility (variability, instability). Following the collapse of the Bretton Woods system of fixed exchange rates in the early 1970s, the theoretical and empirical literature started investigating the relationship between exchange rate fluctuations and international trade flows. There was a proliferation of empirical studies analyzing how a reduction of exchange rate volatility or the transition from a floating exchange rate regime to a fixed one (or the other way around) affected foreign trade.

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[1] The benefits and costs of currency union membership are presented concisely by Mongelli (2002, p. 33).

By the mid-1990s most studies, on either an aggregate or bilateral basis, were unable to find a significant relationship between the exchange rate and trade. Côté (1994) conducted a detailed review of the early literature, dating from 1988 to 1993, and demonstrated that the study results were quite heterogeneous. Despite this diversity of results, a considerable number of studies found a negative relationship between exchange rate volatility and the volume of trade, although this impact was relatively small. One of the more recent studies is, for example, the study by Baum and Caglayan (2007) which also suggested that the relationship between exchange-rate volatility and trade was fuzzy. Another interesting discovery of the study, which is considered an empirical novelty, is its finding that exchange rate volatility statistically significantly positively affects the volatility of bilateral trade flows. However, as will be demonstrated below, a distinction must be drawn between the impact of eliminating exchange rate volatility and the impact of introducing a common currency.

Later, Andrew K. Rose, an economist from the University of California, Berkeley, published a study in the Economic Policy in 2000 that analyzed the effect of currency unions on international trade and thereby opened a new chapter in international economics. As already mentioned, prior to A. K. Rose the impact of a currency union on trade was simply equated with the elimination of exchange rate volatility. Rose propagated the popular trade model, i.e. the 'gravity' model, which included a new variable of membership in a currency union (CU). This model presents trade between two economies as a function of their economic mass, distance and a series of other factors. Since this was the first attempt of its kind ever made, Rose is referred to as the pioneer of the study of the common currency effect on trade, which has often been termed the 'Rose effect'. Much to the astonishment of professional circles, Rose established that trade between currency union members triples compared to that of non-members, and that a common currency boosts trade by more than 200 percent. Contrary to most other studies, the study by Rose showed a strong negative effect of exchange rate volatility on trade and, as a novelty, a strong positive effect of a common currency on trade. In addition, Rose demonstrated there was no trade diversion or supply switching from non-members on account of the increased trade within the currency union, meaning that members trade more within the currency union and also with non-members (*trade creation*). This is a fascinating finding which will play a crucial role in the last part of this article.

Rose's common currency effect on trade was too big to persuade professional circles, which is why Rose repeatedly attracted strong criticism for producing incorrect results. The *main critiques* are roughly divided into three groups (Baldwin, 2006b, p. 13):

- missing variables (the variables which raise trade and are linked to the currency union variable spuriously increase its coefficient);
- inverse causality or endogeneity (traditionally large trade flows could serve as a criterion for currency union membership and not vice versa); and
- incorrect model specification (non-linearity of variables etc.).

Many critiques referred to the fact that in the study by Rose (2000) pairs of countries using a common currency were mostly combined from very small, poor and open countries. The countries in the currency unions were anything but average, i.e. they were not representative of a broader sample (Baldwin, 2006b, p. 15). Based on all the critiques it may be concluded that a common currency effect on trade exists and that it is larger than economists would have expected prior to the publication of Rose's first study. The

final size of the investigated effect, whatever it may be[2] (Baldwin (2006a, p. 36) informally concludes that it is about 30 percent), is not that relevant in the context of the euro or the EMU. As previously mentioned, the results obtained based on incomparable non-European currency unions cannot be applied to the EMU. Moreover, the research conducted prior to EMU data availability pointed out potential difficulties which should be considered when estimating the euro's effect on trade. It is important that in panel analyses the method of fixed effects (dummy variables for a country pair) is applied and, to some extent, potential non-linear effects of variables controlled for. In addition, it is desirable that the sample of countries is maximally homogeneous and that one-way trade flows (exports or imports) are used.

