

**Calculation of the effective exchange rates of the Macedonian denar and correlation analysis between the real effective exchange rate and external trade of the Republic of Macedonia**

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## **Introduction**

This paper is structured in the two independent parts. The first part has goal to establish a methodology for the calculation of the real and nominal effective exchange rates of the Macedonian denar (MKD). The methodology used is that of the Bank for International Settlements (BIS) from Basle, Switzerland, which is also used by the European Central Bank. In the second part is done the correlation analysis between the effective exchange rate of the MKD and export and import.

Calculations of the effective exchange rates and the correlation analysis are made on the monthly basis for the period January 1994-December 2000. Data sources used in the calculations are the State Statistical Office of the Republic of Macedonia, National Bank of the Republic of Macedonia, Eurostat and the IMF.

### **1. Calculation of the nominal and real effective exchange rates of the MKD**

The development of the concepts of the effective exchange rates has started after the collapse of the Bretton Woods system of the fixed exchange rates at the end of the 1960's. The introduction of bilateral floating exchange rates has made difficult to monitor and express the value of the currencies, thus creating need for construction of the so called effective exchange rates. The value of a currency expressed as weighted average of the bilateral exchange rates with the major trade partners is called Nominal Effective Exchange Rate (NEER). In this case the word "effective" means average. The effective exchange rate is usually expressed as an index number that shows the average increase-appreciation (index below 100), or average decrease-depreciation (index above 100) of the exchange rate. By deflation of the NEER with appropriate price or cost indexes can be derived Real Effective Exchange Rate (REER), which is the most frequently used indicator for measuring international price and cost competitiveness.

The official foreign exchange market in the Republic of Macedonia started functioning in May 1993 with the floating exchange rate of MKD. At the beginning of 1994 the country initiated active macroeconomic policy supported by the IMF. Initially the exchange rate of MKD was used as a main indicator of the successfulness of the monetary policy. Very soon, next year its importance was upgraded with its positioning as a main anchor of the macroeconomic policy. Since the very beginning the MKD was pegged to the DEM<sup>1</sup> and the Central Bank has a policy of managed floating exchange rate or the so-called dirty float. It means, that although the MKD is formally free to float, the Central Bank intervene on the exchange rate market with aim to prevent nominal appreciation or depreciation of the MKD exchange rate to the DEM, which imply existence of de facto fix exchange rate of MKD to the DEM. However, the MKD exchange rate to all other currencies floats, just as the DEM do.

Under this exchange rate policy, only construction of effective exchange rates of MKD can indicate whether the value of denar appreciates or depreciates giving appropriate feedback to the macroeconomic policy. Construction of REER for the Republic of Macedonia is supposed to enable monitoring international price competitiveness of the Macedonian economy. The term "competitiveness" in this paper refers exclusively to relative price development between Macedonian economy and the main trading partners. However, this concept of "competitiveness" does not take into account other aspects of international competitiveness, such as product quality,

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<sup>1</sup> After the introduction of Euro in January 1999, the MKD is pegged to the Euro.

innovation, and flexible labor markets. Apart of the general NEER and REER, in this paper are constructed effective exchange rate indexes for 22 major trading partners and six groups of trading partners: EU, OECD, Candidate Countries for EU (CC's), Countries from the former Yugoslavia, Countries from the former USSR, and the Countries from the Western Balkan. Thus, it enables deeper analysis of the changes in the relative prices in relation to each trading partner individually as well as to these formal or informal economic and territorial groups.

### **1.1. Methodology**

Three elements are important for proper construction of the NEER: choice of trading partners and their currencies to be included in the index, assignment of appropriate weights to the selected currencies, and the base period. In addition, for the calculation of REER the choice of a proper deflator is of a major importance. Elaboration of the methodology below will involve explicit or implicit discussion for all four elements.

Choice of the currency basket and calculation of the weights are based on annual external trade data for period 1997-1999. It is taken three-year average in order to avoid the possible biases when using only one-year data<sup>2</sup>. Imports of goods is valued CIF while exports values are FOB.

#### **1.1.1. Choice of trade partners**

Republic of Macedonia has external trade relations with more than 150 countries from all continents. This means that change in the effective exchange rate of MKD have to be measured in relation to large number of trading partners. However, with some of the trading partners the external trade is only incidental or negligible, while with others it is difficult to obtain timely and quality statistics. Therefore, it is decided the calculations to take into account the first 23 trading partners whose share reaches 91% of the total external trade of the country. The largest share in this group of trading partners has Germany (16%), and the lowest the Czech Republic (0.6%). Later, Bosnia and Herzegovina (share of 0.9%) was excluded from practical reasons<sup>3</sup> afterward all calculations were done for 22 trading partners. All countries except USA are from Europe, which shows that Macedonian external trade is predominantly oriented toward Europe.

