Should the Macedonian denar be devaluated? Some evidence from the trade.

Branimir Jovanovic, MSc
Research Department
National Bank of the Republic of Macedonia
Kompleks Banki BB, 1000
Skopje, Macedonia
E-mail: jovanovicb@nbrm.gov.mk

Abstract: Recently some reminded us of the panacea for the Macedonian economy - the devaluation of the denar. We feel that the public deserves an explanation - why could the devaluation help the economy, and why it wouldn't help the Macedonian economy at the present moment. In theory, devaluation makes domestic products cheaper and foreign products more expensive, so it could stimulate exports and de-stimulate imports, improving the current account. In practice, however, Macedonian exports appear not to be dependent on the exchange rate, while the imports appear to depend only very little. Thus, devaluating the denar is likely to have no major effect on the current account, while the costs, in terms of the loss of confidence in the national currency, will be very high.

Key words: devaluation, exchange rate, current account, trade, exports, imports, denar, Macedonia.

Biographical note: Branimir Jovanovic is a Junior Analyst at the Research Department of the National Bank of the Republic of Macedonia. He obtained his MSc from the Staffordshire University, Stoke-on-Trent, UK and won the 2007 Annual Award for Best Young Macroeconomic Researcher from the National Bank of the Republic of Macedonia. Jovanovic has done research on exchange rates, house prices, modelling the Macedonian economy and forecasting inflation and GDP. His research fileds include economic modelling and forecasting and applied economics and econometrics.

1. Introduction

Lately, we, in Macedonia, could hear and read about devaluation almost every day. Two of the most influential daily newspapers in Macedonia, Dnevnik and Utrinski vesnik, have been elaborating the issue quiet extensively in the last 6 months (July 2008-January 2009). For instance, Dnevnik has had 15 stories mentioning devaluation in the period, which means than they have written about it more than once in a fortnight. It's even worse if you read Utrinski vesnik - there are around 100 articles containing 'devaluation' and 'denar' in the last 6 months, and once even the front page was about it. Not to mention the TV programs, which we cannot count.

It is easy to understand why journalists are so concerned about devaluation - they are always after bombastic stories, and not many stories sell better than this one, especially if memories from past devaluations are fresh. As for who stands behind these stories - it's simple, again - there are always small groups of people who can make profit from such an action. One additional factor contributes greatly to the recent ubiquity of these stories in Macedonia: politics. Issue like this is very suitable for attacking your political opponents. But that's out of the scope of this paper.

Of course, as economists, we shouldn't care a lot about such cheap talks. But, what's more worrisome than journalists writing about devaluation, is that this thesis is becoming more and more popular even among academics. The number of economists, who are supporting this thesis, at least judging from their statements in the media, is growing. And they all present the same argument – the high and worsening trade deficit and the declining foreign exchange reserves.

We strongly disagree with them. We disagree with the thesis that the high and worsening trade deficit is a sufficient condition for devaluation. For the devaluation to be a viable action at the current setting in Macedonia one additional condition must be met, and that is - it has to be able to improve the trade balance. As we will show, this is not likely to be the case: the exchange rate does not seem to influence the trade. Thus, devaluating the denar will have no significant effect on the trade, while it will have disastrous effects on the economy, through the loss of confidence in the national currency.

To be clear – we are not saying that the fact that the exchange rate is not affecting the trade is itself sufficient argument against devaluation. The question of the right parity of a currency is very complex and the case for or against devaluation should be made only on the grounds of the relation between the actual and the equilibrium exchange rate.

The structure of this paper is as follows: in the next section we briefly explain some basic concepts - nominal and real exchange rate, the case for devaluation, and the conditions for it to be successful. Then we present

short literature review on the issue, including the literature that exists for Macedonia. We then estimate export and import equations for Macedonia, using the OLS method, we examine the robustness of the results, as well as their stability, and investigate whether cointegration methods give different results. In the penultimate section we discuss our findings, we investigate why they differ from some previous studies and we present the contributions of the individual factors to the total exports and imports growth. In the final section we conclude.

2. Devaluation and the case for it

The price of a national currency is called **nominal exchange rate**. Similarly to other prices, the nominal exchange rate is determined by demand and supply conditions - if the demand for the Macedonian denar increases, its price will tend to go up, i.e. the denar will appreciate. Being a form of money, a currency can be demanded either for transaction purposes, i.e. for paying for goods and services, or for store of value purposes. If exports of Macedonian goods increase, in order to pay for those goods, the demand for denars will increase, and the denar will appreciate. However, if people think that a currency will depreciate in the future, they will switch their holdings away from that currency to some other, which will decrease the demand and will lead to depreciation.

The above described mechanism works for currencies with **flexible exchange rate** regime, when the country lets the market determine the price of the currency, for instance the US dollar. If the **exchange rate is fixed**, as is the case in Macedonia, the price of the currency cannot change – the monetary authority provides the amount of currency, either national or foreign, that is demanded at the set exchange rate. If the demand for Euros (relative to denars) is increased, the central bank will have to sell Euros out of its foreign reserves, in order to meet the demand for them, so the value of the denar will not change. However, with a high demand for Euros for a longer period of time, the central bank might sell its reserves[1], and then it will have either to make the currency float freely, or to devaluate it.

As was mentioned above, the demand for Euros (relative to denars) might increase basically for two reasons - if assets, both goods and financial assets, as well as services, that are paid by in Euros are purchased more than assets and services paid by in denars, and if people start using Euros, instead of denars, to store value. Right now in Macedonia, due to the worsened net exports, i.e. increased imports and decrease exports, the demand for denars, relative to Euros, is decreased. This generates pressure on the foreign reserves, and if this situation continues for a longer period of time, the central bank might eventually be forced to devaluate the currency. In order to avoid losing reserves, authorities might devaluate the currency, which should improve the trade balance. This is the case for devaluation.

Let's turn to the **real exchange rate.** The nominal exchange rate, adjusted for inflation differentials between the countries, gives the real exchange rate. For instance, since the denar is pegged to the euro, with inflation in Macedonia in 2008 8% and in the Eurozone 3%, the real amount of products you can buy with the denar in Macedonia in 2008 is 5% less than the amount you can buy with the euro in the Eurozone, compared to the previous year. Therefore, the real exchange rate is not a measure of the value of the domestic currency, but a measure of the price level at home, relative to abroad. Thus, if the inflation at home is higher than abroad, this makes domestic products more expensive, i.e. the real exchange rate appreciates. If the relative price of Macedonian products is higher, the demand for them falls. So, the exchange rate determines the price competitiveness of the domestic products, and, consequently, affects both imports and exports. It is important to note that it is the **real** exchange rate, and not the **nominal,** that affects trade; nominal exchange rate affects trade only indirectly, through the real exchange rate.

So, the arguments for devaluating the denar lie in the worsened net-exports. To improve net-exports, the authorities might devaluate the currency. This will make domestic products cheaper, and foreign products more expensive, people will buy more Macedonian products, and net-exports will improve. However, whether this will happen depends on two conditions: how will the real exchange rate react to a given change in the nominal exchange rate, and how will imports and exports react to a change in the real exchange rate.

Regarding the first condition, how much a given change in the nominal exchange rate will affect the real exchange rate depends on the exchange rate pass-through, i.e. how domestic prices will react. Nominal depreciation makes imported products more expensive; if final prices of domestic goods depend a lot on the prices of the imported intermediate products, then the real exchange rate will not change much. Studies on the exchange rate pass-through for Macedonia have indicated fairly strong reaction of consumer prices to changes in the nominal exchange rate. Besimi et al (2006) found that unitary increase in the exchange rate increases prices by 0.4%; Vrboska (2006) finds that the exchange rate pass-through varies between 0.46 and 0.17, depending on the horizon, while Krstevska et al (2004) reports a lower pass-through (0.10). This means that nominal depreciation of, say, 10% will lead to inflation of around 4% (according to Besimi et al, 2006), with real depreciation of around 6%. In other words, given nominal depreciation, which is what authorities can directly achieve, will produce not as high real depreciation, plus some inflation, which is one argument against devaluation.