2.2   Empirical literature after formation of the EMU

After the euro was introduced in 1999 and when sufficient time series were available authors could start estimating its trade effect directly using EMU data. The timing of the euro was perfect for the literature addressing currency unions as the euro's introduction serves as a typical example for studying monetary links between developed countries. *Micco, Stein and Ordoñez (2003)* conducted the first important study which indicates the potential existence of the Rose effect within the EMU. The authors assessed the gravity model of bilateral trade, taking into account country-pair fixed effects and using annual data for the 1992-2002 period. Based on different regressions the authors estimated that the common currency effect on intra-EMU trade ranged between 4 and 16 percent. Like Rose (2000) they also established that there was no negative effect of trade diversion for non-member states. The results showed that the euro increased trade with members and non-members alike. Using a sample of developed countries, trade with non-members rose statistically significantly by 9 percent, whereas a smaller sample of the EU-25 showed a (statistically insignificant) increase of 1.2 percent. Even though the effect was not as strong as in the earlier studies of currency unions, it was still statistically and economically significant, thereby confirming the thesis that a currency union boosts trade.

Figure 1: The euro's effect on EMU members (in percent)
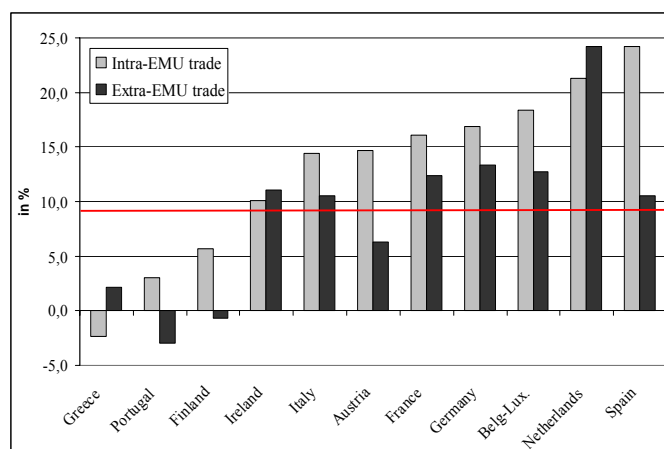
Source: Micco et al. (2003), table 8; own presentation.

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[2] Rose (2004) conducted a meta-analysis of 34 studies and the result was that a currency union increases trade by 30 to 90 percent.

Faruqee (2004) takes the study by Micco et al. (2003) one step further (2003). Besides the aggregate EMU effects he also assessed the effects by country and sought to find reasons behind the differences between countries. He estimated that on average the euro's introduction increased trade within the eurozone (intra-EMU) by 7 to 14 percent compared to the remaining trade with industrialized countries. As regards trade benefits gained by individual eurozone countries (see Figure 1), the most successful were Spain and the Netherlands and the least Finland and Portugal. According to Micco et al. (2003), the 'defeated' countries also included Greece (where the effect was even negative). Both studies established that, after the euro's introduction, trade with non-members increased the most in the Netherlands and Germany. It was again demonstrated that, along with the growth in intra-EMU trade, extra-EMU trade also grew (by 8 percent on average) relative to the trade of the remaining industrialized countries. Faruqee (2004) thus corroborated that there were no diversion effects as both 'intra' and 'extra' trade in the eurozone 'benefited from specific comparative advantages' (Faruqee, 2004, p. 10).

According to Baldwin, the study by *Flam and Nordström (2006a)*[3] is one of the best as it succeeds in avoiding most of the above criticisms applying to such studies. Baldwin (2006b, p. 38) established, for example, that they avoided the so-called 'logarithm' error typical of many studies by only using data on exports and not the average sum total of exports and imports. They focused only on exports instead of bilateral trade in its entirety and thus separated the euro effect on exports from members to non-members from the euro effect on exports from non-members to the eurozone. They used OECD-20 annual data for the 1989-2002 period (four years of the euro).

The analysis showed that the euro effect was already triggered in 1998 (the same was found by Micco et al., 2003) and kept rising until the end of the studied period. The authors explained this by the fact that it was already clear during 1998 that the euro currency would be launched on 1 January 1999; moreover, companies could hedge against foreign exchange risk in futures markets for the remaining part of 1998 (Flam & Nordström, 2006a, p. 10). They calculated that the introduction of the euro in the 1998-2002 period boosted trade between EMU countries by 15 percent on average compared to the previous period and the control group of countries. In addition,, independently of the common currency effect, they also established a negative effect of exchange rate volatility on trade. According to their estimates, a reduction in average exchange rate volatility by one standard deviation would increase trade by 1.5 percent.