We considered that beside the total NEER and REER it is interesting to observe the changes in competitiveness of the Macedonian economy related to the markets of specific group of countries. Therefore for analytical purposes were constructed the following groups of Macedonian trading partners:

- EU with weight of 45% - consisted of Germany, Netherlands, Greece, Italy, France, Sweden, Austria, Belgium and Great Britain;

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<sup>2</sup> Macedonian economy is frequently hit by external shocks that distort the structure of its external trade in some periods of time. Therefore, the use of a three-year average smoothes the database used for this purpose.

<sup>3</sup> In Bosnia and Herzegovina in practice exist two separate markets, the Republic of Srpska and the Federation BIH who have their own statistics. For a large part of the period dealt with in this paper there are no statistical indicators for a country as a whole and in some period of time even existed two different currencies. For these reasons, this country was excluded from the estimates.

- OECD with weight of 64% - beside the trading partners from EU it includes also Switzerland, USA, Turkey, Czech Republic, Hungary and Poland;
- Candidate Countries for membership in the EU with weight of 15% - consisted of Turkey, Czech Republic, Hungary, Poland, Bulgaria and Slovenia;
- Countries from the former Yugoslavia with weight of 24% - that covers FR Yugoslavia, Croatia and Slovenia;
- Countries from the former USSR with weight of 8% - consisted of Russia and Ukraine;
- Countries from the Western Balkan with weight of 18% - consisted of FR Yugoslavia, Croatia and Albania.

### **1.1.2. Weighting**

Three methods of weighting based on the trade structure are in wide use in the world. They are the *method of bilateral trade flows*, *method of global trade flows*, and *method of double weights*. All three methods use external trade structure as a base, but the *bilateral trade flows method* forms the country weights on the basis of the share of individual countries in the total export and import of the country whose effective exchange rates are calculated. Thus, there is an implicit assumption that on each export market only the domestic producers compete with the export country, completely ruling out the competition from other exporters to that market. Use of the *method of global trade flows* is based on the assumption that there is only one world market where all exporters are competing among themselves. Because of that assumption the currencies of the trade partners are generated from their share in the total world trade. The third *method of double weights* includes some elements of both methods. It starts from the share of bilateral trade of each trading partner in the total trade of the country whose effective exchange rates are calculated, afterward adjusting those shares with the significance that each of them have in the world trade.

On the base of these characteristics and the international practice, it was decided to apply the method of double weights used by the Bank for International Settlements from Basle, accepted by the European Central Bank as well.

First, were determined the imports weights according the share of import of each trading partner in the total import of the Republic of Macedonia from the 22 trading partners. The procedure for creating the export weights is much more complex in order to take into account the competition in the “third markets” i.e. to take into account the competition facing Macedonian exporters from the other countries exporting in those 22 trading partners. Therefore, the share of the Macedonian export on each market in the total Macedonian export is adjusted with the so-called “effect of the third markets”. For calculation of that effect it is necessary to determine each trading partner share in the total supply of goods from manufacturing, mining and agriculture on its domestic market as well as on the market of the other 21 countries. This calculations are done on the base of national accounts data or more precisely the value added in manufacturing, mining and agriculture of each trading partner and their external trade data. Eventually, the single import weights and double export weights are used in the calculation of the total weights for each trading partner. The simple comparison between the total weights derived with double weighting scheme of export and the total weights that would be calculated with single weighting of export reveals the significance of the “third markets”. In fact, it can

be noticed that trading partners whose share in the Macedonian external trade is non-proportionally higher than their share in the global world trade have lower total weight than their simple share in the external trade of the Republic of Macedonia, and vice versa.

Trade weights calculated with this approach are used for the calculation of the effective exchange rates for the whole period from 1994 till 2000. Nevertheless, it is recommended to change the weights on every five years because of the changes in the structure of the international trade.

**Table 1**  
Weights in the EER indices of MKD

	<i>in %</i>	
	simple share in the Macedonian foreign trade <sup>1</sup>	Overall weight in the EER index <sup>2</sup>
Total	100	100
Germany	17.9	16.6
Greece	8.2	6.6
Italy	6.2	6.6
Netherlands	3.0	3.2
Austria	2.1	2.3
Great Britain	2.1	3.4
Belgium	1.0	1.8
France	1.8	3.7
Sweden	0.7	1.2
Switzerland	2.5	2.1
USA	8.1	11.1
Turkey	2.4	2.3
Hungary	1.0	1.1
Poland	0.8	0.9
Czech Republic	0.7	0.8
Bulgaria	4.6	4.0
Slovenia	7.0	6.0
FR Yugoslavia	17.0	14.5
Croatia	4.1	3.1
Ukraine	4.1	4.1
Russia	3.9	4.0
Albania	0.9	0.6

<sup>1</sup> Simple import and export shares in total Macedonian foreign trade without the "third market" effects.

