THE OPENNESS OF THE COUNTRY, CURRENCY SUBSTITUTION AND MONETARY POLICY[*]

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Abstract The paper discusses the impact of the openness of a country and currency substitution, both important features of the Croatian economic and monetary system, on monetary policy. The author claims that standard macroeconomic models tend to overlook the presence of currency substitution and, consequently, result in misguided monetary policy recommendations. He argues that the openness of a country and the size of currency substitution affect the ratio of international reserves to the reserve money and can seriously limit monetary policy since open countries with high currency substitution will normally be more sensitive to international capital flows and foreign exchange fluctuations.

1
INTRODUCTION

Most macroeconomic textbooks pay too little attention to the effect of the openness of a country on its macroeconomic policy. Very rarely can one find a textbook that seriously discusses the effect of currency substitution on monetary policy. This means that nowadays students learn about macroeconomics as though all the countries of the world were like the USA or the EU: large, relatively closed and enjoying the unlimited confidence when it comes to their own currency. Furthermore, the level of knowledge attained by an economist of average education is such that he is just aware of the theory of a close connection between the exchange rate and prices in small and open economies. Nothing more than that.

Nowadays the reality appears so complex that it seems that standard macroeconomic models rest upon mistaken assumptions (or that they lack certain important assumptions). Thus, many small and open economies have for decades experienced currency substitution - that is a large scale tendency to keep savings, and even make payments, in a foreign currency, which, as a rule, is a hard currency[1]. However, when considering their macroeconomic measures, many economic policy makers disregard this fact. However, currency substitution can have serious consequences. For example, monetary expansion with the goal of bringing down interest rates may lead to a rapid depreciation of exchange rates and the spread of currency substitution. In these circumstances, the banks will use their excess liquidity, not for credit expansion, but rather to buy foreign currency. What the protagonists of economic policy wanted to achieve with monetary expansion will therefore remain unrealised despite their good intentions, since they did not take into account the effect of currency substitution.

For a large currency area, such as the USA, it may be expected that monetary policy will be run differently than is the case in a small currency area such as Belgium, Panama, Austria, Croatia or France (prior to the creation of the Euro zone). In a large currency area it is more likely that it will be turned in on itself, closed, rather insensitive to the inflows and outflows of international capital in and from the country or currency region, and therefore less favourable to currency substitution. For a small currency area it is more likely that it will be open, sensitive to the

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[1] *In some works, this phenomenon has been named unofficial dollarization or unofficial euroization. Here, currency substitution is used as a sinonym.*

international capital flows and more favourable to currency substitution. This is the central hypothesis tested in this study.

The testing is carried out in an unorthodox manner. Instead of the usual openness indicators, such as the share of imports and exports in the GDP, an alternative monetary measurement of openness is applied - the indicator of the structure of assets of the central bank. It is assumed that in open countries the share of international reserves in the central bank assets will be greater than it is in closed countries. For this reason the starting point of this study is the hypothesis that in open countries the ratio of international reserves to the money supply (R) is relatively larger than in closed countries. This means that the hypothesis tested is that additional unit of accumulated international reserves results in less domestic money created in open than in closed economies[2].

The ratio of international reserves to reserve money (R) is used as a dependent variable. On a large sample of countries, it is shown that this monetary measure of openness is positively related to the traditional measure of openness (import/GDP), but also to currency substitution. In other words, in countries with a small population and currency substitution, there is a greater probability that we will find a high level of reserves, or a relatively small share of the domestic loans in the balance of the central bank, which is reflected in a high ratio of international reserves to the reserve money.

In the first part of the study we will discuss the ratio of international reserves to the reserve money as an alternative monetary measurement of openness. In the second part, we will discuss currency substitution and present econometric results of the effect of currency substitution on the alternative measurement of openness. In the third part some conclusions will be drawn.

2
ALTERNATIVE MONETARY MEASURE OF OPENNESS

In economic literature, the openness of a country is usually measured using data on its international trade. Imports are placed in relation to the GDP, or imports and exports are added together and placed in relation to the GDP. The discussion usually follows on whether services and current transfers or perhaps factor income should also be taken into consideration.

