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**Lubomira Anastassova**

**Institutional Arrangements of Currency  
Boards – Comparative Macroeconomic  
Analysis**

*Warsaw, 1999*

Materials published here have a working paper character. They can be subject to further publication. The views and opinions expressed here reflect Authors' point of view and not necessarily those of CASE.

This paper was prepared for the research project "Support for Economic Reform in Bulgaria" financed by the Open Society Institute, Budapest.

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Graphic Design: Agnieszka Natalia Bury

DTP: CeDeWu – Centrum Doradztwa i Wydawnictw "Multi-Press" sp. z o.o.

ISSN 1506-1701, ISBN 83-7178-205-5

Publisher:

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## **Abstract**

This paper is concentrated on the comparative macroeconomic analysis of the differences stemming from the extent to which the institutional framework of the currency board arrangement is implemented in the legal and regulatory systems in the different countries.

The main objective of taking into consideration and examining the currency board institutional arrangements is to distinguish between the impact that currency board countries and countries with pegged exchange rate have on different macroeconomic indicators. During the analysis of these two extreme representatives of the fixed exchange rate mechanism, a third group of countries naturally emerges, which consists of countries acting like currency boards but without official, legal implementation of this arrangement. Once the distinction among all 22 countries taken into consideration had been made, the main scope of the analysis concentrates on the econometric estimation of the currency boards' effects over inflation, nominal and real interest rates and economic growth in countries under currency board and all other pegged exchange rate economies.

The main hypothesis to be tested is whether the implementation of currency board arrangement results in lower inflation, lower nominal and real interest rates and better economic growth. In the course of carrying out a thorough empirical research, the hypothesis turns out to be true as the currency board countries exhibit almost 3% lower annual inflation differential when putting them against the other pegged exchange rate systems, and 1% point advantage over the countries similar to currency boards. On average, countries with currency boards showed higher economic growth, fact that can be even surprising taking into consideration the inabilities of the monetary authorities to intervene heavily on the market and neutralise the negative effects of various external shocks.

*"...The main characteristic of the currency board system is that the board stands ready to exchange domestic currency for the foreign reserve currency at a specified and fixed rate. To perform this function the board is required to hold realizable financial assets in the reserve currency at least equal to the value of the domestic currency outstanding. Hence in the currency board system there can be no fiduciary issue. The backing of the currency must be at least 100%..."*

Sir Alan Walters

## **I. Introduction**

During the last ten years of our century there was a revival of interest towards implementation of the currency board arrangements as the fastest and most miraculous remedy for curing the economic discrepancies. Consequently, this provoked big debates about the advantages and disadvantages of the currency board system and specifically about whether or not the adoption of such restrictive arrangement is justified.

The largest of Britain's few remaining colonies, Hong Kong reintroduced currency board arrangement in 1983. The Hong Kong dollar is linked to the US. dollar at the rate of HK\$ 7.80 = US \$1. Since 1991 a few other countries adopted currency board systems as well. Argentina did so on 1 of April 1991, establishing an exchange rate of 10,000 Australes (now 1 peso) = US \$1. Estonia followed its example on 20 June 1992, establishing an exchange rate of 8 croons = 1 German mark (DM). Lithuania, influenced by Estonia's success, was the second transition economy to introduce currency board on 1 of April 1994, establishing an exchange rate of 4 Litas = US \$1.

To manage with the problem of hyperinflation and a shrinking economy, Bulgaria established a currency board system on 1 July 1997, based on an exchange rate of 1,000 Leva = DM 1. As stipulated in the Dayton Peace Accord, Bosnia was the most recent country to establish a currency board arrangement linked one to one to the German mark on 1 August 1997. Another group of countries that established currency board long time ago in 1965 are the ECCB countries like Antigua and Barbuda, Dominica, Grenada, St. Lucia and St. Vincent and Grenadines.

This paper is concentrated on the comparative macroeconomic analysis of the differences stemming from the extent to which the institutional framework of the currency board arrangement is implemented in the legal and regulatory systems in the different countries. The institutional arrangements of current currency boards vary substantially across the countries due to specificities in the macroeconomic conditions and differences between the already adopted institutional arrangements and the amount of available foreign exchange reserves for covering the monetary base at the time of their establishment.

The main objective of taking into consideration and examining the currency board institutional arrangements is to distinguish between the impact that currency board countries and countries with pegged exchange rate have on different macroeconomic indicators. During the analysis of these two extreme representatives of the fixed exchange rate mechanism, a third group of countries naturally emerged, which consists of countries acting like currency boards but without official, legal implementation of this arrangement. Once the distinction among all 22 countries, taken into consideration had been made, the main scope of the analysis concentrates on the econometric estimation of the currency boards' effects over the inflation, nominal and real interest rates and the economic growth in countries under currency board and all other pegged exchange rate economies.

The main hypothesis to be tested is whether the implementation of currency board arrangement results in lower inflation, lower nominal and real interest rates and better economic growth. The old dilemma of "rules versus discretionary monetary policy" plays an important role here in making the decision of whether or not to undertake such an extreme measure as the adoption of a currency board system. The recent experience showed, that the successful operation of currency boards requires rigid backing of the currency board and strict exchange rate rules, that can substantially enhance the credibility of the stabilisation program. The credibility of the currency board system, which is vital for this type of arrangements is usually achieved at the expense of sharp reduction of the capabilities and flexibilities of the monetary authorities to act as a lender of last resort or to engage in open market operations in case of emergencies. Despite all these drawbacks though, currency boards are now at their peak and are still heavily recommended by many economic experts as a perfect solution to the phenomena of hyperinflation and all the problems experienced by countries in transition on their way to establishing real market economy.

## **2. Institutional Arrangements of the Currency Board System and their Role for Successful Economic Development**

### **2.1. The Nature of Currency Board**

One of the most precise and helpful definitions of the term Currency Board is given by the economist Kurt Schuler who defines it as a monetary authority that issues notes and coins convertible into a foreign anchor currency or commodity (also called the

reserve currency) at a truly fixed rate and on demand. It can operate in place of a central bank or as a parallel issuer alongside an existing central bank, though cases of parallel issue have been quite rare.

The base money issued by the monetary institution of Currency board consists of notes and coins ("cash" for convenience), and may also include the other reserves, or some of the other reserves held by commercial banks [1]. As reserves, a currency board holds low-risk, interest-bearing bonds and other assets denominated in the anchor currency. A currency board's reserves are equal to 100 percent or slightly more of its notes and coins in circulation, as set by law.

A currency board generates profits (seigniorage) from the difference between the interest earned on its reserve assets and the expense of maintaining its liabilities – its notes and coins in circulation.

**Table I. Differences between Currency Boards and Central Bank Institutions**

<b>A Currency Board</b>	
<u>Assets</u>	<u>Liabilities</u>
Liquid reserve-currencyassets	Cash (Deposits of commercial banks) Net worth
<b>A Central Bank</b>	
<u>Assets</u>	<u>Liabilities</u>
Liquid reserve-currencyassets Domestic assets (government debt)	Cash  Deposits of commercial banks Net worth

An examination of the T-accounts of both currency board and central bank can show the main differences between the two:

- Currency board gains credibility only if the narrow money supply (the monetary base) is backed by the amount of official foreign exchange reserves held at the central bank (the foreign exchange reserves should have equal value to the amount of cash held by the public and the banks on the liability side), while this is not compulsory in the case of central bank system.

- The currency board arrangement guarantees full and unlimited convertibility between its notes and coins and the anchor currency at a fixed rate of exchange.