<sup>2</sup> Overall weights are a weighted average simple import shares and double export weights, i.e. taking into account "third market" effects.

### 1.1.3. Choice of deflators

For calculation of REER it can be used several price and cost deflators, each of them having some advantages and disadvantages. Most frequently used deflators are Consumer Price Index (CPI), Producers Price Index (PPI), Wholesale Price Index (WPI) and Unit Labour Costs (ULC). The availability of timely data and greater international comparability and harmonization were decisive to decide in favor of using CPI as deflator in the calculation of REER of MKD. The major advantages of the CPI are that it is calculated on the base of consumer basket that is largely comparable across countries, it is published monthly, and great statistical efforts are invested in the improvement of its quality and accuracy. The basic weakness of the CPI is that it includes goods and services

that are not traded in the external trade (non-tradables), but it includes machinery and equipment that are very essential in the international trade. Also, the CPI is under serious influence of the different rates of indirect taxes and subsidies and sometimes subject to administrative price regulation. Nevertheless, despite these obvious weaknesses some authors (Bank of France, 1980; Enoch, 1978; Wickham, 1987) think that CPI is a good indicator not only as a price measure, but also as a measure of the operating costs. In fact, some factors of production especially the labour force, but also the other production inputs have tendency to follow the CPI trend.

The total CPI for all 22 trading partners as well as CPI's for the six groups of countries are calculated with the use of weights explained in the previous heading. The use of group's CPI is limited to the comparison between the relative prices in the Republic of Macedonia and its trading partners. They cannot be used as CPI for the EU, OECD or the CC's because in our calculations are not covered all member states of these groups.

## **1.2. Trend of NEER and REER of the MKD**

### **1.2.1. Nominal Effective Exchange Rate of the MKD**

Indexes of the nominal and real effective exchange rates of the MKD are calculated as weighted geometric means. They are calculated for the period January 1994 to December 2000, where January 1994 serves as base period. However, it does not mean that in January 1994 the exchange rate of the MKD was in the equilibrium level, but it just shows the trend of the effective exchange rates from the start of the macroeconomic stabilization policy supported by the financial arrangements with the IMF.

In the seven-year period under observation the exchange rate of the MKD was pegged to the DEM and only once, in July 1997 it was subject to devaluation of 16%. Therefore, the NEER was determined by the exchange rates of DEM with the currencies of the other Macedonian trading partners. In the period 1994-2000 MKD nominally appreciated for 50% due to the nominal depreciation of the exchange rates of the CC's, FR Yugoslavia and countries from the former USSR.

Relating to the EU countries, the NEER recorded slight depreciation of 3% in the first three months after the start of the stabilization policy, and afterward the restrictive monetary policy caused appreciation of almost 6% in the middles of 1995. Short before the devaluation in July 1997 the NEER of the MKD was on the same level as in January 1994. After the adjustment of the exchange rate of MKD the NEER has depreciated for 16%, holding that level till the end of 2000.

NEER of the MKD in relation to the trading partners from OECD had a trend of appreciation till the middle of 1996, afterward it started to decrease. The relation between DEM and US\$ where the later was continuously depreciating, mainly determined such trend. Eventually at the end of 2000, NEER of the MKD lost only 4% of its value comparing with the beginning of 1994 that is significantly less than the loss in relation to the trading partners belonging to EU. The reason for it can be found in the large nominal depreciation of the Turkish lira, Polish zloti and Hungarian forint relative to the MKD.

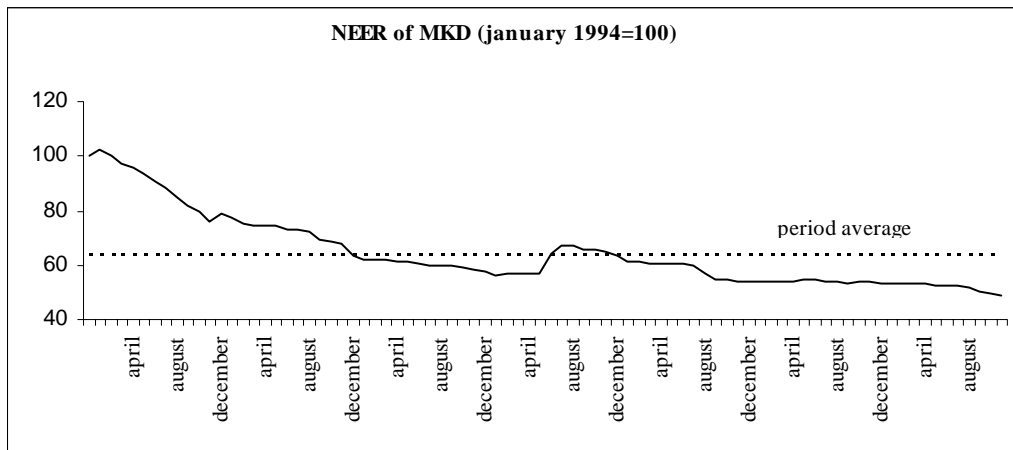
The path of these three currencies supplemented with the similar trend of the Bulgarian lev determined NEER of the MKD relative to the Candidate Countries for EU membership. MKD was continuously appreciating relative to the currencies of this group of trading partners increasing its nominal value in the observed period for 80%. Only