This study also demonstrates the positive euro effect on trade with non-members. Exports from EMU members to non-members rose by 8 percent and in the opposite direction by 7.5 percent. When the sample was made more homogeneous, including only the EU-15, the above effects equaled 9.2, 0.8 and 7.3 percent, respectively, whereby the euro effect on exports from EMU members to non-members (0.8 percent) was no longer statistically significant. This greater volume of trade between EMU members as well as between members and non-members is explained using an idea from the study by Yi (2003), namely increased vertical specialization (production disintegration) between countries. Vertical specialization basically means that some products are manufactured up to various phases in different countries. Flam and Nordström (2006a, p. 16) claim that the introduction of a common currency (analogous to a reduction of tariffs) decreases the costs of cross-border trade and consequently also the

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[3] This study was already unofficially published in 2003.

costs of manufacturing such goods. As a result, products become cheaper and vertical specialization increases even further (those goods previously manufactured entirely in one country can switch over to vertical specialization), with both of them fuelling EMU trade.

The study by *de Nardis, De Santis and Vicarelli (2007b)* presented similar findings. The authors assessed the euro's effects on exports by individual sectors according to the International Standard Industrial Classification (ISIC) and established that the effect was not present in all sectors. The effects were positive and characteristic mainly of the manufacture of motor vehicles, electrical and optical equipment, the production of metals as well as the production of food, beverages and tobacco. The effect averaged out at between 4 percent (food, beverages and tobacco) and 16 percent (transport devices and vehicles). The following are typical of most sectors where the euro's effects were observed: growing returns to scale, imperfect competition and differentiation. The authors explain the positive effects in these sectors using Baldwin's *new good hypothesis* which states that the euro's introduction decreased the fixed costs of entering a new market (costs of exporting) and thus facilitated the penetration of new companies and arrival of new types of goods which were previously absent due to high costs of exporting (de Nardis et al., 2007b, p. 17).

Table 1 schematically summarizes the characteristics and key findings of the main studies addressing the euro's effect on trade. For each study the estimated size of the euro's effect on intra-EMU trade, the dependent variable, the used sample and its main characteristics are presented.

Table 1: Overview of the main studies of the euro's effect on trade

Study	Estimated effects	Dependent variable	Sample	Comment
Micco et al. (2003)	4–16 %	Real bilateral trade (Exp+Imp)	22 industrialized countries (EU15), 1992–2002	Positive effect on non-members (9 %)
Bun in Klaassen (2002)	4–38 %	Real bilateral export	EU15, Canada Japan, USA, 1965–2001	Dynamic model
de Nardis in Vicarelli (2003)	6 %	Real export	EMU countries + 19 other countries, 1980–2000	Dynamic model
Flam in Nordstrom (2006a)	15 %	Real export	20 OECD countries, 1989–2002	Positive effect on non-members (7,3-8 %); sectors
Flam in Nordstrom (2006b)	20–26 %	Real export	20 OECD countries, 1995–2005	Positive effect on non-members (9-13 %); sectors
Faruqee (2004)	7–14 %	Bilateral trade (Exp+Imp)	22 industrialized countries, 1992–2002	Positive effect on non-members (8 %)
de Souza (2002)	18,5 % (insignificant)	Bilateral trade	EU15, 1980–2001	Importance of trend

Study	Estimated effects	Dependent variable	Sample	Comment
Berger in Nitsch (2005)	15 % (1992–2003); 50 % (1948–03); No effect (with a trend control)	Bilateral trade	22 industrialized countries, 1948–2003	Importance of trend
De Sousa in Lochard (2004)	4–7 %	Bilateral trade	22 OECD countries, 1982–2002	Importance of FDI
Mancini in Pauwels (2006)	Significant break in trade 1999q1	Import in current prices	EU15, 1980q1–2004q4	No break for extra trade
Bun in Klaassen (2006)	18 % (1992–2002); 51 % (1967–02); 3 % (with a trend control)	Bilateral trade	19 industrialized countries, 1967–2002	Importance of trend
de Nardis et al. (2007a)	4–5 %	Real bilateral export	23 OECD countries, 1988–2003	Dynamic model
de Nardis et al. (2007b)	Effects on sectors (ISIC rev. 3) med 4–16 %.	Real bilateral export	23 OECD countries (EU13), 1988–2004	Dynamic model; sectors