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[2]   *For an explanation see the Appendix at the end of the study.*

In the broadest sense, some measure of current international transactions is related to GDP. Figure 1 shows the correlation between one such measure of openness (import of goods/GDP in percent) and the size of the country in terms of population. The correlation shows that countries with larger populations are also more closed insofar as they absorb relatively fewer goods from abroad. The regression equation is (t-tests in parentheses):
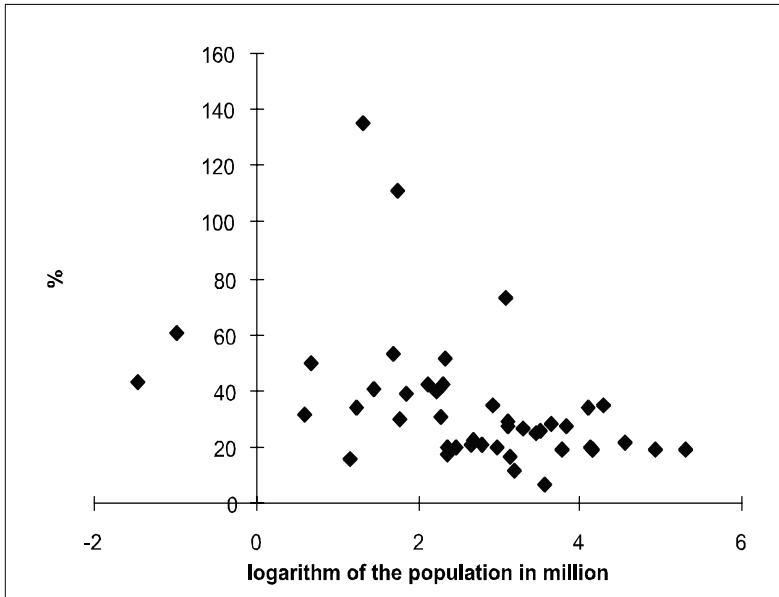
$$(IM/Y) = 53.21 - 7.17\ln(N) \qquad\qquad R^2 = 0.17$$
$$(7.44) \quad (-2.97)$$

where (IM/Y) is the share of imports in the GDP and N is the population.

Figure 1

THE LOGARITHM OF THE POPULATION AND THE AVERAGE RATIO OF IMPORTS TO THE GDP, 1992-1997 IN 44 DEVELOPING COUNTRIES[3]

Due to the fact that in the construction of the openness indicator attention was turned to the current account of the balance of payments (that was a result of the capital controls) for years the sufficiency of

[3] *The 44 countries are: Argentina, Belize, Chile, Costa Rica, Ivory Coast, Ecuador, Egypt, Greece, Guatemala, Honduras, Indonesia, Israel, Jordan, Kenya, Korea, Kuwait, Malaysia, Malta, Mexico, Morocco, Nepal, Pakistan, Peru, Philippines, Portugal, Saudi Arabia, Singapore, South Africa, Sri Lanka, Tanzania, Thailand, Tunisia, Turkey, Uruguay, Venezuela, Yemen, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia.*

the international reserves of a country was estimated from the point of view of their relationship to imports. Thus the rule was affirmed that a sufficient level of international reserves needs to cover three average monthly values of imported goods. However, this rule is directly linked to the financial and only indirectly to the current foreign currency flows. That is to say, delays of payments are usually approved up to a maximum of 90 days, and the three-month-reserves rule provides a possibility to use international reserves in order to compensate for any distortion in approval of payments delays, which may result from an unexpected political event or any other phenomenon causing international financial distrust.

The three-month-import rule suited the needs of economic analysis and running of economic policies at a time when most international financial flows were closely linked to merchandize trade trends. For this reason, the traditional measurement of openness (import/GDP) was also very suitable at the time. In the meantime, the global financial landscape has changed: many financial flows have taken on an independent character. Direct investment and portfolio foreign investment, international borrowing, flows of deposits in order to exploit interest rate differentials, are all financial flows which are not necessarily directly linked to international trade (although financial and commercial openness follow each other on a country level, but not on the level of individual businesses).

Moreover, in many countries since the 1970s, the currency substitution has emerged. Currency substitution is sometimes called unofficial dollarization and is related to the substitution of the domestic currency for a foreign one in some or all functions of money (Balino et al 1999). Therefore, openness measures that are linked to the current international flows are no longer appropriate. We need more broadly defined openness measurements - such that reflect the influence of international financial flows.