Czech koruna from this group of currencies has appreciated its nominal value relative to the MKD. The Slovenian tolar recorded nominal depreciation of 17% relative to MKD.

The 90% nominal appreciation of the MKD in relation to the Yugoslavian dinar has determined the NEER trend of the group of countries of the former YU and the Western Balkan countries. However, the changes of the NEER of the MKD were much more modest in relation to the other countries from these two groups.

NEER appreciated for more than 80% relative to the currencies of Russia and Ukraine till middle of 1995. Afterward, followed a period of stable exchange rate that lasted till the big financial crisis in Russia in August 1998. Then, resume the downward trend of the two currencies. At the end of 2000 NEER of the MKD was 95% more valuable than the currencies of the trading partners belonging to the former USSR comparing with January 1994.

Chart 1



Note: Decline means appreciation

Chart 2

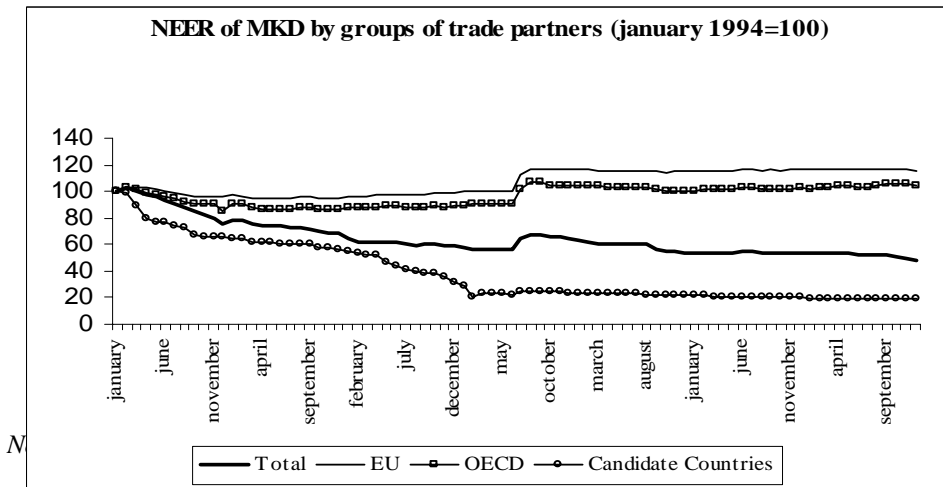
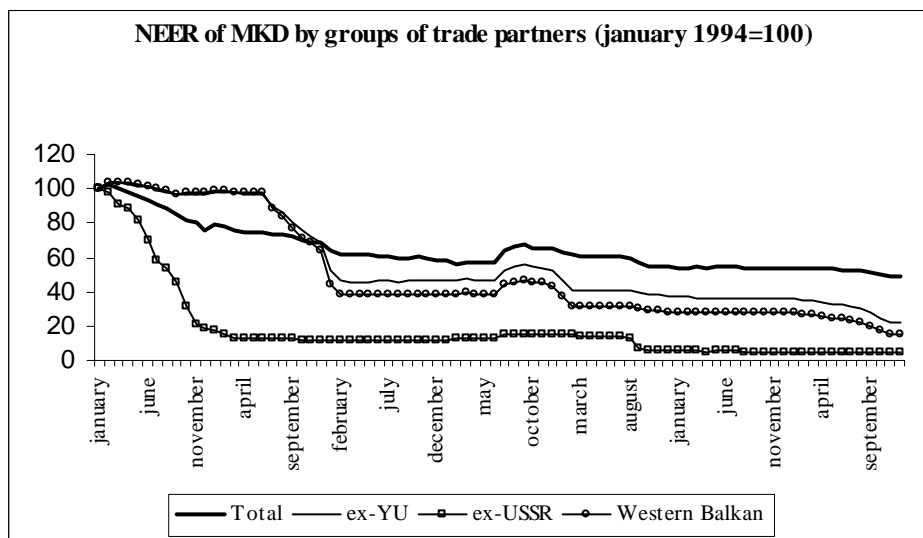