3   Empirical analysis of the effect of formation of the EMU on Slovenia's (international) trade

The focus will now be on an important and interesting finding of the studies, namely that formation of the EMU also positively affected trade with countries outside the currency union. As regards the euro's effect on extra-EMU trade, Baldwin (2006b, pp. 60-61) argues in favor of the results of the study by Flam and Nordstrom (2006a) which were acquired from a sample consisting only of EU member states. According to him, the results stemming from large samples are 'inflated' due to the influence of the policies and/or reforms of the Single Market. The introduction of the euro and implementation of Single Market policies correlate positively and both increase trade, which means that they yield biased results. Baldwin recommends using only those country pairs where the rules of the Single Market are adhered to. The regressions using a sample with EU member states only show that the euro only positively affected intra-EMU exports (9 percent) and exports from non-members to members (7 percent). The reason lies in the fact that the euro was believed to reduce the fixed costs of entering EMU markets and thus increase the number of products exported to the eurozone by EMU members and non-members alike (i.e. *the new good hypothesis*) (Baldwin, 2006b, p. 74).

Does this mean that a country need not join the EMU to benefit from the euro? From the point of view of the optimal currency area theory this would mean that a country need not renounce its own monetary policy to benefit from a common currency. As the euro caused no diversion in trade, this also means that the benefits of including new countries in the EMU will not equal those of establishing the EMU. After the euro's introduction, new countries are assumed to have increased their exports to the EMU only to a limited extent (equaling the difference between the euro's effect on intra-EMU and extra-EMU trade; e.g. 9 percent - 7 percent) as the exports had already increased earlier. Introduction of the euro will primarily boost the new EMU members' imports (both from the rest of EMU members and from non-members; e.g. 9 percent + 7 percent) (Baldwin, 2006b, pp. 88-89).

The above gives rise to the question of what were the consequences of the 1999 introduction of the euro for Slovenia's (not a member of the EMU at the time) trade with the eurozone. Did Slovenia already

register an increase in its exports to the 12 eurozone countries? We shall analyze the indirect effects of the euro (i.e. formation of the EMU) on Slovenia's trade in the period before the euro was officially launched in Slovenia. Are we talking about positive spillover trade effects which fuelled imports from and exports to the EMU or did Slovenia perhaps feel (at least in the short run) the consequences of a potential trade diversion?

3.1   Overview of Slovenia's (international) trade flows

Figure 2 shows Slovenia's nominal goods exports and imports from 24 EU member states, divided into EMU members and EU member states which are EMU non-members. Raw quarterly data show that exports to and imports from the EU, with some short-term fluctuations, were on the rise and that trade with the EMU-12 is of great importance to Slovenia, accounting for over 80 percent of its total trade with the EU.

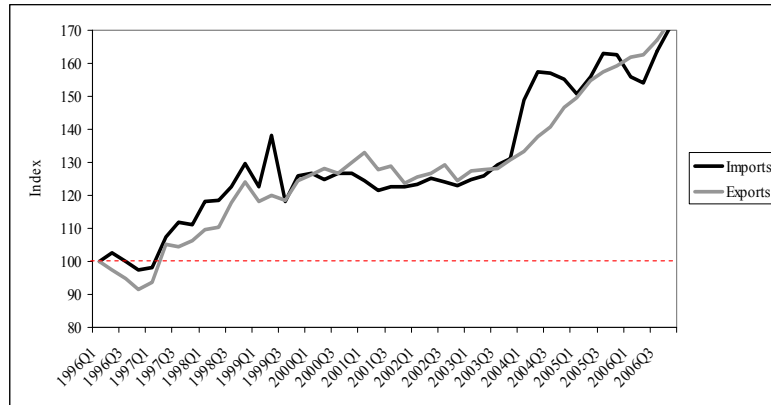Figure 2: Slovenia's nominal goods exports and imports to and from the EU-24, in EUR million
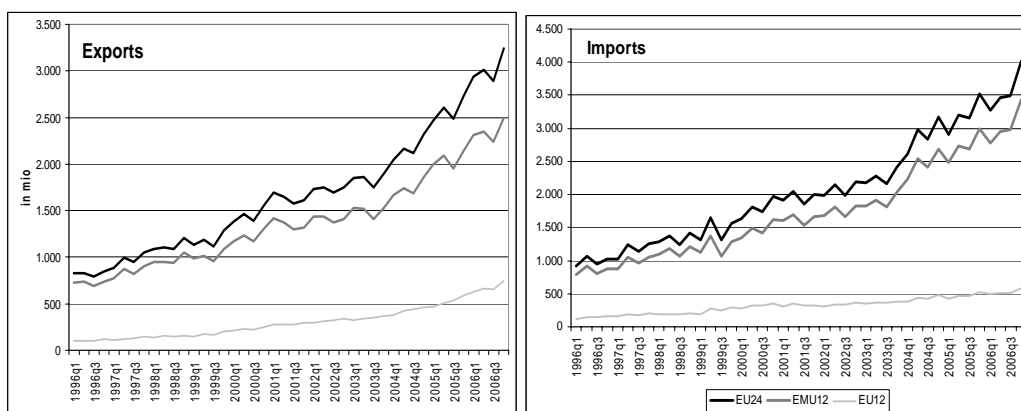
Source: SORS