The second condition - how will exports and imports react to a given change in the real exchange rate, is the main objective of this paper. We emphasize that the primary aim of the analysis is not to estimate trade elasticities in the conventional manner. Trade elasticities show how much exports and imports **volumes** react to changes in income and prices. We want to investigate the factors that drove exports and imports dynamics

in the previous 12 years, and, in particular, to examine whether the exchange rate has been one of them. Thus, we are more interested into exports and imports **values** (we'll return to this later). So, let's begin.

3. Literature review

Vast literature exists on econometric modeling of exports and imports, which makes this task almost easy (Some of the studies include Houthakker and Magee, 1969, Goldstein and Khan, 1978, 1982 and 1985, Dornbusch, 1985, Krugman, 1989, Holly and Wade, 1991, Riedel, 1984 and 1988, Muscatelli et al., 1990). Regarding **exports**, two general approaches can be identified in the literature. The first one models exports as a function of the **demand** (see Houthakker and Magee, 1969) assuming that supply can meet whatever quantity is demanded. However, this assumption has been questioned by Goldstein and Khan (1978), amongst others, who argued that **supply** conditions are as much important, especially for small countries, who can affect neither the price nor the demand for their exports. Consequently, significant differences can be observed in the estimated trade elasticities. Most of the early studies, that neglected supply-side factors, found high income elasticities of exports and low price elasticities, which would mean that export performance for a small country is exogenously determined, i.e. depends on how well the rest of the world is doing, implying little scope for action. However, studies taking into consideration supply side factors generally find that supply conditions, i.e. production capacity, is an important determinant of exports. They do, however, differ regarding the importance of the demand factors, some arguing that demand is not important, and some arguing that it is[2].

Regarding **imports**, things have been nowhere near as complicated - almost all studies model imports as a demand function, i.e. depending on price and income. Studies might differ with regards to the variables used, but the essence is the same.

Several studies have so far investigated **Macedonian exports and imports** - Jovanovic (2007), Kadievska-Vojnovic and Unevska (2007) and Petreski and Jovanovic (2009). Strangely or not, their findings regarding the trade elasticities differ substantially, as can be seen from table 1.

Table 1 here

However surprising these differences are, it is easy to understand them - they are a consequence of the different data sources used (International financial statistics or the State statistical office of Macedonia), the different ways the variables have been constructed (trade weighted GDP of biggest trading partners or GDP of EU-15, real exchange rate or export and import prices) and the different specifications of the equations (some equations include additional variables, too). Nevertheless, these differences, together with the

differences found in the literature and mentioned above, point out to the care with which one should approach the estimation of trade equations.

4. Empirical investigation

4.1. Data and variables

Data and variables used can affect the quality of the research to a great extent, especially for countries like Macedonia, with short time series, sometimes with questionable quality, and often subject to major revisions. When modeling trade, it is common to model volumes and prices separately, i.e. trade equations usually explain trade volumes, not values, as a function of income and price. However, in the Macedonian case no official data exist for export and import volumes or prices after 2005-Q4, which leaves us with two options - we can either try to compile export and import volumes and prices ourselves, or we can use export and import values, instead. We opted for the second alternative, for two reasons. First, we believe that everybody should do what they can do best, and we don't think we are very experienced at data compiling. Second, we don't believe that working with values, instead of volumes, will affect the results greatly, at least for our purpose. Of course, the coefficients of the independent variables in the regressions will differ, but it is highly unlikely that the significance will differ. Also, we doubt that there will be difference when we interpret the variables in terms of their contribution to the growth in the exports and the imports. Therefore, the dependent variables in our equations are the nominal exports and imports (source: State statistical office of Macedonia, SSOM). The price variable used is the real effective exchange rate, compiled by the National Bank of the Republic of Macedonia, defined in such a way that increase stands for a real appreciation. The foreign demand is a trade weighted real GDP of 6 major trading partners - Belgium, Germany, Greece, Spain, Italy and Netherlands, with weights being normalized shares in total exports in 2006 (this is the series that the National Bank uses as the foreign demand in its analyses). Domestic GDP is in real terms, from the SSOM, as well as the industrial production, metals prices are from the IMF Primary commodity prices database (commodity metals price index), divided by the denar/dollar nominal exchange rate, to eliminate the effect of the depreciation of the dollar, while domestic private consumption and investment are in nominal terms (again, no official data on real consumption and investment exists for Macedonia) and for the period prior to 2005, when no official quarterly data exist, are calculated from the annual data, using the Chow-Lin method for interpolation.

Thus, in the final imports regression all the variables are in nominal terms, while in the exports only the exports are nominal. All the series are seasonally-adjusted, except the real exchange rate and the metals prices (we don't expect seasonality in these). The variables enter the models in their logarithmic form, meaning that

their coefficients represent the respective elasticities, i.e. that they give the percentage growth in the dependent variable due to a one percent change in the independent variables.

4.2. Estimation method

In the quest for the correct exports and imports models we use the **Ordinary Least Squares (OLS) method.** The OLS method is suitable for series that are stationary, while its use for non-stationary (trended) series may give spurious results. Intuitively, the explanation is that when we work with non-stationary data, the presence of a trend in the both series can make them appear correlated when they really are not. Therefore, in order to be able to trust the OLS method, we will have to make sure that our series are stationary. However, as can be seen from the stationarity tests reported in the Appendix, all our series are integrated of order 1, i.e. non-stationary.

Natural choice when working with non-stationary data is to use a **cointegration technique**. Cointegration techniques investigate whether exists there a cointegration between non-stationary series, i.e. whether two trended series move together over time. For instance, if consumption and income are cointegrated, that means that there exists some equilibrium long-run relationship between them. Do note that cointegration implies a relationship between series **in the long-run** (say for a period of at least 20 years), which means that in the short run the series might not move together. This has two further implications. First, the dynamics of a series is determined both by its long-run relationship with some factors and by its short time relationship with some possibly different factors, i.e. the factors that drive consumption in the long-run may differ from the factors that drive it in the short-run. Nevertheless, series in the long-run will tend to their equilibrium relationship, i.e. every short-run departure from the equilibrium state is short-lived and will be corrected soon. This will be done by the error-correction mechanism, which is one of the factors that drive consumption in the short run[3]. The second implication, very important in our case, is that existence of cointegration assumes long enough time span. Therefore, even though it would be natural to use a cointegration technique in our case due to the non-stationary series, the short time span of 12 years makes the use of cointegration problematic.

Thus, neither the traditional OLS method, nor cointegration techniques, is completely appropriate. What is commonly done in cases like this is to use them both and to compare the results - if they do not differ greatly, we could consider them to be the true relationship. This is what we do. We use two alternative cointegration methods - the Johansen VECM technique, and the ARDL method**. The Johansen vector error correction method (VECM)** is very commonly used nowadays and is based on a vector auto regression analysis, which treats all variables as both dependent and explanatory, and thus, it reduces simultaneity issues (Johansen, 1988, 1991, 1992). Unfortunately, it is a long-sample technique, i.e. it requires long sample in order to

produce reliable results. **The auto regressive distributed lag method (ARDL)** is based on the OLS method, it just adds dynamics and separates long-run from short-run relationships, and is believed to have strong short sample properties (Pesaran and Pesaran, 1997, Pesaran and Shin, 1997, Pesaran et al, 2001).

So, we will base our story for the exports and imports determinants on the OLS method, mostly because of clarity and simplicity, but also due to our personal belief that in short samples the OLS should be preferred to the more sophisticated cointegration techniques. As we will see later, the OLS and the cointegration results will not differ at all.

4.3. Exports

We began our exports equation modeling in the conventional manner - we estimated a regression with only the **real effective exchange rate (REER) and the foreign demand** as explanatory variables. A priori, we would expect a positive sign on the demand and negative on the REER (appreciation would decrease exports). This is exactly what we obtain (Table 2, column 1) - positive, high and significant coefficient of the foreign demand (2.5) and negative and borderline significant coefficient of the exchange rate (-0.76). If we could accept these results, they would support the thesis that Macedonian exports are exogenously determined, i.e. that the export growth is due to the favorable demand conditions, and that exchange rate plays little role, if any.