Chart 3



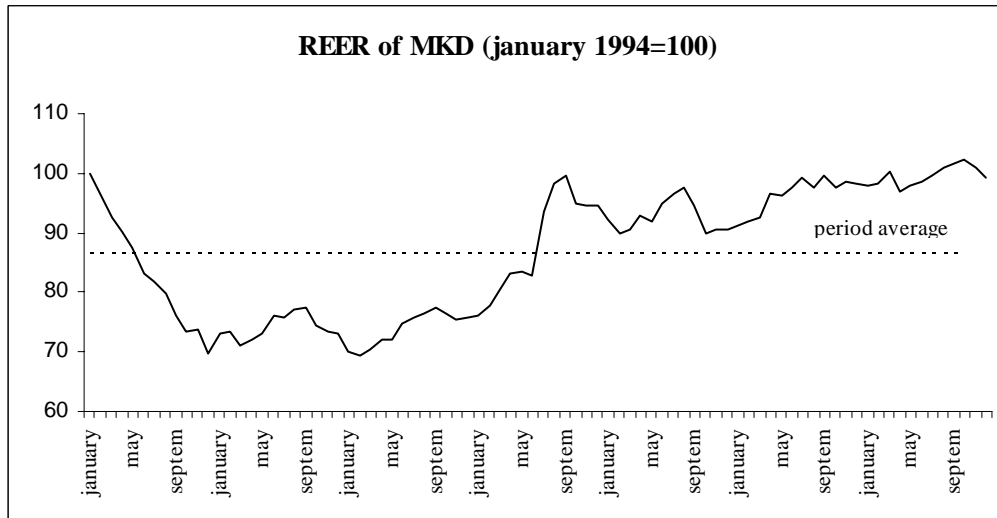
Note: Decline means appreciation

### 1.2.2. Real Effective Exchange Rate of the MKD

International price competitiveness of the MKD measured through the has stayed the same in the observed seven-year period, i.e. MKD had appreciated for 0.7%. By regions, the largest appreciation of 10% was recorded relative to the EU currencies and relative to the CC's, former YU and former USSR the REER of the MKD had depreciated for 16%, 7% and 8% respectively. However, the period average shows that MKD had lower price competitiveness relative to all six groups of trading partners. The largest average decrease of 15% is recorded relative to the trading partners from OECD, the lowest loss of competitiveness of 6% is realized relative to the trading partners from EU, with total average decline of price competitiveness of 13%.

REER of the MKD had appreciated for 30% in the first two years and after the nominal devaluation in July 1997 it started to regain the price competitiveness of the Macedonian economy. The main reason for such behavior lies in the relative CPI of the Republic of Macedonia and its trading partners. The first two years (1994 and 1995) were period of calming hyperinflation in the country, which was characteristic for the pre-stabilization period. Nevertheless, despite the calming trend, CPI was still very high (128% in the 1994 and 15.7% in the 1995). These high CPI rates combined with the MKD exchange rate pegged to the DEM resulted in the expected 30% appreciation of the REER in the first two years. Since 1996, the inflation was lowered to the level of the developed economies, which was a sound base to return the price competitiveness with the 1997 devaluation of 16%. Macedonia achieved better success in the inflation control than the CC's, therefore in the period from August 1997 till the end of 2000 the REER of the MKD was continuously depreciating, thus improving the price competitiveness of the Macedonian economy relative to the CC's.