Figure 3 is more valuable for further analysis as it shows movements in Slovenia's real goods exports and imports to and from the eurozone i.e. EMU-12 in the 1996q1-2006q4 period (index, 1996q1=100)[4]. It is evident that Slovenia's accession to the European Union (1 May 2004) accelerated trading with the EMU as expected. Moreover, a certain degree of volatility is noticeable in the second half of 1998 and in 1999. A fluctuation in the 1999 imports (and a leap in the first quarter of 2004) is distinctive along with a surge in exports in the last two quarters of 1998. In the period in-between, from 2000q1 to 2000q3 (until Slovenia joined the EU), a stagnation was recorded in exports and imports. Although the above observations overlap with the introduction of the euro, it cannot be claimed that these effects were caused by the euro without considering other factors affecting Slovenia's trade with the EMU.

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[4] Data are adjusted to the missing time series (only those series with at most two missing quarters were taken into account), deflationed and deseasoned.

Figure 3: Slovenia's real exports and imports to and from the eurozone (index 1996q1=100)

Source: SORS, own calculations.

Comparatively, Figure 4 shows movements in Slovenia's real goods exports and imports to and from the EU-12 countries which are not EMU members. In contrast to the previous figure, the volatility of trade at the time of forming the EMU is not the same. A surge in exports to the 'non-EMU' EU member states throughout the period under scrutiny is distinctive.

Figure 4: *Slovenia's real exports and imports to and from the rest of the EU-12 (index 1996q1=100)*
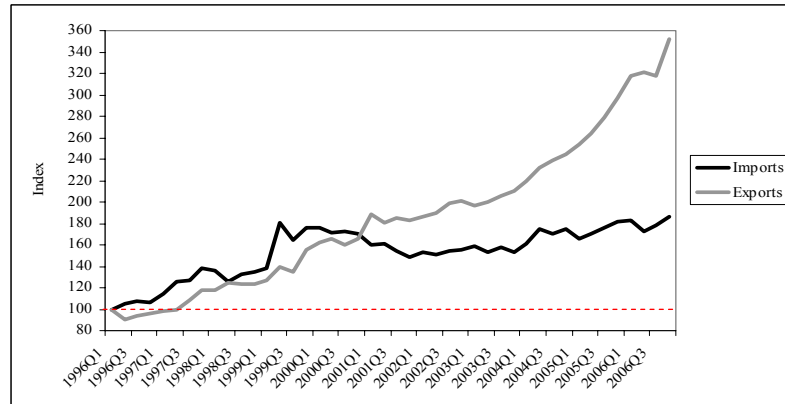
Source: SORS, own calculations.

Table 2 informatively shows the average quarterly growth rates of Slovenia's exports and imports with the intra-EMU and extra-EMU EU member states. The considered 1996q1-2006q4 period is divided into three sub-periods (1996q1-1999q4, 2000q1-2003q4 and 2004q1-2006q4), with the second sub-period representing the time after formation of the EMU and the third the time of EU accession.

Table 2: Average quarterly growth rates in Slovenia's exports and imports to and from the eurozone and the remaining EU members

Growth rate (in %)	Import from EMU	Import from EU12	Export to EMU	Export to EU12
1996q1-2006q4	1.06	1.04	1.17	2.96
1996q1-1999q4	2.04	3.55	2.00	3.26
2000q1-2003q4	0.13	-0.79	0.00	1.74
2004q1-2006q4	0.71	0.83	2.23	4.26
2000q1-2006q4	1.31	0.40	1.13	2.75

Source: SORS, own calculations.

3.2   Empirical methodology

Below follows a robust analysis of the time series of Slovenia's exports and imports to and from EMU members. Using the OLS method and quarterly data for the 1996q1-2006q4 period, the model of Slovenia's goods exports and imports with the eurozone was assessed. The variables are in logarithm form and therefore the regression coefficients represent constant elasticities.