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[1] Williamson, John, 1995, "What role for Currency Boards? Policy Analysis in International Economics" No. 40, Institute for International Economics.

– The balance sheet of currency board central bank consists only of liquid reserve-currency assets on the asset side, while in the case of central bank system the asset side can include domestic assets as well, usually in the form of government debt.

– Currency board usually tries to hold larger value of assets comparing to liabilities, 5 to 10 % in order to prevent some negative shock like for example increase in the interest rates in the reserve-currency country, which will result in lowering the value of its assets. When the net worth rises beyond 5 or 10% , the currency board usually transfers the excess to the government due to the profits that it makes by holding interest-bearing assets and issuing non-interest bearing liabilities (the so-called emergency fund). The central bank system however has the ability to serve as an unlimited lender of last resort to banks in financial trouble.

– In the case of currency board commercial banks can hold their reserves either in the form of liquid holding of the reserve currency or as deposits in the liability side of the currency board central bank, while in the case of the typical central bank the commercial banks always hold their reserves at the central bank.

– In the central bank system there is no restriction on commercial banks borrowing from the central bank or central bank buying assets from the commercial banks, thus having the ability to perform the well-known "sterilisation" functions.

– The currency board system has no power in exercising monetary policy such as adjustments of domestic interest or exchange rates in order to stimulate the economy in case of big macroeconomic shocks, the adjustment instead should work through the slow changes in prices and wages. The currency board cannot lend to the domestic government, domestic companies or banks, it can finance its spending only through taxing or borrowing.

As Williamson defines in his book "What Role for Currency Boards" the marginal currency board rule holds when the domestic component of the monetary base is held constant and varies one-for-one with the central bank's holdings of foreign reserves. Another opportunity for a country is to use the gold standard rule where foreign reserves are kept in constant proportion of total assets.

## **2.2 Institutional Arrangements of the Currency Board System Generating a Successful Economic Environment**

The successful operation of the currency board depends entirely on how well it is embedded in the institutional and legal framework of the country. That's why changes should be made both in the institutional framework for financial management in the economy and in the legal environment in which central banking is carried out.

The main decisions that need to be taken when a country considers establishing a currency board arrangement concern choosing the peg or the reserve currency, estimating and setting the level of the fixed rate, and determining the extent to which the central bank can serve as a lender of last resort to the financial system (creating the so-called safety margin). Defining the structure and the depth of the relations between the central bank and the government through changes in the legal system is also an important requirement for the healthy operation of the currency board.

While choosing an anchor currency the country should take into consideration an international stable currency with already developed financial markets, thus taking advantage of the strength and financial depth of the reserve currency [2]. Another important consideration is defining properly the current and prospective trade flows and other economic links with the country issuing the reserve currency and trying to choose as anchor currency, that of the countries' predominant trade partner. The reserve currency should be well accepted by the population in the home country as well.

For example, the wide acceptance of the US dollars can be an argument in favour of adopting fixed peg against it, even though USA is not the main trading partner of the country. This is the reason why most of the currency board countries pegged their currencies to the dollar and the rest to the deutsche mark.

Setting the exchange rate properly is another important characteristic of the operational environment of currency board. Although given that the monetary base should be fully covered by the foreign exchange reserves makes the judgement much simpler, yet the rate of coverage can vary depending on the exact definition of reserves used.

Choosing the appropriate definition most likely involves a trade-off: on one hand setting small safety margin will improve the financial discipline and therefore the credibility of the system, but on the other hand it can lead to difficulties and resulting devaluation of the currency due to the presence of an external shock to the economy reflecting negatively on the credibility.

In a "pure" currency board arrangement, the currency board has no margin to intervene as lender of last resort or to engage in open market operations. In most of the currency board countries the need for excessive coverage of the monetary base or in other words the need of lender of last resort imposes a tendency of setting the peg to a little bit more depreciated rate compared to the rigid calculations. The need for significant central bank interventions in the economy should also be thoroughly estimated, having in mind that an eventual intervention can result in loss of credibility, which is vital for the success of currency board.

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[2] IMF Paper on Policy Analysis and Assessment, November 1997, " Making a Currency Board Operational" by Charles Enoch and Anne-Marie Gulde, p4.

From legal point of view, one of the main factors for establishing a sound currency board is its embeddedness in the legal framework. Usually currency board is established by law and changes in the central bank law are required for exchange rate adjustments. Both the exchange rate and reserves should be defined in the law, as well as specification of the limited powers of the managing institution is required.

Finally, establishment of a currency board arrangement will require redefining of the financial relationships within the country's government. One of the biggest problems that leads often to the adoption of this strict monetary rule is extensive central bank financing of the government deficits. Rules for a currency board arrangement therefore need to prohibit new central bank loans to the government and restrict central bank monetary operation. The question about the government deposits also should be arranged properly. Keeping government deposits in central bank can result in lowering the transparency and the credibility of the system and needs for full coverage of these deposits by foreign reserves.

For these reasons, some economies with currency boards-most notably Hong Kong SAR-have moved all government accounts to commercial banks. Some transition economies though not being able to rely on commercial banks allow these deposits to be held at the central bank. In this case a possible solution is to divide the central bank operations in two different departments, one dealing with the currency board functions providing transparency and one banking department dealing with the public debt management function.

The main hypothesis to be tested in this paper is that the implementation of a currency board system in a country for which its adoption is justified, will lead to an almost immediate decrease in the level of inflation, nominal and real interest rates and in roughly one year's time to faster economic growth in comparison with countries exhibiting similar characteristics to these of currency board system as well as countries just with fixed exchange rates. These three groups of countries, i.e. currency board countries, middle group countries exhibiting pegged exchange rates but operating under quite similar to currency board arrangements (e.g. compulsory backing of the monetary base by the foreign exchange reserves, restrictions on the ability of the central bank to give credits to the government, restrictions on the ability of the Central bank to act as a lender of last resort,) and countries with pegged exchange rates or crawling peg within +/- 7% band will be estimated through comparative macroeconomic analysis of one of the main economic indicators connected with currency board system.

All the countries taken into consideration have experienced currency crisis at some stage and the main idea is to compare the different strategies and policies carried out by the authorities of these countries in their attempt to deal with the crisis and improve the

overall economic status. The main economic indicators to be considered will be: level of inflation (estimated through the consumer price index), nominal and real interest rates, GDP growth per capita, exports, imports, money growth, etc.

The first group of countries consists of 6 countries, most of which adopted currency board arrangements in the 90s: Hong Kong (October 1983), Argentina (March 1991), Estonia (June 1992), Lithuania (April 1994), Bulgaria (July 1997), Bosnia (August 1997).

The rest of the countries having currency board system like Brunei Darussalam (1967), Djibouti (March 1949) or the countries operating under Eastern Caribbean Central Bank (1965) will most probably be excluded from the analysis, because of their quite different historical background and the fact that they implemented the monetary rule thirty to almost fifty years ago.

The second group countries or the currency board-like countries consists mainly of countries like: Singapore, Latvia, the countries in the CFA franc zone (Senegal, Chad, Gabon) have officially currency board arrangements but operate under restrictions very close to these. For example Singapore's Monetary Authority though maintaining floating exchange rate holds net foreign reserves equal to about 100% of the monetary base; Latvia exhibits the same characteristic and pegs its currency to the Special Drawing Right (a basket of major international currencies) but can change its policy whenever it wants and CF zone countries require 20% cover of the monetary base on one hand but including access to automatic overdraft with the French treasury on the other.