Measurements which rest on the indicators of the structure of assets of the central bank, even the entire banking system, seem to be good candidates for this role. It is to be expected that smaller countries, which are more open and more sensitive to international financial flows, will have a greater share of international reserves in the assets of their central banks, since at times of expansion on the basis of the capital inflow, they will increase the reserve money by purchasing foreign currency, thereby accumulating foreign currency for a possible intervention on the market at times of recession (to avoid a foreign currency crisis). On the other hand, it is to be expected that larger countries will enjoy greater autonomy in running their monetary policies, that is, greater possibilities to run their monetary policy through the expansion and contraction of the central bank domestic

credit. Such countries will have fewer problems with volatility of the exchange rate as well as with volatility of the capital inflow.

Figures 2 and 3 show the link between the traditional openness measurement (import/GDP and the population) and the monetary openness measurement (international reserves/reserve money). The coverage ratio R is calculated on the basis of data from the International Finance Statistics of the IMF, as the ratio of foreign assets in the central bank assets and the reserve money. The ratio was calculated at the end of 1997, so it relates to the end of the period in which the traditional openness measurements were used (calculated as the averages of annual data for the period 1992 to 1997)[4].

Figure 2

LOGARITHM OF THE POPULATION AND THE RATIO OF INTERNATIONAL RESERVES TO MONEY STOCK IN 1997 FOR 44 DEVELOPING COUNTRIES

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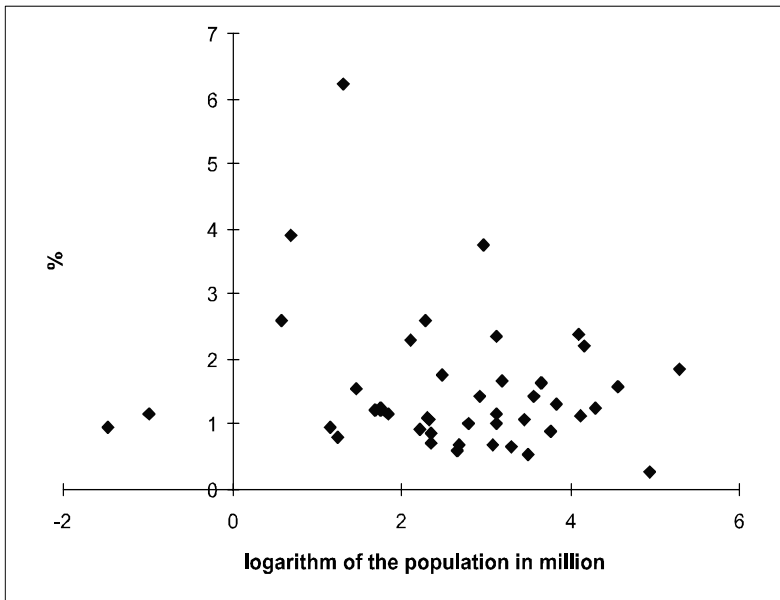
[4] *The openness ratio was originally calculated for another study (Šonje and Vujčić, 2000). The elements of the sample were determined on the basis of availability of comparable data. It should be pointed out that the calculation of the ratio of central banks' foreign assets to money stock for the end of 1997 probably shows higher values for average coverage than normal, since in 1997 the movement of international capital was very large. However, in this study, the average values are not important, but rather the variability of the ratio between countries. Therefore, the choice of period does not effect the result. It is also presumed that the result is not influenced by the fact that the comparative results relate to one year, rather than the annual average over a longer time period.*
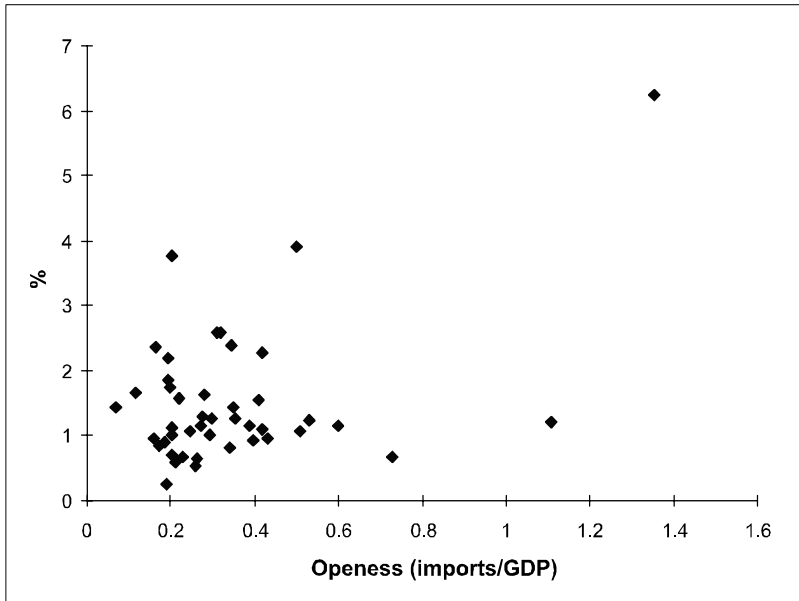
Figure 3