However, we cannot accept them, as the residuals of the regression are clearly not satisfactory (the residuals plots of all the regressions are given in the Appendix), as well as the fit (72%), and we proceed forward. In attempt to improve the specification, we try adding some variables. The first variable we include is the **metals prices.** The inspiration for including this variable comes from the observation that metals exports experienced rapid growth since 2004. For illustration, 76% of the growth in exports in 2008 comes from the metals, and metals accounted for 40% of exports in 2008 and 30% in 2007. Arguably, what caused this expansion is not the increased world demand for metals, but the increased domestic production of metals, due to the high metal prices. No doubt, the main reason for the rapid growth of metals prices is the increased world demand (though, according to the commodity bubble hypothesis increased world liquidity and speculation might have also played a role), but if world supply increased enough to meet this increased demand and prices didn't change that much, exports would not grow that much.

Anyway, one caveat with the inclusion of the metals prices is that they might incorporate some other effects, too. They might capture some effect of the foreign demand - arguably, the increase in the world demand for metals is not well captured by our demand variable, which constitutes solely of European countries, whereas the demand for metals has been generated by some other countries, e.g. P.R. China. Furthermore, recall, our

exports variable is not in real terms, but in nominal. Thus, the rising metals prices will affect the exports not just through the increase in the volume of exports, but also through the higher export prices. So, it would be impossible to disentangle between the price and the volume effect of the metals prices, although this is not a major concern in our case.

The results change dramatically with this specification (Table 2, column 2). The coefficient of the demand drops by nearly a half (1.4), suggesting both that some of the effect of the foreign demand might now be captured by the metals prices and that some of the effect of the metal prices previously might have been captured by the foreign demand. Metals prices appear with a fairly high coefficient (0.33), indicating high elasticity of export with respect to them. Both coefficients are significant at the 1% level. However, the exchange rate is now not only insignificant, but with a wrong sign, too. The fit of the regression improves substantially (86%), indicating higher explanatory power. The residuals, however, fail to improve, we dismiss this specification and we go on.

The bad residuals of the two specifications should not surprise us, since it has been acknowledged in the literature that the export performance of small countries depends to a large extent on how much they produce, i.e. on their production capacity, since, facing a given demand for their exports, they can sell almost anything they can produce. So, we continue our pursuit for the right specification by including a variable for the production capacity - **industrial production.** The industrial production itself might not be the best proxy for the production capacity, since it depends to a great extent on the capacity utilization. However, the fact that the capacity utilization in Macedonia is fairly stable (around 63%[4]) gives credit to the use of the industrial production for this purpose.

We arrive at a satisfactory specification (Table 2, column 3). For the first time we obtain satisfactory residuals[5]. The fit, too, improves and becomes 94%. As for the coefficients, the foreign demand coefficient restores some of its magnitude (2.1), indicating **fairly high income elasticity of exports.** The metal prices coefficient drops by more than a half (0.13), suggesting that the high coefficient from the previous specification has been spurious, but that **metals prices do affect the exports.** The industrial production appears with relatively high coefficient of 1.4, saying that indeed **the exports expansion has been partly due to the increased domestic production.** All these variables are highly significant. Unlike them, the exchange rate is insignificant, once again, saying that **exports indeed have not depended on the exchange rate.** However, the sign is correct.

Despite the good results, some ambiguities remain. First, we could see that the foreign demand coefficient varied greatly in all the three specifications (1.4, 2.1 and 2.5). Although the high coefficient of the first specification was due to the omission of metals prices, while the low coefficient of the second specification

was due to metals taking some effect of the demand, it would be interesting to see how robust these findings are. Second, metals prices are likely to be highly correlated with the production capacity, too - higher prices induce higher investment, and thus metal prices can incorporate some of the effects of the industrial production. To explore these two issues, we see what happens with the regression results when we exclude the metals prices (Table 2, column 4). We observe that the coefficient of the industrial production changes slightly (from 1.4 to 1.8), as well as the coefficient of the demand (from 2.1 to 2.6). At the same time, the regression fit changes only marginally (from 94% to 93%). The small change in the explanatory power would suggest that metal prices exert only small effect in addition to the previously included variables, and the small change in the industrial production and foreign demand coefficient should be interpreted as evidence that metal prices, at worst, might capture only small part of their effect.

Table 2 here

4.4. Imports

The initial specification of the imports equation explains imports as a function of **domestic GDP and the real effective exchange rate.** We obtain (Table 3, column 1) high and significant GDP coefficient (3.1) and wrongly signed, low and insignificant exchange rate coefficient (-0.2; we would expect positive coefficient, since appreciation should stimulate imports). If we could accept this specification, it would tell us that imports are driven solely by the GDP, with very high response, and that exchange rate does not affect them. Though the fit of the regression is good (93%), we dismiss these results due to the unsatisfactory residuals.

We try to improve the initial model in a manner similar to Petreski and Jovanovic (2009). Namely, instead of investigating how aggregate domestic activity affects imports, we inspect how separate components of the GDP affect it. Thus, we start by substituting our previous income variable, the GDP with **private consumption**, the rationale behind being the fact that major part of the imports consists of goods that consumed in Macedonia. The results of this model (Table 3, column 2) seem even worse - the residuals fail to improve and the fit lowers to 90%, so we proceed further.

As big part of Macedonian imports consists of intermediary goods, which are processed and then exported, we add **exports** to the specification. The results improve significantly - the residuals now seem not to suffer from serial correlation, non-normality and heteroskedasticity, and the fit jumps to 96% (Table 3, column 3). The coefficient of the consumption drops to 0.7, suggesting moderate response of imports to consumption growth and exports get a coefficient of 0.6. The exchange rate appears with an insignificant coefficient, and low, too (0.1).

Finally, we add **gross investments** to this specification, in order to see whether increase in imports can be explained by intensified investment activity (Table 3, column 4). The residuals seem fine, again, and all the coefficients, including the exchange rate, are significant and with the expected signs. Gross investment has a coefficient of 0.25, saying that part of the imports is due to the investment activity, especially in the last 4 quarters, which is evidenced by the significantly lower residuals for this period in the specification with the investments. The inclusion of the investments lowers all the other coefficients, but only slightly. The exchange rate gets a significant and correctly signed coefficient of 0.33, implying that imports do react to exchange rate changes, but only slightly. The fit improves further, and reaches 98%.

Before we conclude the imports equation, we explore one more issue. Similarly to exports, imports might also be affected by oil and metals prices, since imports are in nominal terms and oil and metals constitute big part of them. Thus, we investigate whether including oil and metals prices changes the results in any way (Table 3, column 5 and 6). Both the oil and metals prices coefficients appear insignificant and no other coefficient changes significantly. This is not strange - since all the variables in this imports equation are in nominal terms the effect of the oil and metals prices is already incorporated. For comparison, the foreign demand variable in the exports equation was in real terms.

Table 3 here

So, our analysis here confirms the findings of Petreski and Jovanovic (2009) about, in our opinion, the appropriate way of modeling Macedonian imports - as a function of the separate GDP components. They show that **imports are most elastic to the growth in consumption, but that exports contribute to the imports growth considerably, as well as the investments.** The low and significant exchange rate coefficient indicates that **imports do depend on the real the exchange rate, but that big changes in the exchange rate are required in order to affect the imports**. We consider this finding plausible, given the small size of the Macedonian economy and the high level of dependence of imports.

4.5. Further investigation

In order to see whether the just described relationships really hold, we investigate their **robustness.** We start by investigating whether the sample selection affects the results, i.e. whether our findings are affected by changes in the sample. First we exclude the first 4 quarters, then we exclude the last 4 quarters, and finally we exclude them both (see last three columns of Table 2 and 3). Though it is obvious that some of the coefficients change a little, nothing changes dramatically.

We also inspect the **stability of the parameters** (see Appendix). For this purpose we use the CUSUM test, the CUSUM squares test, the Chow breakpoint test and the Chow forecasting test (for the latter two we set

the breakpoint date at the middle of the sample - 2002Q4). Some evidence exists for parameter instability (the Chow breakpoint test), but the overwhelming evidence favors the thesis that there is no structural break in the exports and imports regression.