With its small, open economy, Slovenia cannot influence the terms of its international trade. Imports are considered as import demand by Slovenian entities and exports are considered as export supply by Slovenian producers. In the available literature two main factors affecting imports are delineated, namely domestic economic activity and relative prices, whereas exports are influenced by foreign economic activity and relative prices (in export equations one can also find domestic activity which increases the supply of goods intended for export). Relative prices are presented as the ratio between the export (import) price index and domestic price index (or by applying the domestic exchange rate). Generally, the export and import function can be formulated as follows:

$EXP = f(Y(f), p(exp)/p(d))$; anticipated effect $[+, +]$ (1)

$IMP = f(Y(d), p(imp)/p(d))$; anticipated effect $[+, -]$ (2)

where EXP(IMP) is real goods exports (imports), *Y(d)* the income of domestic country, *Y(f)* the income of foreign region, *p(exp)* export prices, *p(imp)* the prices of imported products and *p(d)* the domestic prices of imperfect substitutes. We expect economic activity to positively affect trade in both cases. Theoretically, growth in export prices, relative to domestic prices, should increase export supply, whereas relative growth in import prices (foreign goods become relatively more expensive) should reduce import demand. Similar can be expected for the real effective exchange rate (appreciation positively affects imports and negatively exports).

First, Slovenia's quantitative (real) goods exports to the EMU-12 were estimated. The model has a double-logarithm form and conforms to the basic assumptions of the OLS method (multicollinearity, autocorrelation and homoscedasticity).

The estimated export function:

$$\ln(EXP_t) = b_1 + b_2 \ln(IMEZ_t) + b_3 \ln(CFSL)_{t-1} + b_4 \ln(XP)_{t-2} + D98q3 + D98q4 \qquad (3)$$

The applied explanatory variables of the export function are as follows: the import index of the 12 members of the eurozone (*IMEZ*, 1996q1=100) as an indicator of foreign demand, gross fixed capital formation by Slovenian producers which increase export supply (*CFSL*, in EUR million, prices in 1996q1), relative export prices (*XP*, the export price index relative to the consumer price index, 1996q1=100) and dummy variables for the third and fourth quarters of 1998 (the pre-euro period).

In the search for a statistically optimal import model, the double-logarithm function was assessed by using different explanatory variables (and their lags) for domestic economic activity and for relative prices. The best variables proved to be domestic consumption (DC) and the real effective exchange rate (REERT) of the Slovenian tolar vs. the EMU-12 (deflator: nominal labor costs by unit in manufacturing). The model takes a differential form[5] (first differences of the logarithm) and conforms to the basic assumptions of the OLS method (multicollinearity, autocorrelation and homoscedasticity).

The estimated import function:

$$\Delta \ln(IM_t) = \beta_1 \Delta \ln(DC_t) + \beta_2 \Delta \ln(REERT_t) + \beta_3 D99q1 + \beta_4 D04q1 + u_t \qquad (4)$$

The applied variables are as follows: dependent variable of Slovenia's real imports from the EMU-12 in EUR million (sign *IM*, fixed euro exchange rate (FEER), fixed prices 1996q1, deseasoned), explanatory variables of total domestic consumption (*DC*, fixed prices, reference year: 1995, in EUR million (FEER before 2007), deseasoned and adjusted to the number of working days) as well as the real effective exchange rate vs. the rest of the EMU-13 (*REERT*, 1999=100, deflator: nominal labor costs per unit in manufacturing). *D99q1* is a dummy time variable whose value in the first quarter of 1999 equals 1 and which overlaps with the time the euro currency was introduced in Europe. *D04q1* is a dummy variable for the first quarter of 2004 and overlaps with the period immediately before Slovenia joined the EU.

3.3 Empirical results

The estimated export function is as follows:

$$\ln(EXP_t) = -1,23 + 0,84 \ln(IMEZ_t) + 0,28 \ln(CFSL)_{t-1} + 0,42 \ln(XP)_{t-2} + 0,055 D98q3 + 0,10 D98q4$$

se:	(0.564)	(0.019)	(0.047)	(0.092)	(0.022)	(0.022)
t:	(-2.176)	(42.327)	(6.112)	(4.536)	(2.432)	(4.456)
p:	(0.036)	(0.000)	(0.000)	(0.001)	(0.020)	(0.001)

$n = 42$ (1996q3–2006q4) $R^2 = 0,981$ $d = 1,87$

The signs of the coefficients correspond to what was expected and are statistically significant. Based on the sample data we estimate that the included explanatory variables very well explain the movements in the (logarithm of) exports since no less than 98 percent of the variance of the dependent variable is explained (without dummy variables, the percentage is 96.9). Growth of 1 percent in import demand of