OPENNESS (IMPORTS/GDP 1992-1997) AND THE RATIO OF INTERNATIONAL RESERVES TO MONEY STOCK IN 1997 FOR 44 COUNTRIES

Regression analysis showed that the size of a country measured by the population cannot explain the value of the international reserves ratio to money stock (R). However, it appeared that the reserves ratio is related to the country's openness (with the imports and GDP ratio):

$$R = 0.8461 + 1.9592(IM/Y) \qquad R^2 = 0.193$$
$$(3.29) \qquad (3.17)$$

In other words, the more important international trade is for a country, the greater the international reserves ratio to the reserve money. Therefore, coverage ratio is not only a monetary, but also a structural phenomenon which depends on the international economic position of the country, that is its openness. Moreover, the equation shows that the average ratio R for 44 developing countries (if we ignore the influence of their openness, that is, we only consider the constant element) equals 84.61 percent. If we add to that 80.32 percent money stock coverage, which may be expected on the basis of the openness indicator of 41 percent for Croatia (0.41*1.9592), we get the expected values of coverage R for Croatia of 164.9 percent. This level is somewhat greater than the recorded ratio, which was 154.71 percent at the end of 1997. Distancing ourselves from the use of

comparative regression parameters for the calculation of expected values, we can conclude that the money stock coverage by international reserves is somewhat lower than expected on the basis of the calculation for the group of considered developing countries. Such a result speaks against the hypothesis that Croatia's reserves are too high, and supports the claim that they are in fact still too low (Dubravčić and Mervar, 1998).

The simple arithmetic mean of international reserves ratios to money stock for the group of the considered 44 developing countries is 151.9 percent (notice that Croatia is close to the average itself). The variance in the ratio ranges from 25.4 percent for Pakistan (a country with 138 million people and the imported goods and service ratio to the GDP of less than 20 percent) to 622.9 percent for Singapore (a country with 3.7 million people and the fantastically high ratio of imported goods and services to the GDP of 135 percent).

The group of 44 developing countries includes eight transition countries (Bulgaria, the Czech Republic, Croatia, Hungary, Poland, Romania, Slovakia and Slovenia). The average coverage ratio for the eight transition countries is 174.3 percent (Croatia was below average in 1997). The lowest coverage ratio at the end of 1997 was present in the Czech Republic (106.7 percent) while the highest one was in Slovenia (390.1 percent).

Finally, it might be interesting to compare these data with the data for the most highly developed countries. To this end, we used data for the G-7 member states (USA, Canada, Germany, Japan, France, Italy and the UK). The average coverage in G-7 countries is much smaller than in the first two samples and amounts to 57.2 percent. However, the range of variance is unexpectedly wide in the G-7: it goes from 13.6 percent in the USA to 103.7 percent in France.

Table 1

RATIO OF INTERNATIONAL RESERVES AND MONEY STOCK (R) IN 1997 IN PERCENTAGES

	44 developing countries*	8 transition countries	G-7
Simple average	151.9	174.3	57.2
Minimal value	25.4	106.7	13.6
Maximum value	622.9	390.1	103.7

includes 8 transition countries
Source: International Finance Statistics, IMF

The data in table 1 reveal the structure of the global monetary system. Developing countries need much more international coverage of the domestic money supply due to the lack of confidence in the local currency. This also means that the production of this kind of currency is expensive, whilst the country is still paying the opportunity costs for the production of domestic currency. This cost is equal to the difference between domestic and global interest rates (for the latter it may be presumed that they are equal to the interest a country earns on its international reserves), multiplied by the supply of the domestic currency. The cost of production of one's own currency cannot be eliminated by a simple increase of the money supply, since this kind of action could lead to further currency substitution and/or a currency crisis where the coverage ratio is adjusted through a sudden weakening of the domestic currency[5].