We next turn to the robustness of the results to the **estimation method**, i.e. we investigate whether the Johansen and the ARDL method give different results for our final exports and imports models. To conserve space, we don't explain the whole process, or the details.[6] With the Johansen technique, we set the order of the VAR to 1 for the both models, as all the information criteria suggested so. We then test for cointegration and determine the presence of deterministic components according to the Pantula principle. In the both cases we have 1 cointegrating vector, option 3 for the exports (constant in the long-run equation and no trends), option 2 for the imports (constant in the short-run equation and no trends); the decision was not clear-cut for the exports. Finally, we obtain the cointegrating relationship.

As for the ARDL method, we set the maximum number of lags in the ARDL to 1, due to the good residuals with 1 lag, and because we don't expect higher inertia. We then tested for cointegration, and although the test results were not unanimous, we proceed as if we had cointegration.

The results obtained with the cointegration methods are presented in Table 4, for the exports, and Table 5, for the imports (the acronyms next to the ARDL refer to the criterion on which the choice of the lags is done). The similarity of the coefficients is striking. The only major difference for the exports is the higher foreign demand and the lower industrial production coefficient in the Johansen specification. The REER is insignificant everywhere. The imports coefficients are even more similar. Another thing worth mentioning is the relatively high ECM coefficients, which imply very high restoration of the equilibrium, for less than half a year. This might seem too quick, but actually tells us that no big deviations from the equilibrium states have existed in the exports and imports relationships. Thus, our cointegration results confirm our previous findings.

Table 4 and 5 here

4.6. Discussion

Probably the story of the Macedonian exports and imports would be best illustrated by showing the relative merit of the individual factors for the exports and imports dynamics[7]. This is done in Figure 1 and 2. The dashed lines show the total annual growth, in percents, while the bars show how much of this total growth is due to the individual factors.

Figure 1 and 2 here

As for the **exports**, few things are worth noting. The total dynamics of the exports has been driven by the industrial production to a large extent: the fall in the exports in 2001 and 2002 is almost completely due to the fall in the production (in 2001 there was an internal conflict in Macedonia); industrial production contributes substantially to the rise in the last three years, too. After being almost irrelevant for the exports dynamics prior to 2004, metals prices became very important factor for the exports growth in the last five years. At the same time, foreign demand contributed positively to the export growth throughout the whole period. So, the export expansion since 2005 has been a consequence of the favorable external demand, accompanied by the high metals prices and the increased domestic production. Regarding the exchange rate - throughout the whole period, its contribution to the total exports growth was hardly different from zero.

On the **imports** side, consumption appears to be the most stable contributor, with a positive contribution for all the years, except two (including 2001, the conflict year). This is not surprising at all, bearing in mind the limited domestic production capacities. However, the factor that made imports grow considerably in the last five years is not consumption, but – exports. As can be observed, in the last five years the contribution of the exports regularly exceeds the one of the consumption. Still, one additional factor, often overlooked, made imports jump in the last couple of years - the intensified investment activity. For all the time, the contribution of the exchange rate, though slightly higher than in the exports case, is always only marginal.

Thinking about these findings, it is not very strange that imports depend on the exchange rate only marginally - this is often found for small open economies, poor in natural resources, who must import everything that they can't produce. Furthermore, some previous studies for Macedonia have indicated that imports are not very price-elastic (Jovanovic, 2007, Petreski and Jovanovic, 2009). However, it would seem very strange to claim that export are totally inelastic with respect to the exchange rate, since so far it was always believed that the opposite is the case, that exports depend to a large extent on the exchange rate, and since previous research confirmed this.

A few points are worth emphasizing here. The first one is that we do not claim that exports do not depend on the exchange rate at all, or that they won't in the future. We claim that the exports dynamics in the analyzed period was not determined by the exchange rate, but by other factors. This seems quite reasonable. Exports grew considerably in this period (in 2008 they were nearly three times higher than in 1997), especially after 2004 (in 2008 they were double than in 2004). As was mentioned, this recent expansion was first and foremost due to the increased exports of metals. Thus, if we are thinking of the factors that caused exports to grow this much, we must think about what caused the exports of metals to grow. One of the most important factors here is the metal prices. On the other hand, the exchange rate of the denar is unlikely to affect exports of metals – the price of metals is expressed in dollars, so the exchange rate of the denar does not affect it.

This helps explain why some previous studies found that the exchange rate influences exports. To be sure, data and variables can affect the results to a huge extent. For example, the real effective exchange rate from the IFS Statistics and the NBRM differ substantially. But omitting some variables can also contribute greatly. If we look at the exports regressions without the metals prices (Table 2, columns 2 and 4), we can see that the coefficient of the exchange rate was significant (at the 10% in the former case, at the 5% in the latter). However, including the metals prices makes the exchange rate coefficient insignificant. This is because the metals prices and the real exchange rate move in the opposite direction, it seems very closely (see Figure A-1 in the Appendix). Thus, omitting the metals prices from the exports equation can indicate, wrongly, that the exchange rate is a significant determinant of the exports dynamics.

But, Macedonian exports do not consist only of metals. What about the rest of the exports? It would be hard to say that they do not depend on the exchange rate at all. The thing is that these other products would have to be very elastic to exchange rates changes, in order for the total exports to appear elastic, too. If one third of the exports is completely inelastic (metals) and one third is unitary elastic, the remaining one third would have to have an elasticity of 3.5 in order for the total exports to have an elasticity of 1.5[8]. Such a high elasticity is difficult to expect - usually, services are considered to be that elastic - restaurants, travel, tourism and maybe some luxury goods (see Houthakker and Taylor, 1970), but Macedonia exports none of these. Thus, even if some part of the exports is elastic, due to the dominance of inelastic metals, the total exports might appear inelastic too.

The reader might get the feeling that our analysis of the determinants of the trade was biased towards the exports, in terms of the space they were dedicated. This is indeed true, and is due to the simple fact that the existing literature on Macedonian trade almost unanimously showed that exports are highly price elastic, while the findings for the imports were less clear-cut. However, one must not neglect the fact that, in reality, devaluation is often used as a measure to destimulate imports, not to stimulate exports. Thinking about this thesis, our analysis definitely showed that Macedonian imports do depend on the exchange rate, and that devaluation is likely to have an impact on the imports. The important question here is - how big will that impact be? We'll leave this question aside, since any precise assessment needs analysis of a different type, but by looking at the exchange rate elasticity and the exchange rate pass-through from the previously mentioned studies we can definitely say that the effect will be very small. Just for illustration, if 10% nominal depreciation results in 6% real depreciation (since the exchange rate pass-through is around 0.4), given the exchange rate elasticity of the imports of 0.35, this is likely to result in decline in the imports of around 2%.

On the other hand, since the recent imports expansion was mainly due to the intensified investment activity, accompanied by the exports expansion, given the likely downward prospects for the exports and the

investment, we can be quiet certain that the imports will fall, too. This fall will almost definitely exceed the fall that will be brought by a possible devaluation.

In terms of the net-exports, thus, as our analysis showed, devaluation is not likely to have any major effect. But there might be other factors that support devaluation, for instance - the depreciation of some other currencies. Almost all the Central and Eastern European countries with flexible exchange rate regimes experienced depreciations in the last few months, with possibly even higher depreciations ahead. Since these countries represent the major trading partners for Macedonia, this implies possible further worsening of the trade balance for Macedonia.

When thinking about this question, as well as about many others, one should always remember that the issue of the right parity of a currency is best analyzed using the apparatus of some equilibrium exchange rate concept, like the Fundamental Equilibrium Exchange Rate. Put simply, one should analyze the real effective exchange rate vis-à-vis the equilibrium real exchange rate and devaluation should be considered only if the currency is overvalued. Following this logic, the depreciation of the trading partners' currencies implies a real appreciation of the Macedonian denar. If, at the same time, the equilibrium real exchange rate does not appreciate, the real exchange rate might become overvalued. This might be considered as a valid argument for devaluation. But, that's a topic for some other story, and will leave this story end like this.

5. Conclusion

The issue of the determinants of exports and imports has received big attention in the literature, due to the special place the trade has always had in the economic literature. The issue is even more important for small open economies, whose performance depends critically on trade. In the case of Macedonia things are even more pronounced, since it has been always considered that the exchange rate is an important policy instrument, and that changes in the exchange rate can influence other performances to a great extent. The episode of the devaluation of the denar in 1997 clearly illustrates this stance.