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[5] The reason for using first differences lies in the elimination of AR(1) and in non-stationarity.

the eurozone ('*IMEZ*') increases Slovenia's exports on average by 0.84 of a percent, with everything else being equal. Growth of 1 percent in Slovenian gross fixed capital formation, with a 3 month lag on average, increases exports by 0.3 of a percent ('ceteris paribus'), whereas 1 percent growth in relative export prices increases exports after 6 months by 0.42 of a percent. The dummy variables for the last two quarters of 1998 were statistically significant, thus indicating that this was potentially a consequence of the euro's expected introduction on 1 January 1999. Namely, in the third quarter of 1998 exports were 5.6 percent higher than the average of the studied period, whereas in the last quarter they were 10.6 percent higher. Figure 5 shows the actual (ln(EXP)) and the estimated values.

The results show that only a short-term positive effect on Slovenia's exports can be observed in the period immediately preceding the euro's introduction. The size of the effect complies with the estimates made in the discussed studies, showing that on average the euro increased the EMU non-members' exports to the eurozone by 7 to 13 percent.

The estimated import function is as follows:

$$\Delta \ln(IMP_t) = 1.367 \, \Delta \ln(DC_t) + 0.687 \, \Delta \ln(REERT_t) - 0.0638 \, D99q1 + 0.1064 \, D04q1$$

se:	(0.144)	(0.409)	(0.025)	(0.025)
t:	(9.457)	(1.681)	(-2.509)	(4.244)
p:	(0.000)	(0.101)	(0.016)	(0.001)

n = 43 (1996q2–2006q4) R^2 = 0.76 d = 1.71

The signs of the coefficients of domestic consumption and the exchange rate correspond to the expectations and are statistically significant (at 10 percent, the exchange rate is borderline-significant). Based on the sample data we estimate that the explanatory variables included very well explain the movements in imports as no less than 76 percent of the variance of the dependent variable is explained (without dummy variables, the percentage is 60.4). If domestic consumption increases by 1 percent, the real volume of Slovenian imports from the EMU rises on average by 1.37 percent, with all other things being equal. A 1 percent exchange rate appreciation increases imports by 0.7 percent on average ('ceteris paribus').

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Figure 5: Actual and estimated values of Slovenia's exports to the eurozone
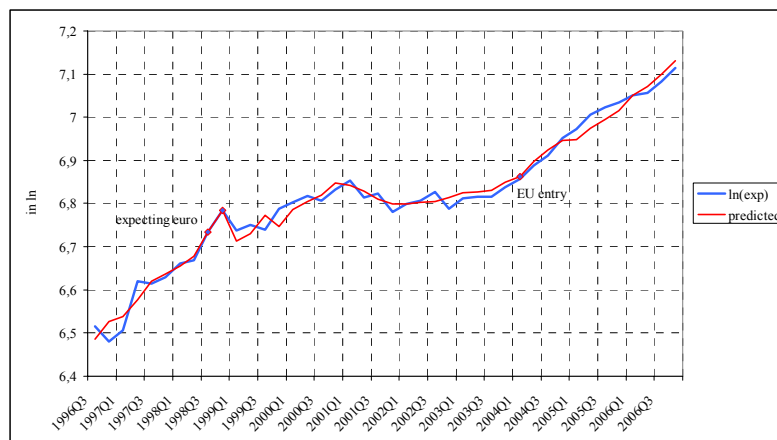
Source: Own calculations.

The basic finding we were searching for is hidden in the dummy variable of the euro's introduction (*D99q1*). It turns out that, in the first quarter of 1999, Slovenia's imports from the eurozone recorded a one-off 6.6 percent drop (exp(0.0638)-1), whereas the envisaged entry to the EU increased exports in the short-term by 11.2 percent and this cannot be explained by economic activity or exchange rate fluctuations. Figure 6 shows the actual values of imports (differences of the logarithm of imports (*dim*)) and their estimates based on regression. The considerable volatility of imports is clearly seen until the beginning of 2000, particularly in 1999. We presume that the surge in imports in the second quarter and the plunge in the third quarter of 1999 were due to the introduction of value-added tax in Slovenia on 1 July 1999 (the beginning of the third quarter); however, this movement is well explained by the model applied (domestic consumption and exchange rate).