In transition countries the average coverage R is higher than in developing countries. None of the eight transition countries observed has a coverage ratio of less than 100 percent. However, it is particularly interesting that the coverage ratio in the Czech Republic and France do not differ significantly. Amongst the seven most developed countries of the world, where the coverage ratio is, as expected, the lowest, there is a large difference between the three countries offering global currencies (USA, Japan and Germany) and the other four countries, whose currencies do not have the characteristics of a global currency (their currencies are not sought as parts of the international reserves of other countries on a large scale). Apart from France, with a coverage ratio of 103.7 percent, these are: Canada, 74.3 percent, the United Kingdom, 72.9 percent and Italy, 69.4 percent. The "strongest" three are: USA (13.6 percent), Japan (27.2 percent) and Germany (39.8 percent).

The coverage ratio approximately follows the currency structure of global reserves, and ensuing from this, there are only three "large, closed economies" in the world of today. All other national economic systems come close to what we usually describe as small and open economies. Nowadays, this is equally true for Croatia as for France (especially before the creation of the Euro zone. Ever since we can speak of the Euro zone as a large and closed economic system). It is an illusion to imagine that these are predominantly monetary phenomena, or that the position of individual countries on the global monetary ladder can be measured by how

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[5] *An adjustment occurs for foreign assets grow by depreciation (when expressed in domestic currency) whilst the money stock, which is by definition expressed in the domestic currency, stagnates, so that there is a positive correlation between the nominal exchange rate and the coverage ratio.*

independent their monetary decisions are. The problem is much more complex and encompasses all aspects of the economic, social, political and geo-political system. The world would truly be incredibly simple if everything depended merely on central banks.

Finally, the conclusion can be drawn that the coverage ratio of reserve money by international reserves (R) is a plausible monetary approximation of the openness of an economic system.

3
CURRENCY SUBSTITUTION

At first sight one could conclude that a high ratio of international reserves to reserve money could signalise an insufficient supply of money in the economy (for the basis for monetary multiplication - reserve money, is relatively low). This fact, combined with the transitional phenomena of illiquidity and insolvency, made some economists conclude that the solution to the problem lies in the monetary and credit expansion (Baletić and Zdunić, 1999). In support of this claim, it is often said that the ratio of money supply to the GDP in Croatia is unusually low. However, no arguments have ever been offered on the structure of the global monetary system, which presents an important limiting factor to the solution of the problem by means of monetary expansion alone.

Šonje and Vujčić (2000) showed that the ratio of the money supply and the GDP, which is an inverse indicator of money velocity, depends on the level of currency substitution: the more widespread the currency substitution (the role of a foreign currency), the greater the speed of circulation of the domestic currency[6]. In the continuation of this study, the same approach will be applied, but the reserve money coverage by foreign reserves will serve as a dependent variable. We will test the hypothesis that countries with currency substitution have a greater coverage ratio R, for in conditions where a large proportion of savings are in foreign currency, it is very dangerous for the country to be exposed to the risk of reducing the reserves under a critical value for the ratio R, which is much higher here than in countries without currency substitution.

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[6] *What is called the circulation speed here is a mere tautology. It means that in fact money does not have to circulate more rapidly, but that one portion of the GDP is realised by transactions which are settled in a foreign currency.*

The greatest limitation to research, when dealing with currency substitution, are the data. Currency substitution is usually measured by the foreign currency deposits share in the broadly defined money supply. To date, the best source of comparable data is to be found in the study by Balino, Benett and Borzenstein (1999). The limitation of their data lies in the fact that a comparison for a large number of countries is only possible for the period 1993-1995. However, it is well known that currency substitution is very rigid, and according to some authors, even irreversible (Guidotti and Rodriguez, 1992). The Croatian experience confirms this too, so that one can presume, without losing any credibility, that the situation survey regarding currency substitution in the middle of the 1990′s is representative of a longer time period.

The test was carried out in two variants, in two steps. The first step was to examine the association between the monetary openness measure (R) and the share of foreign currency deposits in the broadly defined money supply. In the second step, new variables were added to the regression equation, in order to test robustness of the results on the influence of currency substitution on the coverage ratio. Both steps were used in both variants of testing. The first variant started from the 44-member sample of countries mentioned in the first section. From the Balino-Bennet-Borzenstein sample countries were selected which were included in the 44-country sample, and the test was carried out on a smaller sample. In the second variant, the Balino-Benett-Borzenstein sample of countries was used, and coverage ratios were calculated for them on the basis of data from the International Finance Statistics of the IMF. Thus according to this second method of sample definition, the maximum number of countries was included in the sample.