The third group includes countries with pegged exchange rate or crawling band like Chile, Israel, Poland, Hungary, Italy, Spain, Portugal, etc.

These three groups will be compared by the following criteria:

*Currency Board countries*

1. Legal embeddedness of currency board arrangement – Constitution, Law, Council of Ministers.
2. Independence of the Central Bank.
3. Lender of Last Resort Function.

*Currency Board-like countries and Pegged Exchange Rates countries*

1. Degree of coverage of Monetary Base by the International Exchange rate Reserves.
2. Lender of Last Resort function.
3. Direct lending of the Central Bank to the government.

### **2.3. The Existing Empirical Evidence on the Role of Institutional Arrangements of the Currency Board System**

The hypothesis considered above will be tested using cross-country combined with time-series analysis using all the economic indicators. There is similar empirical work that has been done by A. R. Ghosh, Anne-Marie Gulde and H. C. Wolf in their article "Currency boards: The Ultimate Fix?", where they compare groups of countries that implemented currency board regimes mainly with countries with other kinds of pegged exchange rate. At some point the analysis broadens even to countries with floating rates. They don't make the difference though between countries with pegged exchange rate and countries that are quite similar to currency board regimes that could be even mistaken for such, neither do they consider the effect on the nominal and real interest rates.

The main results that the IMF economists achieve can be summarised as follows [3]:

- the inflation under currency board arrangement was about 4% points lower than under other pegged exchange rates regimes, which is explained partly by the lower money growth rate (discipline effect),
- another effect is also present where the higher money demand results in lower inflation for a given money growth rate (confidence effect),
- the confidence effect is substantially larger than the discipline accounting for 3.5% points out of 4 % point differential,
- countries with currency boards grew faster than the average of all countries with pegged exchange rate regimes and the adoption of a strict monetary regime is reflected in better fiscal performance.

The comprehensive annual set of data covers the period of 1970–1996, while the year when the regime change has taken place is dropped as well as the year after the change in the exchange regime occurred. The test whether the lower average inflation rate is due to the implementation of a currency board arrangement is carried out through regressing the inflation on a dummy variable, which is equal to unity for Currency board and zero otherwise; then in the regression are included annual dummies in order to control for major inflation shocks in the economies under currency board and pegged exchange rates.

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[3] "Currency Boards: The Ultimate Fix?", A. R. Ghosh, Anna-Marie Gulde, H. C. Wolf IMF Working Paper 1998, pp 7–15.

### **3. Empirical Part**

#### **3.1. Model Description**

The most suitable econometric approach to the available data proved to be the panel data analysis or more specifically pooled time series with cross-section analysis. The main hypothesis to be tested as already mentioned are the negative influence of currency board countries over the inflation, the nominal and real interest rates and the positive impact on the GDP growth.

The sample includes periods after the currency board was implemented in the different countries and with respect to the countries with different kinds of fixed exchange rates, the period after the currency crisis will be relevant, excluding the years when some currency shocks were present. The number of observations overall varies between 147 to 184, which allows for relative relevance of the results obtained by the econometric analysis.

The main variables included in the econometric estimation are inflation (in percent, where CPI is taken as a proxy variable); money growth (changes in money in percent); nominal interest rate (the average of lending and deposit rate is taken as a proxy); real interest rate (computed using the nominal int. rate and the inflation); GDP growth per capita (using GDP in base year 1990 and the population variable), openness of the economy (imports+exports)/GDP growth per capita, where the used econometric software is Eviews 3.1 version. Dummy variables were created for the group of Currency board countries (DUMCB), the middle group countries (DMID), the strong and weak currency board groups (SCB and WCB) respectively.

The main hypotheses to be tested through the econometric model are whether the currency board countries have negative influence on the inflation, the interest rates and stimulate the economic growth as well as whether this impact is much stronger in the currency board group in comparison with the middle group. The analysis proceeds further with testing whether there is justification of even deeper disaggregation of currency board countries into strong and weak currency boards, depending on their institutional arrangements, where strong currency boards are expected to have much more rigid cause-effect relationship with the main economic variables than the weak group.

In an attempt of achieving the best model specifications with dependent variables INF, INT, RINT and GDPG and testing different sets of variables the most suitable specifications to be tested proved out to be:

- (1)  $INF = \text{const.} + c_1\text{DUMCB} + c_2\text{DMID} + c_3\text{MG} + c_4\text{OP}$
- (2)  $INT = \text{const.} + c_1\text{DUMCB} + c_2\text{DMID} + c_3\text{MG}$
- (3)  $RINT = \text{const.} + c_1\text{DUMCB} + c_2\text{DMID} + c_3\text{MG}$
- (4)  $\text{GDPG} = \text{const.} + c_1\text{DUMCB} + c_2\text{DMID} + c_3\text{MG} + c_4\text{OP} + c_5\text{INF}$
- (5)  $INF = \text{const.} + c_1\text{SCB} + c_2\text{WCB} + c_3\text{MG} + c_4\text{OP}$
- (6)  $INT = \text{const.} + c_1\text{SCB} + c_2\text{WCB} + c_3\text{MG}$
- (7)  $RINT = \text{const.} + c_1\text{SCB} + c_2\text{WCB} + c_3\text{MG}$
- (8)  $\text{GDPG} = \text{const.} + c_1\text{SCB} + c_2\text{WCB} + c_3\text{MG} + c_4\text{OP} + c_5\text{INF}$

### **3.2. Data Sources**

The dataset is based on annual data for the period 1984–1997 for the three main groups of countries under consideration: Currency board countries, Middle group – Currency board-similar countries and countries with pegged exchange rates. Another feature that connects all these countries except the fact that they are all bounded to some stable currency or currency basket is that they all experienced currency crises, which were mitigated in different ways by different solutions for the various countries. The currency board countries exhibited differences in performance in comparison to the other forms of pegged currency due to institutional differences in the first place, which were considered in the previous part and in the second place due to the different reasons specific to the countries like hyperinflation (Argentina), banking crises, hyperinflation danger, transition from socialism (Estonia, Bulgaria, Lithuania), presence of global financial centre (Hong Kong) or volatile terms of trade (Caribbean CB).

The main source of the data is the database of the International Financial Statistics (IFS) 1999 and partly the web pages of the Central banks of the different countries, World bank reports, IMF reports. Some currency board countries are excluded from the analysis either because of unavailability of data like Bosnia and Herzegovina or Djibouti and Brunei. Countries with at least 60% coverage of monetary base are considered as currency board countries, which allows for the ECCB countries to be considered as currency board ones. The full sample consists of Argentina (1992–1998); Bulgaria 1998, Dominica (1988–1997); Estonia (1993–1998); Grenada (1988–1997); Hong Kong (China) (1984–1998); Lithuania (1995–1998); St. Lucia (1988–1997); St. Vincent and the Grenadines (1988–1997); the middle group countries (Latvia 1995–1998, Singapore 1984–1998, CFA zone countries – Chad, Gabon, Benin, Congo, Ivory Coast for the period 1988–1997) and all the other pegged countries (Chile 1984–1998; Hungary 1991–1998; Israel 1984–1998; Poland 1991–1998; Senegal 1988–1997).

## 4. Empirical Evidence from the Regression Analysis

### 4.1. Currency Board and Currency Board – Like Countries

The most suitable econometric approach for testing the validity of the hypothesis to the available data proved to be the panel data analysis or more specifically pooled time series with cross-section analysis. This is an approach that takes into account and encompasses both the specificities of the different countries and the different time periods in which the countries adopted the Currency Board framework. The results from the regressions confirmed clearly the tested hypotheses. Indeed currency boards contributed to lower inflation, lower interest rates and higher GDP growth per capita.