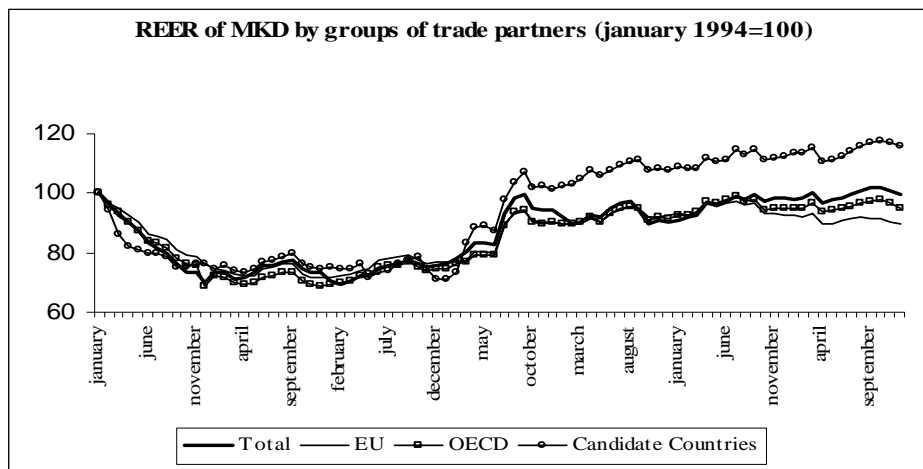
Chart 4



Note: Decline means appreciation

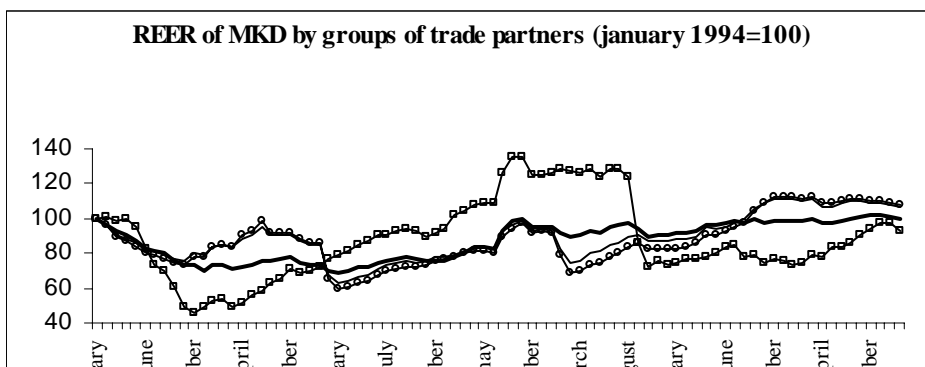
Historically, Macedonian economy had the worst price competitiveness in 1996. At the end of 2000 REER was significantly above the seven-year average that indicate to a good period from the point of view of price competitiveness.

Chart 5



Note: Decline means appreciation

Chart 6



*Note: Decline means appreciation*

## **2. Correlation analysis of the REER and external trade of the Republic of Macedonia**

### **2.1. Introduction**

High elasticity of the export and import to the changes in REER in a small open economy is a typical example from the macroeconomic textbooks. Appreciation of the REER of domestic currency diminishes the competitiveness of domestic production on the export markets and increases the competitiveness of imported goods on the domestic market. In other words, domestic goods are getting more expensive while imported goods are becoming cheaper in domestic currency. Therefore, import is growing and export falling leading to the deficit in the trade balance. The same but in opposite direction happens when the REER depreciates. This logic is the building bloc of all economic models of a small open economy and is actively used in the economic policy.

Macedonia is a small open economy where import in the last five years reaches between 40% and 60% of GDP and export between 30% and 45% of GDP. In this period it continuously registers trade deficit of around 10%. As we have seen in previous chapter there was a significant fluctuation of REER of MKD in the same period. Thus, a question that arises is the existence and the extent of any correlation between the REER of MKD and Macedonian foreign trade. The answer to this question is very important for the economic policy of the country because it can enable prediction of impact of the exchange rate policy to the Balance of Payments and economic growth of the country.

### **2.2. Correlation**

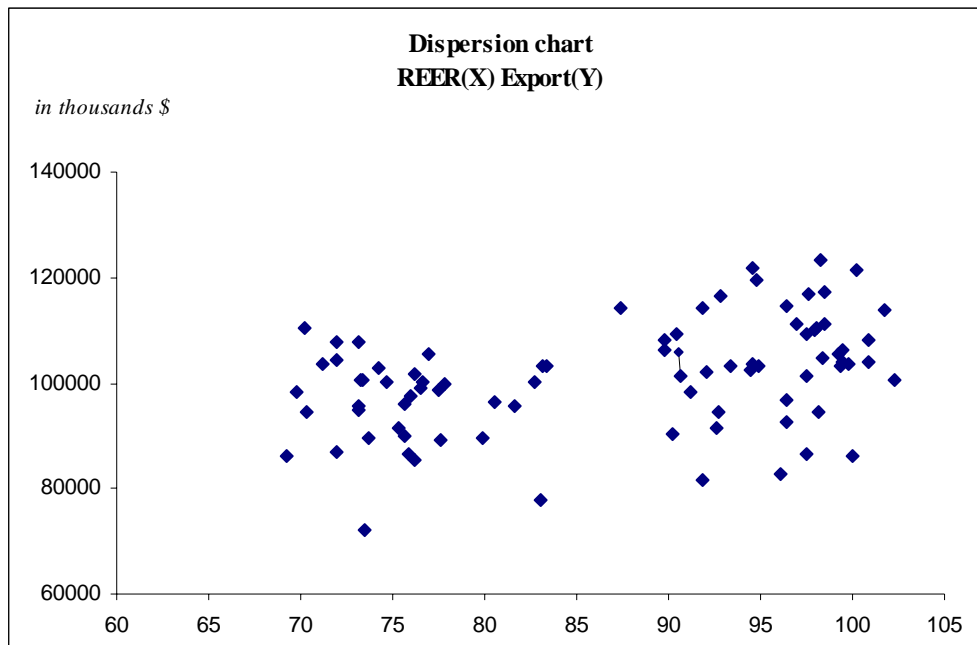
To come to the answer on the question of correlation between REER of MKD and external trade two elements are needed: monthly series of REER and seasonally adjusted export and import for the period 1994-2000. Preference is given to the seasonally adjusted data of the external trade instead of the original data in order to avoid the strong seasonal component that can distort the correlation analyze. The correlation analyses are made between the total REER and total export and import as well as between the REER and export and import of individual groups of trade partners.