The first method of testing yielded the following regression equation (t-tests in brackets) for 21 countries (in these countries our sample from the first section overlaps with the Balino-Benett-Borzenstein sample):

$$R = 2.3259(D/M) + 1.9897(IM/Y)$$
$$(3.53) \qquad (3.56)$$

where (D/M) is the share of foreign currency deposits in the broadly defined money supply. The parameters show that a 10 percent share of foreign currency deposits is related to, on average, a 23.3 percent ratio of coverage, and that a 10 percent indicator of openness is linked, on average, to a 20 percent coverage ratio. These results can only be obtained in an equation without a constant, which is logical from the point of view of economics, for

in a completely closed country, without foreign currency reserves, there is no reason at all to keep international reserves (and the constant equals zero).
The following regression equation reflects the link between the key variables for the entire sample of countries for which Balino, Benett and Borzenstein and their associates, gathered comparable data (t-tests in brackets):[7]

$$R = 2.7152(D/M) + 0.2441N$$
$$(5.93) \qquad (3.31)$$

The parameter that accompanies the logarithm of the population (N) has an unexpected sign (the larger the country, the greater the coverage ratio). This variable was applied because for some of the countries in the sample it was not possible to calculate the indicator of openness (imports/GDP) in a comparable manner. However, the parameter of the foreign currency deposits share in the broadly defined money supply, remained positive and significant, and just slightly higher in comparison to the value from the regression for 21 countries. To this extent this result is robust and we can conclude that currency substitution, along with openness in international trade, is an important factor which can explain the level of reserve money coverage by international reserves: the greater the substitution and openness, the greater the coverage (R). An amount of caution is advisable in the light of the fact that the parameters become insignificant when a constant element is included in the equation.

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[7] *When, due to the lack of data in the International financial Statistics of the IMF, Uzbekistan and Vietnam were omitted from the sample, 54 countries that remained in it were: Argentina, Azerbajan, Byelorus, Bolivia, Cambodia, Costa Rica, Croatia, Georgia, Guinea-Bissau, Lao, Latvia, Mozambique, Nicaragua, Peru, Sao Tome and Principe, Tadjikistan, Turkey, Uruguay, Albania, Armenia, Bulgaria, the Czech Republic, Dominica, Ecuador, Egypt, El Salvador, Estonia, Guinea, Honduras, Hungary, Jamaica, Jordan, Lithuania, Macedonia, Malawi, Mexico, Moldavia, Mongolia, Pakistan, the Philippines, Poland, Romania, Russia, Sierra Leone, Slovakia, Trinidad and Tobago, Uganda, Ukraine, Yemen, Zambia, Greece, the Netherlands, the United Kingdom.*

4
CONCLUSION

The analysis has shown that the ratio of international reserves and reserve money (which indirectly means the ratio of reserves and deposited money)[8] is not variable under the unlimited influence of the monetary policy makers. This ratio depends on the extent of currency substitution and the level of openness of the country, which means that it depends on historical factors. A higher coverage ratio can be seen in smaller countries with widespread currency substitution, since the confidence in the domestic currency is weaker there, and the need for foreign currency due to the openness of the country is more frequent and relatively greater.

When powers are at work which make a high coverage ratio optimal, than an independent monetary policy whose aim is to reduce coverage ratio cannot be successful. The parameter of the foreign currency deposits share in the last regression can be used to illustrate this statement statistically (2.71). By multiplication of that parameter with the foreign currency deposits share, the optimal value of coverage for each country is obtained. At that point, significant deviations of various countries were sought, where values are below the optimal ones[9]. As the data in Table 2 show, the greatest differences (more than 30 percentage points below the optimal values) were found in Bolivia, Belarus and Uruguay, a moderate difference (20 to 30 percentage points below the optimal values) in Nicaragua, and a small difference (10 to 20 percentage points below the optimal values) was seen in Ukraine, Pakistan, Azerbaijan. If we bear in mind the results these countries have achieved in their process of development, we can conclude that an expansive monetary policy with the aim of lowering the coverage by reserves would probably end in failure. In countries which in structural terms are aiming at a higher ratio R (because of the position they occupy in the global commercial and financial system), too large an expansion would probably lead to a currency crisis. The R ratio automatically adjusts upwards during a currency crisis, for by depreciation of the exchange rate the value of foreign assets grows when expressed in the domestic currency, whilst the value of money stock remains unchanged (it is assumed that the money stock is not indexed in any country). According to this hypothesis, a fall in

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[8] *For an explanation see the Appendix at the end of this study.*

[9] *It should be noted that the omission of the influence of the size of the population parameter effected the results in that it lowered the optimal coverage and reduced the number of countries in the group with coverage significantly below the optimal.*

the ratio precedes a currency crisis or depreciation in the exchange rate.[10] This hypothesis needs to be tested in future research.