**Table 2 [4]. Regression Results – Currency Boards and Currency Board -Like Countries**

Variables	Dependent Variables			
	INF (1)	INT (2)	RINT (3)	GDPG (4)
<b>Constant</b>	5.651*** (30.093)	13.932*** (11.815)	6.223*** (3.203)	2.076*** (15.543)
<b>DUMCB</b>	-2.740*** (-5.882)	-8.462*** (-6.231)	-3.927* (-1.757)	2.013*** (5.089)
<b>DMID</b>	-2.062*** (-3.870)	-5.274*** (-3.549)	-2.906 (-1.163)	-1.481*** (-4.129)
<b>MG</b>	0.510*** (45.310)	0.187*** (4.849)	0.540*** (8.464)	0.116*** (26.836)
<b>OP</b>	-1.485*** (-5.879)	-----	----	0.837*** (4.332)
<b>INF</b>	-----	-----	-----	-0.207*** (-21.538)
<b>R-squared</b>	0.399	0.333	0.370	0.225

Note: All regressions include a constant. One star (\*) indicates statistical significance at a 10% level. Two stars (\*\*) indicates significance at a 5% level. Three stars (\*\*\*) indicates significance at a 1% level.

Using the method of cross-section weights the inflation was regressed first (regression (1)) on the two dummies, money growth and the openness of the economy. The goodness of the fit is 0.39, which is normal for this type of analysis and all the

[4] The numbers in the table are values of the coefficients the t-values in the parenthesis.

explanatory variables are perfectly significant. The observed difference in the magnitude of the coefficients for currency board and the middle group countries which are respectively:  $-2.74$  and  $-2.06$  shows the bigger impact of the currency board countries in decreasing the inflation. The variable for money growth is positively correlated with inflation, which is a well known fact and the coefficient by the openness of the economy supports the proposition – the more open the economy the lower the inflation. This result supports the view that it will be efficient to introduce currency board arrangement to open countries.

The analysis about the effect on nominal and real interest rates (regressions (2) and (3) respectively) is quite similar yielding the results that the currency board countries are definitely better in lowering the interest rates in comparison with the other pegged exchange rate countries. Looking at the regression 2, we can see clear predominance of the currency board countries in negatively influencing the interest rates over the middle group, while the coefficients in real interest rates are much closer to each other and difficult to interpret. The growth in money supply is positively correlated with both nominal and real interest rates and is significant at the highest significant level. The importance of the change in money for the real interest rates is almost 0.4% higher than for the nominal one.

The goodness of fit in the regressions under consideration is quite satisfactory, on average 0.35 percentage points, explaining the effect of 1% change in all the explanatory variables on 1% change in the inflation.

The test on the real interest rates (regression (3)) reveals an interesting point: the average impact on real interest rates both by currency board and currency board-like countries is lower than the one observed on the nominal interest rates. Currency boards are still significant though at 10% level in their negative influence on the real interest rates, while the middle group is not relevant any more.

Testing the hypothesis about the real GDP growth per capita (regression (4)) gives the result that the currency board countries experienced almost 2% higher GDP growth than other pegged exchange rate countries. This hypothesis is tested while including the usual two groups of countries, money growth, inflation and the extent of openness of the economy.

Though the goodness of the fit is a bit lower, all the explanatory variables are highly significant at 1% significance level. The coefficient of the currency board group is positive 2.01, while the coefficient for the middle group is negative  $-1.48$ , which supports the idea that there is clear distinction between these two groups and it makes sense to estimate their individual impact on the economic growth. The negative relationship between the middle group countries and the GDP growth is not surprising since exercising their discretionary policies in the wrong time, the monetary authorities can contribute even to lowering growth.

The result that the currency boards have positive effect on the GDP growth might prove to be a little bit exaggerated, because the countries in the sample are small, open economies subject to specific shocks and their economic structure might not be relevant for the other countries. Though the result about the economic growth might be subject to arguments, the data definitely don't support the idea that currency board arrangement leads to lower real GDP growth.

The openness of the economy has positive impact on the GDP growth; the more open the economy the higher the economic growth. There is an interesting result concerning the money growth and the corresponding inflation rate: money growth has some positive influence on the GDP growth especially when it is used as an instrument to stimulate the economy in the proper moment, while the resulting inflation usually is overtaking this impact to some extent (the coefficient is slightly higher) and thus leading to a natural slowdown.

## **4.2. Strong and Weak Currency Boards**

While proving that currency board systems contribute to lowering inflation, nominal and real interest rates and possible stimulating the economy, it might be interesting if we give a try and make even deeper distinction between currency board countries and define them as strong or weak depending on the strength of the institutional arrangements implemented in the different countries. The analysis is rather fragile considering the possible multicollinearity between the countries having currency board arrangements. Speaking econometrically, the strong and weak currency board countries will be represented by two dummy variables which are used in the regressions below as SCB and WCB. On the basis of the already considered institutional arrangements we can separate the currency board countries as follows:

Strong currency boards – Bulgaria, Estonia and ECCB countries and Weak currency board countries: Hong Kong, Lithuania and Argentina. After creating dummy variables with respect to these two groups the results are quite definitive:

The goodness of the fit in the regression (5) is 0.39, which reflects the usual problems while comparing many and quite different countries. An interesting point here is that while both coefficients of SCB and WCB are negatively correlated with the inflation, WCB dummy is not significant and the contrast with the SCB is quite big. One possible explanation of this result might be that the loose legal framework in the countries forming the group of WCB, especially in the case of Hong Kong, might lead to lowering of the inflation after adopting the currency board but not so drastically. The other results concerning money growth and the openness of the economy are trivial.

**Table 3. Regression Results – Strong and Weak Currency Boards**

Variables	Dependent Variables			
	INF (5)	INT (6)	RINT (7)	GDPG (8)
<b>Constant</b>	5.418*** (17.076)	11.138*** (26.132)	4.657*** (12.195)	2.011*** (19.107)
<b>SCB</b>	-2.460*** (-4.268)	-5.083*** (-10.474)	-2.759*** (-4.651)	3.346*** (14.366)
<b>WCB</b>	-0.044 (-0.056)	-3.081*** (-3.260)	-1.602** (-1.985)	1.726*** (13.858)
<b>MG</b>	0.515*** (42.853)	0.062*** (3.275)	0.518*** (26.020)	0.124*** (56.903)
<b>OP</b>	-2.355*** (-6.847)	-----	-----	-----
<b>INF</b>	-----	-----	-----	-0.209*** (-52.771)
<b>R-squared</b>	0.396	0.172	0.362	0.215

Note: All regressions include a constant. One star (\*) indicates statistical significance at a 10% level. Two stars (\*\*) indicates significance at a 5% level. Three stars (\*\*\*) indicates significance at a 1% level.

The regressions on nominal and real interest rates (6 and 7) reveal the clear predominance of the SCB countries in having negative impact on interest rates over the WCB ones, with much stronger influence by both groups on the nominal interest rate than on the real one.

As far as real GDP growth performance is concerned (regression (8)), the results seem pretty good, with both weak and strong currency boards being highly significant and contributing to the positive economic growth, characterising the countries established such institutional arrangement as currency board. The results about money growth and inflation variables again fit perfectly into the whole picture, showing the negative influence of the inflation over the GDP growth offsetting fully the positive effect exhibited by money growth.