#### *Correlation between REER of MKD and export*

The total coefficient of correlation between REER and export is rather low (0.398) giving arguments to the conclusion that there is very weak correlation between these two variables. According to this result, only 39.8% of the variations of export can be

explained with the fluctuations of MKD, while the biggest part of the variations of export is a result of the impact of other factors. The same is clearly visible on the dispersion chart that does not show any mutual dependence between two variables. Similar results have the coefficients of correlation between REER of EU and Countries from the former Yugoslavia and export on those markets (0.407 and 0.248).

Chart 7



On the contrary, the correlation analyses between REER of MKD and export on the markets of CC's and Countries from the former USSR reveals surprising and logically not apprehensible dependence. Coefficients of correlation of  $-0.695$  and  $-0.431$  suggest inverse dependence between the two variables that is significant for the CC's and weak for the Countries from the former USSR. Deeper analyses give the reasons for the unexpected result. In 1994 and 1995, Macedonian export into the CC's was between 30 and 40 millions of US\$, 80% of which were export to Bulgaria. In January 1996, was recorded sudden 90% drop of export to Bulgaria, the level kept in the whole forthcoming period. Something similar has happened with the import from Bulgaria too. It was halved in January 1996, keeping that level afterward. Obviously, in the period 1994-1995<sup>4</sup> were present strong irregular factors in the external trade between Macedonia and Bulgaria. It was the period of embargo imposed by the UN to FR Yugoslavia when its neighbors has taken the role of intermediators between the isolated FRY and the rest of the world. Therefore, in the structure of Macedonian export and import can be found some products that were neither before nor afterward present there. Although such behavior was the most characteristic in the external trade with Bulgaria, something similar can be noticed

<sup>4</sup> The same is true for 1993, which is not observed in this paper.

in the Macedonian trade with Turkey, Russia and Ukraine. By coincidence, the decline of the export to the markets of the CC's and the Countries from the former USSR has overlapped with the depreciation of REER of MKD in relation to the currencies of these two groups of trade partners, thus leading to the unexpectedly negative correlation coefficients.

Table 2

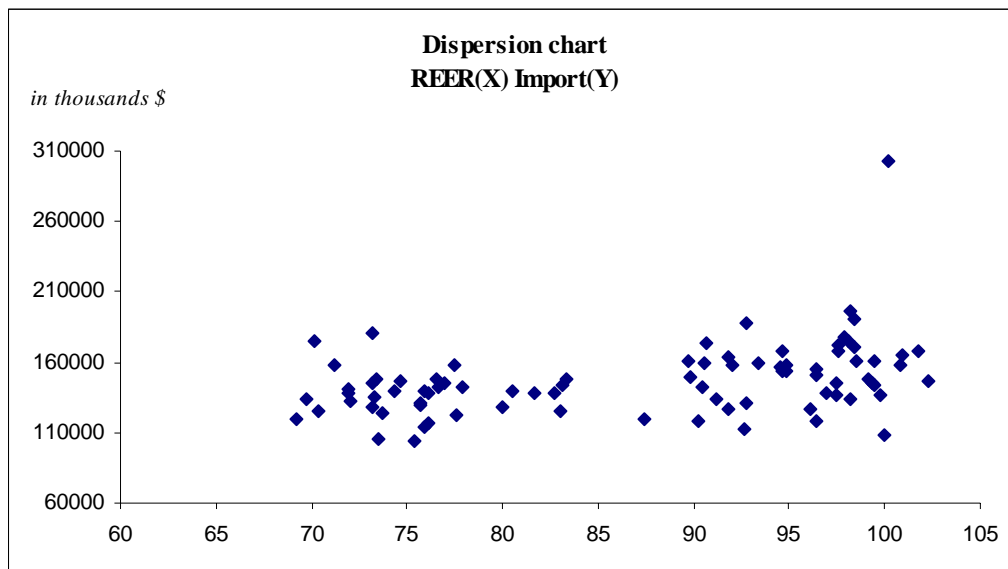
Correlation coefficients between REER and desesonalised export and import

	Export	Import
Total	0.398	0.374
EU	0.407	0.134
Candidate Countries	-0.695	-0.387
ex-YU	0.248	0.195
ex-USSR	-0.431	0.173

*Correlation between REER of MKD and import*

The dispersion chart of the points matching REER of MKD and the total Macedonian import are also highly dispersed indicating weak interdependence between the two variables. The same is confirmed with the estimated coefficient of correlation of 0.374 implying that major part of the variations in import are result of other factors than REER. Looking at the groups of trade partners, the coefficients of correlation are so low that every assumption that the REER has some influence on the decisions of the Macedonian importers have to be abandoned. Even, the coefficient of correlation between the import from the EU that is not distorted by irregular factors in 1994-1995 and REER of MKD in relation to the EU currencies is only 0.134. Concerning the import from the CC's it has inverse correlation with REER of MKD as well as the export has. The reasons are the same explained above.