The recent good performances in the external sector, and generally in the economy, have contributed greatly to economists in Macedonia stop thinking for a moment about the exchange rate. However, the usual tendency - in difficult times, when no viable solution is known, to come up with recommendations that are drastic, is confirmed yet again in Macedonia. The recent worsening of the external performances, due to the world crisis, have made economists claim that the economy can be made better off by devaluating the currency.

We argue that this is not likely to be the case. In order for the nominal exchange rate, which is in direct control of the policy makers, to have real effects on trade, two conditions must be met - it first has to be able

to affect the real exchange rate, and then the real exchange rate would have to be able to affect trade flows. Regarding the first condition, previous studies have shown that given change in the nominal exchange rate is likely to result in a smaller change in the real exchange rate, due to the high exchange rate pass-through. Regarding the second condition, we show that external sector performances in the past have not been determined by the real exchange rate, and are therefore unlikely to depend on the real exchange rate in the future, either.

However, even if the exchange rate is unlikely to be the factor that is responsible for the poor net-exports performance, the case for devaluation can be strong. In fact, rarely is the devaluation used as a measure to stimulate net exports. More often it is used as a measure to restore the equilibrium more quickly. This means that what is important for the devaluation is whether, and how much, the actual exchange rate differs from the equilibrium. Therefore, in order to argue against devaluation more soundly, one should consider some equilibrium real exchange rate concept, for instance, the Fundamental Equilibrium Exchange Rate. This marks the path for future research.

But, besides speaking out loudly against the devaluation, this research would like to point out to another issue - that public in Macedonia, including journalists, economists and policymakers should start making their arguments on solid grounds. It is about time. If this is achieved, this article could be considered successful.

Table 1: Review of Macedonian trade elasticities found in the literature

Study		Imports	Exports	Comment
Jovanovic (2007)	**Income**	2.1 and 2.5	1.5 and 1.6	Real exchange rate as price
	Price	1.2 and 1.3	-2.2 and -2.8	
Kadievska-Vojnovic and Unevska (2007)	**Income**	3.5	1.5	Relative export and import prices (to domestic prices) as price.
	Price	-1.6*	-0.7	
Petreski and Jovanovic (2008)	**Income**	1.1	4.7	Include other variables, as well
	Price	0	-1.5	

* The sign is opposite, but due to the different definition of the variables, the direction of the effect is the same

Table 2: Results of the OLS models for EXPORTS

	-1-	-2-	-3-	-4-	-5- no first 4 lags	-6- no last 4 lags	-7- no first and last 4 lags
log_fordem	2.498***	1.416***	2.145***	2.611***	2.665***	2.078***	2.569***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log_reer	-0.762*	0.284	-0.156	-0.539**	-0.132	-0.151	0.154
	(0.082)	(0.426)	(0.528)	(0.024)	(0.671)	(0.560)	(0.643)
log_metals		0.329***	0.134***		0.111**	0.134***	0.120***
		(0.000)	(0.004)		(0.099)	(0.006)	(0.101)
log_ind			1.402***	1.759***	1.464***	1.317***	1.387***
			(0.000)	(0.004)	(0.000)	(0.000)	(0.000)
Constant	1.902	1.986	-7.333***	-9.727***	-11.429***	-6.562**	-10.645
	(0.606)	(0.461)	(0.002)	(0.000)	(0.000)	(0.011)	(0.003)
LM serial correlation test	0.000	0.000	0.045	0.030	0.022	0.033	0.016
Jarque-Bera normality test	0.231	0.632	0.424	0.463	0.458	0.443	0.576
Koenker-Bassett heteroskedasticity test	0.149	0.282	0.198	0.238	0.191	0.545	0.508
Observations	47	47	47	47	43	43	39
R-squared	0.724	0.856	0.936	0.932	0.949	0.915	0.916

***** p<0.01, ** p<0.05, * p<0.1**
p values in parentheses

Table 3: Results of the OLS models for IMPORTS

	-1-	-2-	-3-	-4-	-5-	-6-	-7- no first 4 lags	-8- no last 4 lags	-9- no first and last 4 lags
log_gdp	3.081***								
	(0.000)								
log_reer	-0.220	-0.0864	0.118	0.335**	0.368**	0.210	0.675***	0.334**	0.677***
	(0.341)	(0.719)	(0.447)	(0.021)	(0.013)	(0.190)	(0.000)	(0.028)	(0.001)
log_cons		1.220***	0.656***	0.566***	0.687***	0.596***	0.811***	0.565***	0.804***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log_expo			0.583***	0.437***	0.463***	0.534***	0.368***	0.436***	0.372***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log_inv				0.251***	0.248***	0.243***	0.233***	0.243***	0.234***
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log_oil					-0.053				
					(0.251)				
log_metals						-0.089			
						(0.118)			
Constant	-22.05***	-2.281	-2.985**	-3.935***	-5.434***	-4.198***	-7.284***	-3.834***	-7.267***
	(0.000)	(0.240)	(0.019)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)	(0.000)
LM serial correlation test	0.005	0.001	0.136	0.178	0.309	0.238	0.859	0.184	0.873
Jarque-Bera normality test	0.926	0.398	0.448	0.377	0.718	0.143	0.632	0.362	0.657
Koenker-Bassett test for heteroskedasticity	0.234	0.927	0.551	0.346	0.157	0.829	0.726	0.619	0.638
Observations	47	51	51	43	43	43	39	39	35
R-squared	0.925	0.917	0.967	0.983	0.983	0.984	0.986	0.968	0.973

***** p<0.01, ** p<0.05, * p<0.1**
p values in parentheses

Table 4: Comparison between the OLS, Johansen and ARDL results for EXPORTS

	OLS	Johansen	ARDL SBC	ARDL R-sq
log_fordems	2.145	3.131	2.116	2.286
	(8.317)	(8.842)	(4.901)	(5.483)
log_reer	-0.156	-0.196	-0.081	-0.256
	(0.636)	(0.587)	(0.188)	(0.616)
log_metals	0.134	0.125	0.175	0.135
	(3.050)	(2.087)	(2.110)	(1.656)
log_ind	1.402	0.793	1.589	1.729
	(7.266)	(2.895)	(4.958)	(5.301)
Constant	-7.333	-8.242	-8.610	-9.412
	(3.319)		(2.528)	(2.882)
ECM		-0.282	-0.503	-0.529
		(3.029)	(5.769)	(4.422)

Absolute value of the t statistics in parentheses; value higher than 2 indicates significance

Table 5: Comparison between the OLS, Johansen and ARDL results for IMPORTS

	OLS	Johansen	ARDL (SBC)	ARDL (R-sq)
log_reer	0.335	0.350	0.455	0.433
	(3.619)	(2.693)	(3.878)	(2.900)
log_cons	0.566	0.611	0.663	0.671
	(2.412)	(8.650)	(9.460)	(7.377)
log_expo	0.437	0.445	0.416	0.398
	(7.534)	(8.867)	(9.973)	(7.230)
log_inv	0.251	0.189	0.223	0.219
	(8.150)	(5.282)	(8.240)	(5.071)

Constant	-3.935	-4.008	-5.083	-4.837
	(6.905)	(3.938)	(5.140)	(3.819)
ECM		-0.563	-1	-0.800
		(1.622)	NA	(6.085)

Absolute value of the t statistics in parentheses; value higher than 2 indicates significance

Figure 1: Contribution of the individual determinants to the annual growth rates of the EXPORTS