One of the main conclusions that can be drawn out of the regression results is that the idea of dividing currency board countries into two groups is sensible and econometrically justified. This affiliation allows for the proper distinction between the countries functioning under currency board due to the different legal environment adopted. This is to confirm that adopting strict institutional arrangements will have much stronger impact on the main economic variables and will contribute to the successful achievement of the desired goals.

## **5. Conclusion**

After falling into disfavour during much of the post-war period, currency boards have recently achieved a remarkable acknowledgement. They can be successfully used in dealing with hyperinflation inertia and bolstering the credibility of the policies carried out by the monetary authorities. Even though currency board systems are considered simple monetary arrangements, their implementation requires preparatory work in a number of legal and institutional issues. The adoption of a proper institutional basis is one of the main prerequisites for the successful operation of currency boards and taking advantage of all the economic benefits that result from these institutional arrangements.

Since currency boards are more restrictive in comparison with other pegged exchange rate systems, it is expected that they should result in better inflation performance if they are to be justified. In the course of carrying out a thorough empirical research, this indeed turns out to be the case as the currency board countries exhibit almost 3% lower annual inflation differential when putting them against the other pegged exchange rate systems and 1% point advantage over the countries similar to currency boards. The anti-inflationary benefits from currency boards appear to arise mainly from the establishment of credible and transparent monetary policy by the authorities. Difference in favour of the currency boards can be noticed also in their substantial negative impact on the nominal and real interest rates, which indisputably proves their leadership in comparison with the other two groups of countries. On average, countries with currency boards showed higher economic growth, the fact that can be even surprising taking into consideration the inabilities of the monetary authorities to intervene heavily on the market and neutralise the negative effects of various external shocks. The result that the currency boards have positive effect on the GDP growth might prove to be a little bit overestimated, because the countries in the sample are small, open economies subject to specific shocks and their economic structure might not be relevant for the other countries. Though the conclusion about the economic growth might be subject to arguments, the data definitely do not support the idea that currency board arrangement will lead to lower real GDP growth.

An attempt was made to distinguish between strong and weak currency board systems and estimate whether they have significant individual impact on the discussed already macroeconomic indicators. Though this new analysis is subject to further refinement and justification, the results showed clear predominance of the strong currency boards over the weak ones in their effect of achieving lower inflation, lower interest rates and higher economic growth.

Generally speaking, taking the decision of adopting currency board system as a remedy for the persisting economic problems that a country suffers from, symbolises the enhanced commitment of the authorities to maintain a sound currency, stable exchange rate and carrying out healthy monetary and fiscal policies.

## **Annex**

### **Legal Framework Of The Countries Adopted Currency Board**

#### **Estonia**

– In 1991 Estonia became an independent state, in 1992 Estonia introduced its own national currency, the kroon and implemented currency board arrangement by pegging its currency to the D-mark in correspondence 8:1.

– The board of the central bank consists of chairman and eight board members. It is nominated by the President of Estonia and appointed by the Parliament for 5 years (art.7 of the Law on the Central Bank of the Republic of Estonia). The chairman, the members of the board and the president of the central bank can be dismissed if and when found guilty by a court of law.

– Croon bank notes and reserve deposits of banks are fully backed by foreign currency reserves. (100% of the monetary base excluding central bank certificates) The assets eligible for backing are foreign assets, mainly gold and deutsche marks interest bearing ones. The latest actual coverage of the foreign exchange reserves with respect to the monetary aggregates is up to 118% of monetary base and 43,5% of M2.

– The central bank has the right to revalue the exchange rate, while devaluation can be done only by the act of Parliament.

– The Bank of Estonia is forbidden to grant loans to the state budget or budgets of local authorities as well as to buy government securities.

– Limited possibilities of acting in the quality of lender of last resort. The design of the system also implies little or no control over the interest rates – as the interest rates are to converge with those of the base currency.

– The operations of the Bank of Estonia are divided into two departments: Issuing and Banking Department. The Issuing department represents the currency board and its balance sheet contains as liabilities all kroon bank notes and banks' reserve deposits with the central bank and as assets the foreign exchange necessary to match these liabilities. The Banking department contains all the surplus foreign exchange and (in case that some of these reserves have already been used for emergency loans to troubled banks) kroon loans to the banking system. The role of the Banking department in fact is to undertake the usual technical central banking functions and if emergency arises to act as a lender of last resort and to provide the necessary temporary liquidity assistance to commercial banks [5].

– All deposit banks should maintain 10% reserves on all deposits, including foreign currency deposits as well as government ones, otherwise a penalty rate on the deficient

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[5] "The operation of the Estonian currency board" by Adam Bennet, Staff Paper IMF, Vol.40 (june, 1993).

amount is levied; if the account balance drops below 70% of the obligatory reserves, the bank is even excluded from the payment system.

## **Lithuania**

– The Law of Republic of Lithuania on the Credibility of the Litas, that came into force on April 1, 1994 made the currency board arrangement a legitimate one; the Litas was pegged to the US dollar at an absolutely fixed exchange rate of 4:1.

– The bank is governed by board consisting of Chairperson, Deputy Chairpersons (3) and Members (10); the Chairperson is appointed for a period of 5 years by the parliament upon the recommendation of the President of the republic, while the deputy chairpersons and the members of the board are appointed for a term of 9 years by the president of Lithuania on the recommendation of the chairperson (art. 10 from the Law on the Bank of Lithuania). The chairperson of the board may resign from his post by submitting a resignation request to the President of the Republic, which should be accepted by the parliament.

– The national currency is fully backed by gold and convertible foreign currencies, (100% coverage of monetary base and liquid central bank liabilities) where they should be covered initially by gross reserves and later on the coverage should be in terms of net reserves. The actual coverage of the monetary base is 91.8%, while M2 is covered by 41.1%.

– According to Article 3 of the Law, "Only in the case of extraordinary circumstances when further retaining of the exchange rate of the Litas would damage the stability of national economy, the Bank of Lithuania, upon co-ordination of the Government of the Republic of Lithuania may change the anchor currency and (or) the official exchange rate of the Litas".

– The Bank of Lithuania, to a very limited extent, has preserved the right to extend liquidity loans to commercial banks while acting as a lender of last resort while the commercial banks are still required to keep required reserves at the Bank of Lithuania. The Bank of Lithuania has the right to make credits to the commercial banks and other credit institutions but the amount of credit should not exceed 60% of the liabilities of the commercial bank. The international reserves required for backing are calculated using the concept of not taking into account central banks' longterm external obligations.(IMF loans)

– One of the main goals of Lithuania nowadays is its future European monetary integration, which is not compatible with the adopted currency board system. A Programme of the Government of the Republic of Lithuania for 1997–2000 was introduced, providing the main steps for phasing out the currency board arrangement. The main objectives of this governmental programme are to slowly transform the Lithuanian economy and especially the currency board arrangement in order to allow for the resurrection of the conventional central bank and achieving the European standards.

## **Bosnia and Herzegovina**

– The Central Bank of Bosnia and Herzegovina began operations as the sole authority for the country's currency, the Convertible Mark, and monetary policy on August 11th 1997. The adopted Currency Board Arrangement requires the Central Bank to preserve the stability of its national currency by maintaining the established fixed exchange rate of Convertible mark to German mark in correspondence 1:1.

– The Governing Board of the Central Bank consists of a Governor appointed by the International Monetary Fund, after consultation with the Presidency, and three members appointed by the Presidency, two from the Federation (one Bosniac, one Croat, who share one vote) and one from the Republic of Serbia, for period of six years. Onwards, the Governing Board of the Central Bank of Bosnia and Herzegovina will be represented by five members appointed by the Presidency for a term of six years. The Board itself is supposed to appoint, from among its members, a Governor for a term of six years.