Chart 8



### 2.3. Conclusion

Macedonian external trade is characterized with a very rigid structure, i.e. very low product diversification. In the export, 50% are attributed to the goods for processing from the textile and steel industry and additional 20% to 30% are products with very low level of processing like: fermented tobacco, wine in tanks, vegetables, lamb meat, lead, zinc, ferrous-nickel and ferrous-silicium. On the other side, most of the imported products in the Macedonian economy are not produced in the domestic economy at all, like: crude oil, machinery and equipment, automobiles, raw materials for manufacturing industry, household durable goods and some products from the food industry.

Because of the small domestic market the Macedonian manufacturing industry is export oriented but in same time highly dependent on imported raw materials. Thus, there is a closed circle in which the external demand generates growth of the domestic production that in turn creates high demand for imported raw materials and energy. However, the external demand is not an endogenous variable that reacts on the changes in the REER of MKD. On the contrary, the external demand is an exogenous variable in the Macedonian economy mainly determined by the market conditions in its trade partners. Because of the small market, Macedonian exporters have not other choice except to export at any price. If on this situation are added lacks of qualified management and proper marketing in the majority of the Macedonian companies, it is very clear that the exporters are in inferior position taking the terms set by the foreign buyer. Therefore, there is not any correlation between the REER of MKD and export/import.

The changes in REER of MKD have impact on the profitability of exporters. Appreciation of REER causes decline of profitability, while depreciation of REER of MKD has favorable influence to the profitability. However, the impact of REER of MKD is completely opposite to the importers. Depreciation of REER of MKD means higher input costs, i.e. fall of profitability. Therefore, it is difficult to say what is better for the Macedonian economy as a whole. Previous experience shows that in 1996 when MKD was the strongest in the seven-year observed period (30% real appreciation comparing with January 1994) foreign exchange reserves were decreasing eventually leading to the devaluation of the currency in July 1997. Then, till the end of 2000 followed a period of real depreciation (in December 2000 REER of MKD on the same level as in January 1994) joined with growth of foreign exchange reserves to the unprecedented level. Any conclusion based on it, that real appreciation of MKD has negative impact on the Macedonian economy and real depreciation a positive one would be premature. After lifting of UN embargo toward FR Yugoslavia at the end of 1995, Macedonia was faced with adverse external shock<sup>5</sup> due to the loss of speculative incomes gained from intermediation in the trade between FRY and the rest of the world. It caused fall of foreign exchange inflow and deterioration of foreign exchange reserves. Opposite to it, in 1998 and especially in 1999 and 2000 Macedonia was hit by large inflow of non-resident

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<sup>5</sup> Contrary to the general perception that UN embargo against FRY in 1992 was an adverse external shock for Macedonian economy and lifting embargo at the end of 1995 was a positive external shock, the situation was opposite. In an irregular transition economy as Macedonian economy was, on the short run the inventive speculators closed to the government have turn the embargo into a powerful source for foreign currency inflow. Nevertheless, on the long run it's true that the UN embargo against FRY was an adverse external shock on the Macedonian economy.

consumers through the non-government organizations and NATO forces, which were the main causes for huge inflow of foreign currencies. In both cases there was not direct relation between the appreciation and depreciation of REER of MKD and outflow or inflow of foreign currencies. At the end, it can be summarized in two points:

- On the macro level, because of the high dependence of Macedonian economy from exogenous external shocks, the economic policy has very little room for use of exchange rate policy as a tool for Balance of Payments management;
- On the micro level, profitability of the companies with significant external trade is highly dependent on the changes of REER of MKD. This fact, supplemented with the commodity prices forecasts can be used in the business planning and evaluation of the credit worthiness of the companies.

### **List of used acronyms**

GDP	Gross domestic product
VAT	Value added tax
EU	European Union
CC	Candidate Countries for EU membership
IMF	International Monetary Fund
MKD	Macedonian denar
NEER	Nominal Effective Exchange Rate
REER	Real Effective Exchange Rate
OECD	Organization for Economic Cooperation and Development
UN	United Nations
USSR	Union of the Soviet Socialist Republics
CIF	Costs insurance freight
FOB	Free on board

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