Table 2

COUNTRIES WHOSE R RATIO IS SIGNIFICANTLY BELOW THE OPTIMAL VALUE (in percentage points)

10-20	20-30	More than 30
Ukraine	Nicaragua	Bolivia
Pakistan		Belarus
Azerbaijan		Uruguay

Finally, it is worth mentioning that the data on currency substitution are very unreliable. Attempts at exact measurement of currency substitution are only in the very early stages, especially when it comes to one aspect of the substitution that is related to the foreign currency in circulation. It is still too early for these estimates to be used in econometric research. This is the reason for the issue of measurement and definition, and the measurement of the effect of a wider group of illustrative variables, to be considered the biggest limitation of this analysis.

The final question, which will remain unanswered for some time, is the issue of the production cost of one's own currency. We established that the price is equal to the opportunity cost, that is, the product of multiplication of the money stock and the difference between the domestic and global interest rates.[11] Many European countries with centuries long currency tradition have decided that this price was too high for them to pay.[12] This is quite understandable if it is recognised that even countries such as the Netherlands and France had a ratio of international reserves to their money stock above the level of 100 percent. Moreover, in our sample of 54 countries only 15 of them had a coverage of less than 100 percent. Alongside the United Kingdom as a developed country which in the past offered a global currency, these are: Costa Rica, Greece, Uruguay, Belarus, Georgia, Guinea Bissau, Albania, Dominica, El Salvador, Jamaica, Pakistan, Russia, Sierra Leon, Ukraine. Although the time of measuring the coverage ratio

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[10] *Naturally, assuming that the fall in the R ratio is not compensated for by an opposite change of the monetary multiplier - for an explanation see the Appendix at the end of this study.*

[11] *The full cost includes a correction by the sum of the multiplication.*

[12] *The most important studies on this subject to be published recently are Mundell (1999), Eichengreen and Hausmann (1999) and Calvo (1999).*

(1997) probably shows a higher ratio than in normal times, it is hard to understand why Croatia should be expected to join a group of countries with a lower coverage ratio of money stock by foreign currency reserves[13].

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[13] *The last sentence is a criticism of some Croatian economic thinkers who maintain that the entire economic problem of Croatia boils down to the problem of "missing money" (such as Baletić and Zdunić, 1999).*

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APPENDIX:

The role of monetary multipliers and statistical data

The main subject of this study has been the ratio of coverage of money stock by international reserves. The conclusions of the study lie upon the assumption that there is no direct link between the coverage ratio and monetary multiplier. If such a link did exist, a higher monetary multiplier could better compensate for the level of the coverage ratio, and the supply of domestic currency, M1, would not depend on the coverage ratio.

The data in Table A have been calculated for the same group of countries as the data in Table 1. Table A shows the share of cash money in the money stock. This share is the most important determinant of the monetary multiplier (the higher the share of cash, the lower the multiplier), and is also suitable for international comparisons. National definitions of money stock may differ depending on whether there are securities issued by the central bank (some countries include those into their money stock, and some, like Croatia, do not).

Table A

**THE SHARE OF CASH MONEY IN THE MONEY STOCK
(C/M1) IN PERCENTAGE POINTS FOR 1997**

	44 developing countries*	8 transition countries	G-7
Simple average	42.8	40.8	23.5
Minimal value	10.0	28.4	14.6
Maximum value	78.0	57.4	34.2

* including 8 transition countries
Source: International Finance Statistics, IMF

The data in Table A reveal that a higher coverage ratio is not related to a higher multiplier (which is inversely proportionate to the cash ratio in the money stock). More developed countries on average have a lower coverage ratio (Table 1) and a higher multiplier (a lower C/M1 ratio) whilst developing countries and transitional countries have a higher coverage ratio (Table 1) and a lower multiplier (that is a higher C/M1 ratio).

A regression analysis confirms the statistical approximation. In the equation with a constant, the parameter (C/M1) is not significant, whilst in the equation without a constant, the share positively affects the coverage ratio R. Since the share has a negative relation to the multiplier, the conclusion can be drawn that the lower multiplier gets reflected in a higher coverage ratio. This implies that a higher coverage ratio R means that in smaller and open economies fewer units of domestic currency are produced per unit of international reserves than in closed economies.

$$R = 2.9722(C/M1)$$
$$(7.79)$$

Finally, the data used in the regression analysis for the calculations in Tables 1 and A are given in Table B.