– The Central bank should have enough reserve amount of liquid German Marks for full back up of monetary base required by the established currency board. The amount of money put into circulation should be only up to the amount of its liquid reserves.

– The Central bank does not loan money to the government neither grants credits or gifts. According to art. (03) of the Law on the Central bank, the bank is "entirely independent of its tasks from the federation of Bosnia and Herzegovina, the Republic of Serbia, any public agency and any other authority in the pursuit of its objective and the performance."

– The function of lender of last resort to the banking system is not among the privileges of the central bank. As a result, the stability of the national currency is guaranteed. At the present situation as the German mark is absorbed into the single currency, all assets held by the Central bank of Bosnia and Herzegovina are respectively tied to the EURO.

– The aggregate amount of the monetary liabilities should be the sum of all the cash put into circulation and the credit balances of all accounts maintained on the books of the central bank, while the net foreign exchange reserves should represent at any time the difference between the fair market value of the assets and liabilities of the bank.

– According to art. (36) from the Law on the Central bank the governing board requires that commercial banks maintain deposits in the Central bank at minimum levels of between 10 and 15% of their deposits and borrowed funds denominated in domestic currency. In case that the required reserves of the commercial banks exceed 5% of the aggregate amounts of their liabilities, they should be paid interest at market rates by the central bank. In addition the Central bank doesn't have the right to perform open market operation involving securities of any type.

## **Argentina**

– Argentina adopted Currency Board arrangement with the Convertibility Law (1991). One of the primary objectives of the Central bank of Argentina is to maintain the value of the Argentine peso according to the established fixed exchange rate parity of Argentine peso to US\$ in correspondence 1:1.

– The Central bank is governed by a Board of Directors consisting of a chairman, vice-chairman and eight directors appointed by the National executive power in agreement with the Senate for the period of 6 years (art.6 and 7 of the Charter of BCRA – Central bank of the Republic of Argentina). In case of unobservance of the provisions of the Charter the members of the Board of directors might be dismissed by the National Executive Power upon previous advice of a committee from the National Congress.

– The monetary base is fully backed by international reserves (100% of monetary base). The assets eligible for backing consist of foreign assets, gold, and US dollar denominated Argentine government debt where the government debt is limited to up to one third of the total backing and a 10% increase per year. The Board of directors recently limits the coverage by government debt to 20% except in case of emergency.

– The exchange rate rule and the backing requirement can be changed only by the act of the Congress, though the Central bank is not required to buy foreign exchange at the fixed exchange rate and hence it can let peso appreciate if needed.

– According to the Charter, the Central bank may not lend to national, provincial or local governments, nor to the non-financial private sector. It can lend though to the Treasury through the purchase of government bonds at market prices.

– The central bank needs to back only two-thirds of the monetary base with claims on non-residents. The international reserves required for backing are calculated using the concept of not taking into account central banks' long-term external obligations (mainly to IMF). On one hand the narrow range of backing the monetary base provides the monetary authorities the opportunity to hold a larger amount of excess foreign exchange that can be used in case of emergency to exercise lender of last resort function, while on the other hand this narrow range can lead to dangerous decrease in currency board credibility.

– As a result of the Mexican crisis in 1995, the central bank established a contingency credit line with international banks, according to which the local banks can take loans in case of crises provoked by external factors and the Charter was amended to allow the extension in time of rolling over of rediscounts and collateralised advances.

– The required capital/asset ratio had been increased gradually from 3% at mid-1991 to 11.5% in January 1995. Starting March 1999 the financial institutions should comply with capital requirements for interest rate risk as well.

## **Hong Kong**

– One of the main monetary policy objectives of the HKMA (Hong Kong Monetary Authority) is to preserve the exchange rate stability within the framework of the Currency Board system established in 1983 keeping the exchange rate at parity HK\$ 7.80 to US \$1

– The monetary base, which consists of "banknotes and coins issued, the Aggregate Balance of the clearing accounts of licensed banks maintained with the HKMA and all the Exchange Fund Bills and Notes outstanding" is fully backed by foreign reserves.

– Among the main reasons for this successful operation of the adopted restrictive framework of the currency board system are the strong official reserves of Hong Kong –US\$ 88.6 bln. at the end of 1998. If China's reserves are added (its government has promised to support Hong Kong dollar) , narrow money can be covered nine times. This impressive amount of reserves makes the Hong Kong's currency board one of the strongest of its kind.

– The only representatives that have access to convertibility at the monetary authorities are the note-issuing banks. In case of issuing banknotes, they are required to submit US dollars (at HK\$ 7.80 = US\$ 1) to the HKMA for the account of the Exchange Fund in return for Certificates of Indebtedness. These certificates represent the main source for backing the currency according to the Law.

– The standard capital/adequacy ratio in Hong Kong is set at 8%, though the monetary authority has the right to increase it up to 12% for any general licensed bank and for any restricted licensed bank or deposit-taking company even up to 12%.

– On 5th of September 1998, the HKMA proposed a package of seven technical measures for strengthening the currency board arrangement, which after consulting with the Exchange Fund Advisory Committee was approved by the Financial Secretary. Among the main measures are the following:

- The requirement for the licensed banks to convert their Hong Kong dollars in their clearing accounts into US dollars at pre-specified fixed exchange rate (the Convertibility Undertaking) of HK\$ 7.75 to US\$ 1, while returning to the old exchange rate of 1.80 HK to 1 \$ from April 1999.
- The removal of the Liquidity Adjustment Facility, which was introduced in 1992 with the goal of provision banks with overnight funds for late adjustments in their liquidity positions.

– In order to strengthen the credibility of the official exchange rate in 1994 HKMA began using the Hong Kong interbank offer rate (HIBOR) as a guiding indicator for open market operations instead of the level of bank balances at the clearing house.

## **Bulgaria**

– The currency board system was introduced in Bulgaria on 1 of July 1997. After long debates about the choice of suitable reserve currency (US dollar or Deutsche mark) the decision was taken in favour of the German currency and the exchange rate was defined as a 1000 Leva per 1 Deutsche mark by the amended Law of BNB (Bulgarian National Bank).

– "The management of the Bulgarian National Bank shall be carried out by the Managing Board, the Governor and the three Deputy Governors" (art. 10 of the Law of BNB). The Managing board consists of seven members: Governor of the Bank, three Deputy Governors all of them elected by the National Assembly, and three other members appointed by the President of the Republic for period of six years. These are also the institutions that can suspend the mandate of the members of the Managing board in case of disobeying the provisions of the law.

– Monetary liabilities are fully covered by the foreign reserves and gold for the peg currency at the official parity on demand without any limits. The actual coverage of the by foreign assets constitutes 134% of the monetary base.

– The change of the exchange rate parity or the backing rule is possible only through corresponding act of Parliament.

– BNB is not allowed to give credits to the government or to any other state agency except for purchases of special drawing rights from the IMF extended by the Managing Board, neither it can lend to banks (art.45 BNB); BNB doesn't perform open market operations

– The excess coverage, which is the difference between the foreign exchange reserves and what is needed to cover the monetary liabilities of the bank serves as a lender of last resort in crises situations

– Article 19 from the Law of BNB defines three structural departments that should be differentiated in BNB: an Issue Department, a Banking Department and a Banking Supervision Department. The Issue Department is the one that reflects all the currency board operations of the Central bank and it issues monetary liabilities at the official parity on demand without any limits. The funds under the name Banking department deposits represent the excess coverage, which is the difference between the foreign exchange reserves and what is needed to cover the monetary liabilities of the bank, which serves as a lender of last resort in crises situations. For even bigger transparency BNB is obliged to publish weekly the balance sheet of the Issue Department. The Banking department is dealing with all the other everyday obligations of the bank while comprising the liabilities towards IMF which are not considered at the issuing department as part of the obligations under currency board.