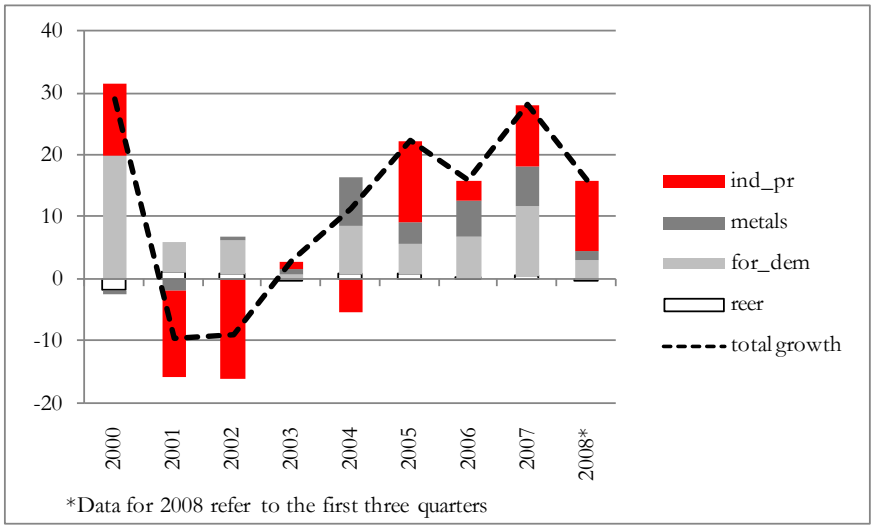
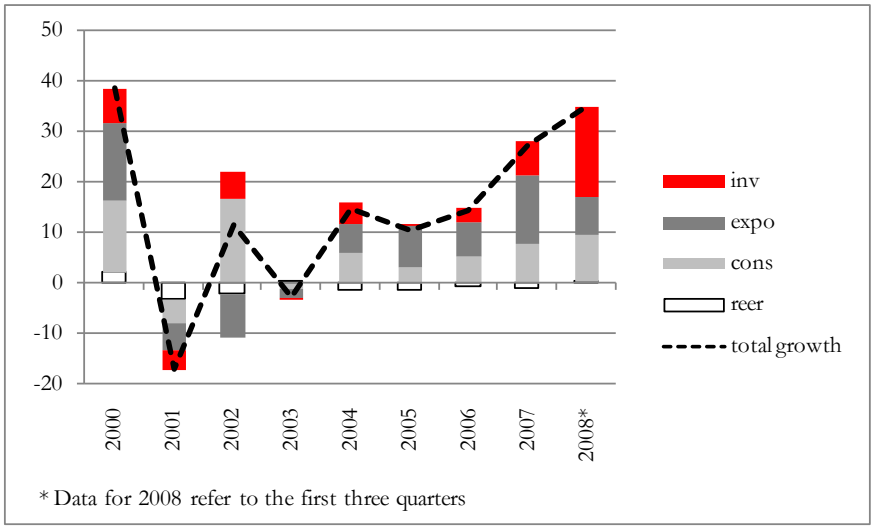


Figure 2: Contribution of the individual determinants to the annual growth rates of the IMPORTS



References

Athukorala, P. and J. Riedel (1994), "Demand and Supply Factors in the Determination of Nie Exports: A Simultaneous Error-Correction Model for Hong Kong: A Comment", *The Economic Journal*, Vol. 104, No. 427 (Nov., 1994), pp. 1411-1414

Besimi, F., G. Pugh and N. Adnett (2006), 'The monetary transmission mechanism in Macedonia: implications for monetary policy', Working Paper No. 02/2006, Institute for environment and sustainability research

Dornbusch, R. (1985), "Policy performance links between LDC debtors and industrial nations", *Brookings Papers on Economic Activity*, vol. 2, pp.303-366

Goldstein, M. and M. S. Khan (1978), "The supply and demand for exports: A simultaneous approach", The Review of Economics and Statistics, vol. 60, 275–286

Goldstein, M. and M.S. Khan (1982), "Effects of slow-down in industrial countries on growth in non-oil developing countries", Ocassional paper No. 12, International Monetary fund

Goldstein, M. and M.S. Khan (1985), "Income and Price Effects in Foreign Trade", in Handbook of International Economics, ed. R.W. Jones and P.B. Kenen, Elsevier Science Publishers Amsterdam

Harris, R. and R. Sollis (2003), "Applied Time Series Modelling and Forecasting", John Wiley and Sons

Holly, S. and K. Wade (1991), "UK exports of manufactures: the role of supply-side factors", Scottish Journal of Political Economy, vol. 38, pp.1-18

Houthakker, H. S. and S. P. Magee (1969), "Income and Price Elasticities in World Trade", *The Review of Economics and Statistics*, Vol. 51, No. 2, pp. 111-125

Houthakker, H. S. and L. D. Taylor (1970), *Consumer Demand in the United States*, 1929-1970, Harvard University Press, Cambridge

Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors", Journal *of Economic Dynamics and Control,* vol. 12, pp. 231-254.

Johansen, S. (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, 59, (6), pp. 1551-1580

Johansen, S. (1992), "Determination of Cointegration Rank in the Presence of a Linear Trend", *Oxford Bulletin of Economics and Statistics*, 54, (3), pp. 383-397

Jovanovic, B. (2007), "The Fundamental Equilibrium Exchange Rate of the denar", Unpublished Master Thesis, Staffordshire University, UK

Kadievska-Vojnovic, M. and D. Unevska (2007), " Price and Income Elasticities of Export and Import and Economic Growth in the case of the Republic of Macedonia", Working Paper, National Bank of the Republic of Macedonia

Krstevska, A., S. Bojceva-Terzijan, B. Davidovska-Stojanova, and F. Besimi (2004), 'Exchange rate pass-through and the monetary strategy of the National Bank of the Republic of Macedonia', Economic Research Paper No. 7/II/2003

Krugman, P. (1989), "Income elasticities and the Real Exchange Rates", *European Economic Review*, vol. 33, pp. 1031-1054

Muscatelli, V. A. (1994), "Demand and Supply Factors in the Determination of NIE Exports: A Reply" *The Economic Journal*, Vol. 104, No. 427 (Nov., 1994), pp. 1415-1417

Muscatelli, V.A., Srinivasan, T.G. and Vines, D. (1990), "The empirical modelling of NIE exports: an evaluation of different approaches", CEPR discussion paper no. 426

Muscatelli, V.A., Srinivasan, T.G. and Vines, D. (1990), " Demand and Supply Factors in the Determination of NIE Exports: A Simultaneous Error-Correction Model for Hong Kong", The Economic Journal, Vol. 102, No. 415 (Nov., 1992), pp. 1467-1477

Pesaran, M. H. and B. Pesaran (1997), "Working with Microfit 4: Microfit 4 User Manual", Oxford University Press

Pesaran, M. H. and Y. Shin (1997), "An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis", Cambridge Working Papers in Economics, No. 9514

Pesaran, M. H., Y. Shin and R. J. Smith (2001), "Bounds testing approaches to the analysis of level relationships", *Journal of Applied Econometrics,* Vol. 16, Issue 3 , pp. 289 - 326

Petreski, M. and B. Jovanovic (2009), "Keynesian Macroeconomic Model of the Republic of Macedonia: Economic theory and Behavioural Equations", Ministry of Finance of the Republic of Macedonia, Bulletin

Riedel, J. (1984), "Trade as the engine of growth in developing countries, revisited", Economic Journal, vol. 94, pp. 56-73

Riedel, J. (1988), "The demand for LDC Exports of Manufactures: Estimates from Hong-Kong", *Economic Journal* , vol 98, pp. 138-148

Vrboska, A. (2006), 'Choice of optimal monetary strategy for small and open economies', unpublished Master thesis, Faculty of Economics, Skopje