Table B.

	Log N	N	OPEN	R	FCD/M	C/M1
Argentina	3.57431	35.67	0.068745	1.427606	0.439	0.620566
Belize	-1.46968	0.23	0.43083	0.945946		0.399892
Chile	2.68239	14.62	0.227294	0.685814		0.301184
Ivory Coast	2.66026	14.3	0.211186	0.601429		0.529444
Ecuador	2.479894	11.94	0.198442	1.754714	0.054	0.342817
Egypt	4.127296	62.01	0.200919	1.13511	0.251	0.579268
Greece	2.353278	10.52	0.173325	0.856568	0.216	0.445054
Guatemala	2.353278	10.52	0.202786	0.704029		0.407602
Honduras	1.846879	6.34	0.389511	1.153787	0.13	0.399687
Indonesia	5.297667	199.87	0.194464	1.846591		0.41323
Israel	1.763017	5.83	0.297862	1.252581		0.391366
Jordan	1.752672	5.77	1.108793	1.215352	0.152	0.607343
Kenya	3.500741	33.14	0.260849	0.525838		0.397425
Korea	3.828424	45.99	0.275355	1.297882		0.440918
Kuwait	0.593327	1.81	0.318728	2.597095		0.276794
Malaysia	3.075929	21.67	0.730147	0.671319		0.257846
Malta	-0.99425	0.37	0.601212	1.15339		0.744276
Mexico	4.568506	96.4	0.219621	1.587144	0.072	0.353184
Morocco	3.307253	27.31	0.262123	0.652333		0.291663
Nepal	3.117507	22.59	0.291945	1.007346		0.723002
Pakistan	4.928412	138.16	0.190312	0.25378		0.388753
Peru	3.193353	24.37	0.116463	1.662387	0.64	0.252191
Philippines	4.297693	73.53	0.352265	1.259974	0.215	0.539331
Portugal	2.282382	9.8	0.309697	2.599296		0.158968
Saudi Arabia	2.969902	19.49	0.201668	3.760302		0.324298
Singapore	1.319086	3.74	1.354667	6.229167		0.389081
South Africa	3.769076	43.34	0.187441	0.899531		0.099963
Sri Lanka	2.92047	18.55	0.347789	1.430191		0.532085
Tanzania	3.450305	31.51	0.246659	1.068767		0.582906
Thailand	4.104295	60.6	0.34382	2.391231		0.776564
Tunis	2.221375	9.22	0.395018	0.930147		0.343165
Turkey	4.154969	63.75	0.194041	2.192312	0.461	0.401264
Uruguay	1.169381	3.22	0.16102	0.958373	0.761	0.631224
Venezuela	3.125883	22.78	0.165563	2.353411		0.176596
Yemen	2.802148	16.48	0.203141	1.012696	0.209	0.762718
Bulgaria	2.11746	8.31	0.42	2.278907	0.284	0.573768
Croatia	1.458615	4.3	0.41	1.547003	0.574	0.385079
Czech R.	2.332144	10.3	0.51	1.068717	0.059	0.283802
Hungary	2.317474	10.15	0.42	1.108495	0.266	0.431344
Poland	3.654547	38.65	0.28	1.6442	0.204	0.441851
Romania	3.116622	22.57	0.27	1.166346	0.217	0.512763
Slovakia	1.682688	5.38	0.53	1.233646	0.111	0.294221
Slovenia	0.688135	1.99	0.5	3.901158	0.311	0.340422
Canada	0.742626			0.177436		
France				1.037152		0.146405
Germany				0.397853		0.297822
United Kingdom				0.72924	0.154	n.a.
Italy				0.694241		0.187792
Japan				0.271541		0.258126
USA				0.136399		0.3419

List of Variables:

N   size of the population according to the latest data from the International Finance Statistics of the IMF

Log N   logarithm of the population in million

OPEN   indicator of openness (the average ratio of imports of goods and services and the GDP for 1992-1997)

R   ratio of coverage of money stock (IFS code 14) by international reserves in 1997, when international reserves were defined as foreign assets of the central bank expressed in the domestic currency (IFS code 11)

FCD/M   share of foreign deposits in the broadly defined money supply

C/M1   share of cash in circulation in the money stock (IFS code 14a for cash and 34 for the money stock).