## Argentina

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1992	24.9	16.78	49.0	12235	13622.6		0.119
1993	10.6	11.34	33.0	13117.8	14693.7	4.298362	0.117
1994	4.18	9.07	15.700	15659.3	19660.9	6.58727	0.133
1995	3.38	11.90	1.600	20967.4	17961.8	-5.26202	0.149
1996	0.16	8.94	14.600	23810.7	22190	3.447654	0.162
1997	0.53	8.11	12.800	25516	28486.5	7.225999	0.175

## Benin

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1990		7.000	23.916	122.1386	265.1556		0.198
1991		7.000	11.580	21.18457	241.2298		0.128
1992		7.750	9.901	335.4846	578.1065		0.442
1993	0.441		-13.157	383.5254	571.3328	0.942	0.472
1994	38.531		67.252	391.2072	431.1024	-2.471	0.529
1995	14.463		-13.151	413.7048	691.7784	2.159	0.540
1996	4.914		17.176	423.6126	664.6437	3.905	0.505
1997	3.466		2.058	406.9086	640.774	4.096	0.494

## Bulgaria

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1998	1.000	2.370				0.500	

### Chad

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1988	15.478	7.552	-8.370	144.0331	228.3043	7.308	0.363
1989	-3.942	7.875	7.935	155.3879	235.4172	3.392	0.351
1990	-0.168	13.000	-0.179	188.0596	285.5383	1.095	0.365
1991	4.195	12.823	3.796	193.5437	249.9054	4.982	0.308
1992	-3.140	12.635	-8.705	182.2875	242.9997	-5.133	0.334
1993	-7.066	12.604	-27.669	131.8324	200.98	-12.435	0.336
1994	40.429	12.792	31.502	147.9815	177.0699	10.341	0.377
1995	9.064	10.750	42.707	251.6287	219.8145	-1.461	0.458

### Chile

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1984	19.860	32.983	22.759	3650.6	3573.632		0.340
1985	30.703	36.389	24.225	3804.1	3071.6	0.781	0.476
1986	19.477	22.633	43.257	4191.2	3436.3	3.798	0.457
1987	19.873	29.010	20.999	5223.7	4396.4	4.809	0.504
1988	14.690	18.135	46.500	7051.8	5291.8	5.544	0.516
1989	17.029	31.822	17.177	8078.4	7233.4	8.769	0.618
1990	26.036	44.550	23.278	8372.7	7742.4	2.589	0.587
1991	21.785	25.438	44.750	8941.5	8207.2	6.187	0.531
1992	15.426	21.091	26.256	10007.4	10182.8	10.454	0.508
1993	12.728	21.270	21.205	9198.7	11134.4	5.199	0.488
1994	11.443	17.712	16.169	11604.1	11820.1	4.046	0.442
1995	8.233	15.947	22.225	16024.2	15914.1	8.992	0.503
1996	7.392	15.413	16.163	15404.8	17827.5	5.729	0.495
1997	6.101	13.844	20.150	16923.4	19659.8	5.598	0.498

## Congo

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1990	-4.792	13.000	25.309	981.0306	620.804	2.260	0.539
1991	9.157	12.823	-7.319	1029.752	594.399	-10.408	0.547
1992	1.993	12.635	6.368	1178.73	451.3931	-4.008	0.579
1993	2.003	12.604	-19.743	1068.733	581.958	-6.655	0.640
1994	49.772	12.792	40.445	958.926	631.1296	-16.464	0.865
1995	21.388	10.750	0.264	1172.598	669.5075	-14.567	0.862
1996	-0.214		13.593	1345.122	1550.782	14.639	1.228

## Dominica

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1988	2.925	5.000	-2.513	54.22444	87.5337	26.371	0.986
1989	6.219	4.542	-1.943	45.10037	107.0685	0.427	0.992
1990	3.191	4.208	24.673	55.03222	117.923	5.098	1.040
1991	5.557	4.375	5.137	54.3037	109.6222	2.794	0.908
1992	5.472	4.083	17.282	53.46296	105.4407	0.857	0.828
1993	1.569	4.000	-12.077	48.76667	93.7	2.146	0.715
1994	0.015	4.000	-1.786	47.14815	96.33333	7.721	0.669
1995	1.318	4.000	24.062	45.11482	117.2815	2.423	0.729
1996	1.677	4.000	5.067	51.28148	129.9444	3.200	0.776
1997	2.426	4.000	-0.338	52.96667	124.5593		

**Estonia**

<b>Year</b>	<b>Inflation</b>	<b>Nominal interest rate</b>	<b>Money Growth</b>	<b>Exports (mil \$)</b>	<b>Imports (mil \$)</b>	<b>Real GDP growth</b>	<b>Openness of the economy</b>
1993	89.812	27.300	75.157	804.8023	896.0163	-7.308	1.070
1994	47.655	17.293	20.645	1304.032	1656.884	-0.485	1.212
1995	28.777	12.345	29.110	1835.191	2538.302	5.661	1.232
1996	23.050	9.861	30.944	2079.443	3231.478	4.689	1.260
1997	10.582	13.007	22.597	2929.195	4438.201	12.151	1.623

**Gabon**

<b>Year</b>	<b>Inflation</b>	<b>Nominal interest rate</b>	<b>Money Growth</b>	<b>Exports (mil \$)</b>	<b>Imports (mil \$)</b>	<b>Real GDP growth</b>	<b>Openness of the economy</b>
1990	7.725	13.000	5.713	2203.738	918.2241	-0.188	0.542
1991	-11.686	12.823	8.011	2242.768	834.4357	13.169	0.523
1992	-9.543	12.635	-27.160	2082.045	699.6819	4.119	0.517
1993	0.534	12.604	-3.449	2294.796	845.0978	-0.182	0.605
1994	36.116	12.792	41.884	2350.305	756.478	8.495	0.714
1995	9.647	10.750	12.349	2713.422	881.9023	-2.829	0.691
1996	0.690		25.976			9.789	
1997	3.973		8.061				

## Grenada

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1988	4.000	6.500	11.701	32.77778	92.14815	16.961	0.677
1989	5.593	6.500	6.013	27.92593	99.22222	5.654	0.604
1990	2.724	6.500	3.522	26.51852	105.11111	5.214	0.595
1991	2.645	6.500	-1.744	22.77778	121.11111	2.934	0.596
1992	3.778	6.500	23.032	21.55556	106.5926	0.570	0.511
1993	2.809	6.500	12.671	21.51852	144		0.661
1994	3.771	6.500	12.071	24.59259	119.4074		0.549
1995	1.869	6.500	4.709	23.18519	129.5185		0.553
1996	2.032	6.500	1.967	21	152.2593		0.587
1997	1.245	6.500	5.510				

**Hong Kong**

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1984				28322.57	28568.15		1.827
1985				30186.78	29702.95	-0.910	2.036
1986				35439.23	35366.54	9.884	2.418
1987				48476.18	48464.92	11.741	2.564
1988				63163.21	63895.77	7.009	2.493
1989				73140.03	72154.74	1.479	2.454
1990		8.335		82159.85	82490	3.223	2.662
1991	11.598	6.98		98577	100240	4.145	2.827
1992	9.332	4.785	24.931	119487	123407	5.166	2.721
1993	7.449	4.375	20.909	135244	138650	4.159	2.697
1994	8.818	6.02	0.068	151399	161841	2.967	2.805
1995	9.004	7.18875	0.324	173750	192751	1.712	2.723
1996	6.322	6.571667	15.339	180750	198550	2.585	2.574
1997	5.838	7.738796	-3.784	188059	208614		