Appendix

Figure A-1: Plots of the series used in the analysis

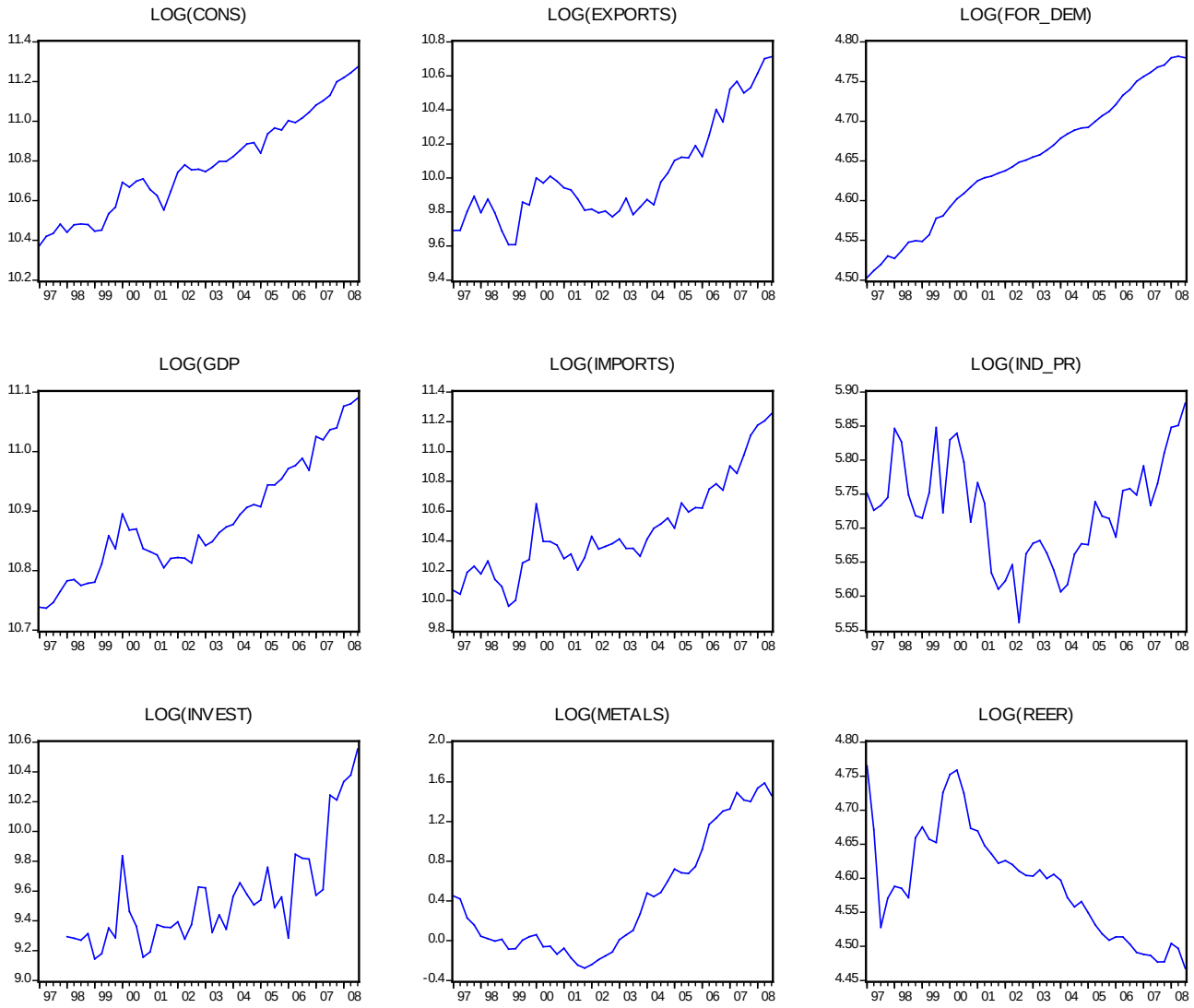


Figure A-2: Plots of the residuals from the OLS exports and imports models

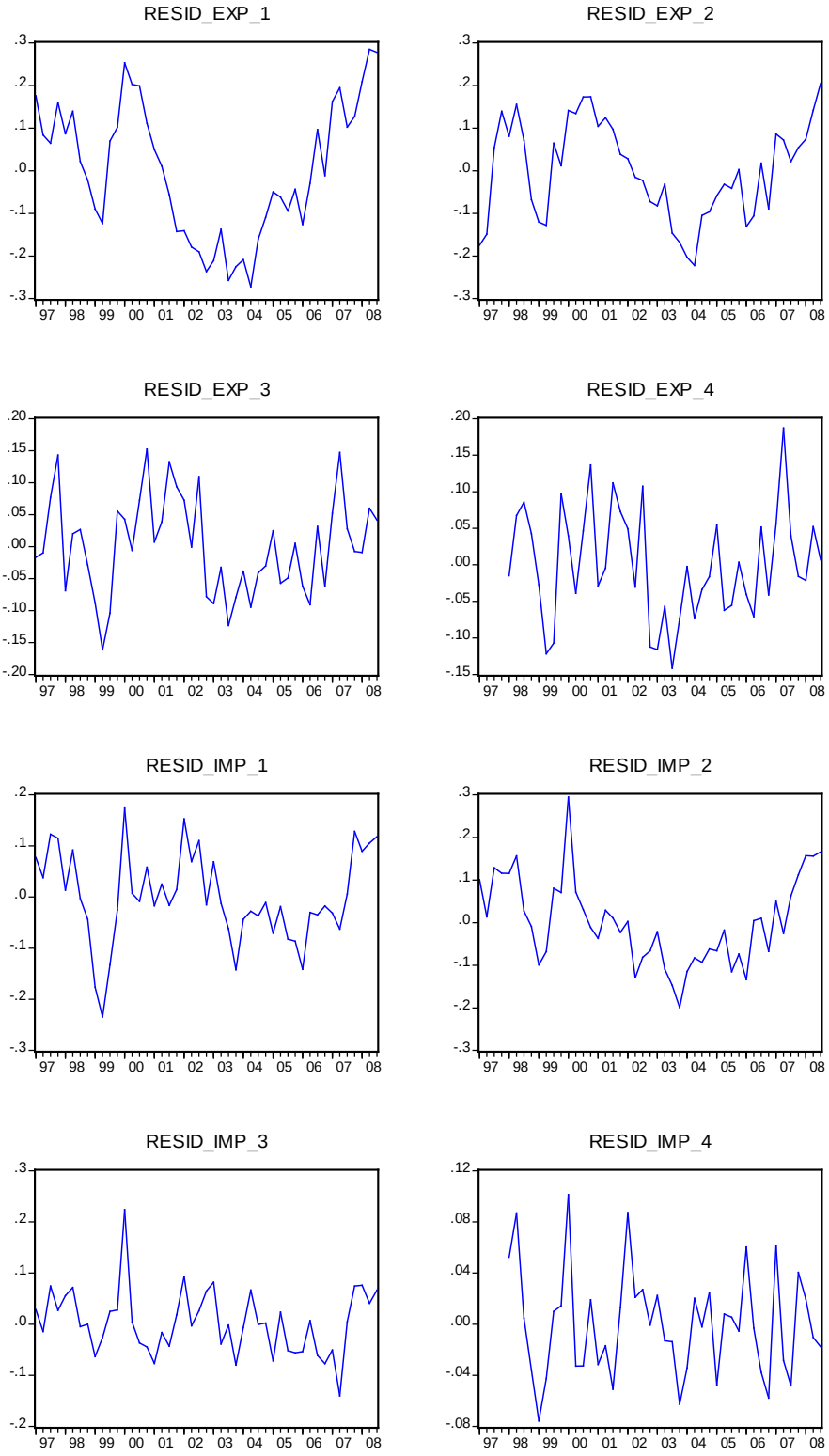


Table A-1: Probability values of Chow tests for the exports and imports equations
Ho: No structural break in 2002Q4

	Exports	**Imports**
Chow breakpoint test	0.000	0.004
Chow forecast test	0.193	0.310