Figure 6: Actual and estimated values of the function of Slovenia's imports from the eurozone

Source: Own calculations.

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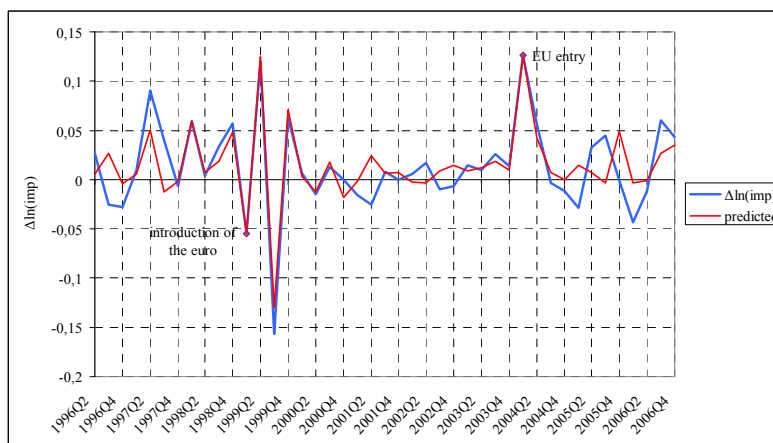
The results lead us to conclude that there were no positive 'spillover' effects of the euro's introduction in the EMU on Slovenia's imports and this was to some extent expected given that the studies by Flam and Nordström (2006a) and Flam and Nordström (2006b) (using a more homogeneous sample of countries) demonstrated that the euro did not affect exports from EMU members to non-members (analogous to Slovenian imports from EU members). If there is any influence at all, it is negative and very short-term (in 1999q1). A panel approach would be required to assess any long-term effects as the time analysis alone cannot separate these effects from other factors such as, for example, a country's accession to the EU.

4   Conclusion

This article offers a broad overview of the main findings of the available literature which addresses the effect of the common currency (euro) on trade. As indicated by studies of the effects of currency unions on international trade, the effect of forming a currency union is relatively strong (about 30 percent), considering that the transaction costs of the currency switch and hedging in futures markets are low. Moreover, many empirical studies established a small or even a zero effect of exchange rate uncertainty on trade. This proves that the traditional effect of eliminating exchange rate volatility must be dealt with separately from the currency union effect on trade. The latter is seen as involving structural changes in the expectations of markets since a common currency is the most durable i.e. an irrevocable fixed exchange rate regime. According to the previous studies, the effect of the euro is not considerable. One of the reasons for this is that the euro's introduction represents one of the last phases in the long lasting process of European integration and thus cannot radically influence the volume of trade between countries.

Based on a thorough consideration of studies conducted in the last decade, which analyzed the relationship between the European common currency, i.e. the euro, and trade between the countries, we arrived at some interesting findings. A conclusion may be that the euro's introduction did positively affect trade within the eurozone given that intra-EMU trade rose by 10 to 15 percent on average. The effect on trade occurred very quickly, already in 1999 (according to some studies even a year before) and was supposed to grow gradually. This increase in intra-EMU trade was not at the expense of a smaller volume of trade with the non-members. Those countries which switched to the euro currency became generally more open to international trade and thus strengthened their trading also with countries outside the eurozone. Trade with non-members rose by 8 percent on average. This increase was considered to include mainly non-members' exports to the EMU as the results of studies dealing with EMU members' exports to third countries are quite mixed, depending more on the particular sample used.

The finding that the euro should also increase trade with EMU non-members (non-members' exports to the EMU) was verified for the case of Slovenia which was still not a member at that time. Employing an econometric analysis, we looked for the consequences of the euro's introduction in 1999 on Slovenia's trade with the eurozone. A short-term negative effect on Slovenia's imports from the eurozone was observed in the first three months after the euro's introduction (a 6.6 percent drop in imports) as well as a positive effect on Slovenia's exports to the eurozone in the last two quarters prior to the euro's

introduction. In the third quarter of 1998, exports were 5.6 percent higher than the average of the studied period, whereas in the last quarter they were 10.6 percent higher. Otherwise, no durable positive euro effects on Slovenia's trade were observed as in the years following the euro's introduction (up until Slovenia joined the EU) imports and exports were more or less constant. If the reason for all of the above is the euro's introduction and/or formation of the EMU, then Slovenia (and probably other prospective EMU members) can primarily expect from the euro's introduction a surge in its imports from the eurozone and only a minimum rise in exports.

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