Figure A-3: CUSUM and CUSUM of squares tests for the exports and imports

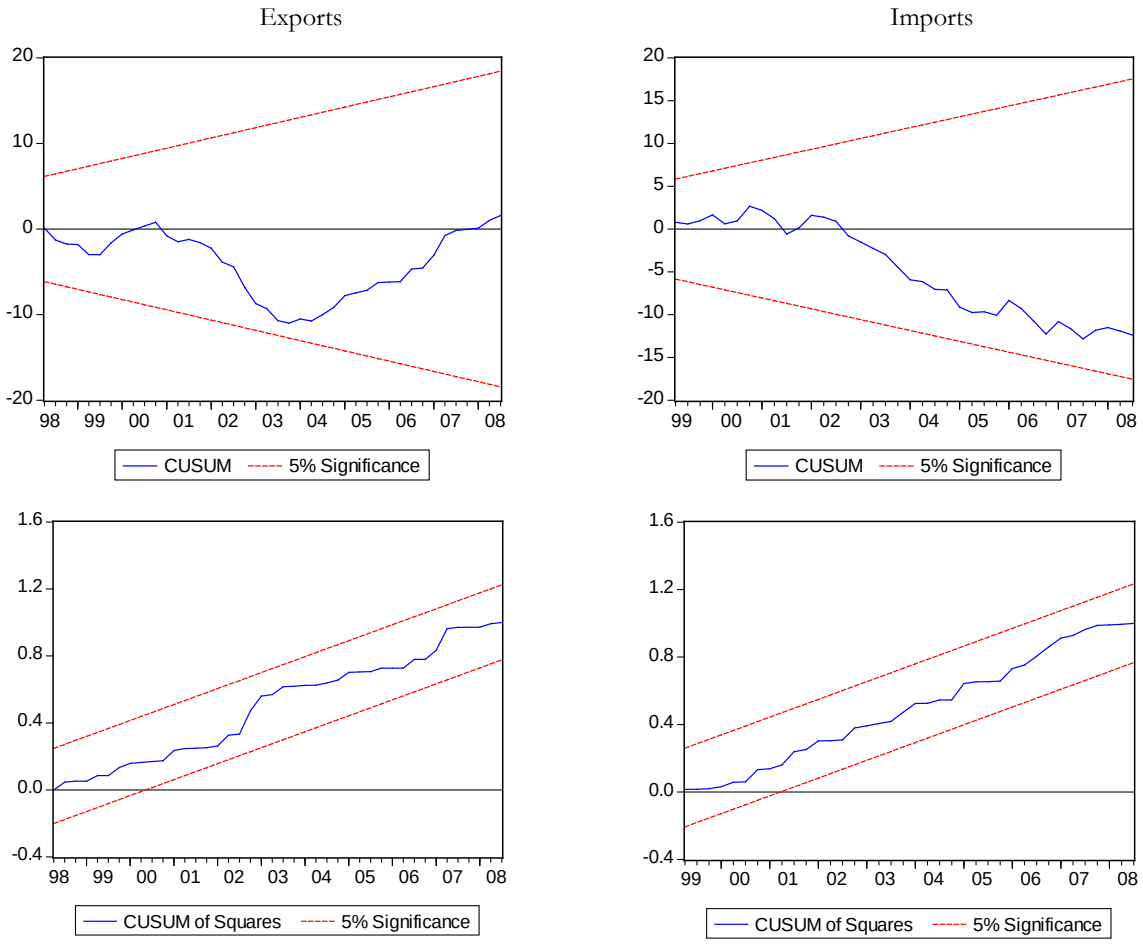


Table A-2: Unit root tests of the levels of the series

Ho: Series has a unit-root

Series	Test	Test statistics	1% critical value	5% critical value
Exports	ADF	1.26	-3.57	-2.92
	ADF-GLS	1.70	-2.61	-1.95
	Phillips-Perron	1.69	-3.57	-2.92
Imports	ADF	2.15	-3.57	-2.92
	ADF-GLS	2.51	-2.61	-1.95
	Phillips-Perron	1.81	-3.57	-2.92
REER	ADF	-2.71	-3.56	-2.92
	ADF-GLS	-0.15	-2.61	-1.95
	Phillips-Perron	-2.72	-3.56	-2.92
Foreign demand	ADF	-1.58	-3.57	-2.92
	ADF-GLS	0.20	-2.61	-1.95
	Phillips-Perron	-1.69	-3.57	-2.92
Metals prices	ADF	-1.23	-3.57	-2.92
	ADF-GLS	-1.47	-2.61	-1.95
	Phillips-Perron	1.14	-3.60	-2.93
Industrial production	ADF	-2.68	-3.55	-2.91
	ADF-GLS	-1.84	-2.61	-1.95
	Phillips-Perron	-2.60	-3.55	-2.91
GDP	ADF	1.24	-3.58	-2.93
	ADF-GLS	2.14	-2.62	-1.95
	Phillips-Perron	0.90	-3.58	-2.93
Private consumption	ADF	1.59	-3.56	-2.92
	ADF-GLS	2.96	-2.61	-1.95
	Phillips-Perron	3.25	-3.56	-2.92
Gross investment	ADF	3.63	-3.62	-2.94
	ADF-GLS	0.07	-2.62	-1.95
	Phillips-Perron	1.14	-3.60	-2.93

Table A-3: Unit root tests of the first differences of the series

Ho: Series has a unit-root

Series	Test	Test statistics	1% critical value	5% critical value
Exports	ADF	-7.59	-3.57	-2.92
	ADF-GLS	-7.63	-2.61	-1.95
	Phillips-Perron	-7.56	-3.57	-2.92
Imports	ADF	-8.61	-3.57	-2.92
	ADF-GLS	-8.64	-2.61	-1.95
	Phillips-Perron	-8.46	-3.57	-2.92
REER	ADF	-3.25	-3.57	-2.92
	ADF-GLS	-3.25	-2.61	-1.95
	Phillips-Perron	-5.96	-3.56	-2.92
Foreign demand	ADF	-4.93	-3.57	-2.92
	ADF-GLS	-4.90	-2.61	-1.95
	Phillips-Perron	-4.96	-3.57	-2.92
Metals prices	ADF	-1.61	-3.57	-2.92
	ADF-GLS	-1.43	-2.61	-1.95
	Phillips-Perron	-5.22	-3.56	-2.92
Industrial production	ADF	-9.05	-3.55	-2.91
	ADF-GLS	-8.11	-2.61	-1.95
	Phillips-Perron	-9.33	-3.55	-2.91
GDP	ADF	-9.71	-3.58	-2.93
	ADF-GLS	-9.34	-2.62	-1.95
	Phillips-Perron	-9.29	-3.58	-2.93
Private consumption	ADF	-6.76	-3.56	-2.92
	ADF-GLS	-6.76	-2.61	-1.95
	Phillips-Perron	-6.76	-3.56	-2.92
Gross investment	ADF	-7.75	-3.60	-2.94
	ADF-GLS	-7.85	-2.62	-1.95
	Phillips-Perron	-7.77	-3.60	-2.94

Table A-4: Results of the unit root tests for the residuals of the exports and imports regressions
Ho: Residuals have unit root

	Exports (Eq. 4 from Table 2)	**Imports** (Eq. 4 from Table 3)
Dickey-Fuller test statistics	-4.02	-5.68
5% critical value	-4.76	-4.76

Notes

[1] This is just a simplification of the process. Of course, the central bank will not sell all of its reserves. Rather, the reserves might reach some critical level, in terms of different criteria, e.g. the coverage of imports.

[2] Very interesting debate on the issue can be found in Riedel (1988), Muscatelli et al (1992), Athukorala and Riedel (1994) and Muscatelli (1994).

[3] Furthermore, as the Granger representation theorem states, the relationship between the series can be expressed in an error correction form, which shows how the series evolve in the short run, and which is the standard way of expressing cointegrating relationships.

[4] The data on the capacity utilization, from the Survey of business tendency in manufacturing industry, from the State Statistical Office is available only since 2003, which precludes calculating the production capacity as the industrial production divided by the capacity utilization.

[5] The serial correlation test is borderline significant (the null of no serial correlation can be rejected on 1% level of significance, but not on 5%), but we go for the lower level.

[6] For explanation of the process, refer to Jovanovic (2007), for example, or see Harris and sollis (2003) and Pesaran and Pesaran (1997). The details of the procedure are available upon request.

[7] We calculate these approximate contributions by the following formula, where "contr" stands for the contribution of the variable to the total growth, "coef" for the respective coefficient, "Δvar" for the change in the respective variable (in logs), "Δtotal" for the total annual growth in the exports or the imports, and "j" is the total number of independent variables:

$$Contr_i = \frac{Coef_i * \Delta Var_i}{\sum_{i=1}^{j} (Coef_i * \Delta Var_i)} * \Delta Total$$

[8] Elasticity is the ratio of two percentage changes. Let's assume that the initial state of the exports was 100 and the structure of the exports is: inelastic goods=50, unitary elastic=25, highly elastic=25. The corresponding changes in the total exports, the inelastic part and the moderately elastic part, due to a 1% change in the exchange rate are calculated as in the table. The change in the highly elastic part is calculated as the difference of these, and the corresponding elasticity as the percentage change of the final and the initial state.

	Initial (A)	**Elasticity (B)**	**Final (A*(1+B/100))**
Total exports	100	1.5	101.5
Inelastic part	34	0	34
Moderately elastic	33	1	33.33
Highly elastic	33	**3.5 = (34.17/33-1)*100**	**34.17 = 101.5-34-33.33**