**Hungary**

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1991	34.234	32.750	18.163	10226.75	11448.97	-11.812	0.656
1992	22.950	28.729	32.093	10680.05	11123.15	-2.780	0.622
1993	22.451	20.538	11.661	8918.434	12596.73	-0.288	0.611
1994	18.866	23.854	7.981	10733.12	14437.94	3.250	0.638
1995	28.303	29.354	5.816	12540.44	15073.03	1.886	0.692
1996	23.489	24.758		12685.51	15895.53		0.689
1997	18.279	20.154		18731.81	20757.63		

## Israel

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1984	373.821	217.300	352.294	5803.7	9819.4		1.307
1985	304.616	210.108	245.745	6266.6	9874.9	2.286	0.851
1986	48.146	19.858	112.773	7127.2	10805.7	2.442	0.603
1987	19.822	19.967	49.516	8475.4	14347.8	4.444	0.621
1988	16.268	16.008	11.264	9740.9	15018.3	1.459	0.594
1989	20.249	12.900	44.398	10738	14347.1	-0.533	0.576
1990	17.173	15.084	30.632	11575.7	16790.7	2.585	0.549
1991	19.006	14.498	13.748	11920.8	18658.1	0.021	0.518
1992	11.948	11.793	33.669	13118.6	20252.6	3.054	0.570
1993	10.944	10.540	27.934	14779.1	22623.4	0.449	0.599
1994	12.331	11.767	7.689	16884	25237.3	3.994	0.565
1995	10.043	14.365	15.102	19046.1	29578.79	4.348	0.585
1996	11.277	15.535	20.432	20610.2	31685.4	1.664	0.560
1997	9.00115	13.87917	11.2755	22502.5	30781.5	-0.033	0.557

**Ivory Coast**

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1990	-0.806	16.000	2.970	3072.121	2097.591	-12.624	0.492
1991	1.683	16.000	-3.102	2686.075	2103.352	3.850	0.419
1992	4.231	16.750	-4.045	6220.139	5346.961	-9.447	1.097
1993	2.165		0.927	2518.695	2115.393	-4.526	0.464
1994	26.082		61.717	2742.233	1917.492	7.112	0.602
1995	14.295		18.235	3644.809	2930.993	1.581	0.646
1996	2.481		2.321	4371.401	2979.95	3.194	0.703
1997	5.613		11.747	4183.192	2817.521		0.698

**Latvia**

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1995	24.979	24.679	0.755	1283.363	1810.409	0.76953	0.707
1996	17.611	18.745	18.818	1424.004	2311.361	4.170808	0.734
1997	8.452	10.572	34.509	1664.003	2718.123	7.411067	0.805

**Lithuania**

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1995	40	23.566	40.765	2705	3648.5	3.568	1.054
1996	25	17.754	3.544	3334.5	4468	4.709	0.989
1997	9	11.140	40.998	3860.25	5644.25	6.066	0.992

## Poland

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1991	76.706	54.042	28.126	14903	15757	-18.559	0.415
1992	45.329	38.375	38.762	13324.3	15701	-2.520	0.398
1993	36.866	34.625	31.300	14143	18834	-1.236	0.452
1994	33.252	33.117	39.723	17042	21383	1.151	0.445
1995	26.798	30.117	36.390	22895	29050	8.072	0.444
1996	20.152	23.046	39.776	24440	37137	4.513	0.488
1997	15.914	22.160	24.804	25751.3	42307.5	5.67104	0.538

## Senegal

Year	Inflation	Nominal interest rate	Money Growth	Exports (mil \$)	Imports (mil \$)	Real GDP growth	Openness of the economy
1988	12.976	9.417	0.227	591.1832	1079.648	9.303	0.341
1989	0.447	10.771	7.409	693.0857	1221.1	-3.593	0.375
1990	0.325	11.500	-11.536	761.6853	1219.842	1.970	0.327
1991	-1.754	11.500	4.415	700.8339	1173.102	-1.089	0.313
1992	-0.110	12.250	1.957	672.7827	1034.109	1.454	0.291
1993	-0.586		-9.036	707.0146	1086.655	-3.538	0.333
1994	32.294		54.411	790.8798	1021.966	-7.170	0.483
1995	7.864		3.739	968.6501	1242.917	-0.293	0.489
1996	2.754		8.481	986.214	1267.515	5.280	0.480
1997	1.753		-0.430	932.5488	1195.54	3.173	0.481

**Singapore**

<b>Year</b>	<b>Inflation</b>	<b>Nominal interest rate</b>	<b>Money Growth</b>	<b>Exports (mil \$)</b>	<b>Imports (mil \$)</b>	<b>Real GDP growth</b>	<b>Openness of the economy</b>
1984	2.601	8.350	3.009	24070.06	28666.88		2.868
1985	0.480	6.420	-0.914	22812.34	26285.24	-3.207	2.655
1986	-1.386	5.365	11.804	22495.01	25510.93	0.676	2.659
1987	0.523	4.495	12.309	28687.01	32559	8.436	2.809
1988	1.523	3.850	8.404	39306	43863.63	-0.118	3.134
1989	2.345	4.710	14.944	44664.64	49667.1	6.630	3.011
1990	3.461	6.015	11.029	52751.91	60899.07	3.332	2.921
1991	3.426	6.105	7.660	59025.05	66292.57	4.220	2.705
1992	2.263	4.405	12.690	63483.64	72178.92	3.621	2.757
1993	2.289	3.845	23.586	74011.65	85233.99	7.122	2.715
1994	3.100	4.440	2.312	96826.06	102670.1	6.996	2.693
1995	1.721	4.935	8.282	118268.3	124507.3	4.480	2.845
1996	1.383	4.835	6.667	125013.8	131337.7	4.070	2.744
1997	2.004	4.895	1.742	124985.7	132437.4	6.787371	3.016

**Santa Lucia**

<b>Year</b>	<b>Inflation</b>	<b>Nominal interest rate</b>	<b>Money Growth</b>	<b>Exports (mil \$)</b>	<b>Imports (mil \$)</b>	<b>Real GDP growth</b>	<b>Openness of the economy</b>
1988	0.781	7.000	14.437	115.5556	220.3704	4.630	1.245
1989	4.054	7.000	12.304	109.1482	273.7407	4.605	1.260
1990	4.726	7.000	6.318	127.2963	270.963	19.966	1.000
1991	5.692	7.000	0.382	110.2963	295.1852	1.603	0.940
1992	5.071	7.000	26.371	122.7778	312.963	-1.057	0.907
1993	1.130	7.000	6.374	119.6204	300.1856		0.844
1994	2.650	7.000	3.464	94.35519	302.6356		0.779
1995	5.840	7.000	12.886	108.9656	306.5667		
1996	0.966	7.000	-6.945	79.50704	313.5115		
1997	0.000	7.000	5.709	61.25778	332.1722		

**Saint Vincent**

<b>Year</b>	<b>Inflation</b>	<b>Nominal interest rate</b>	<b>Money Growth</b>	<b>Exports (mil \$)</b>	<b>Imports (mil \$)</b>	<b>Real GDP growth</b>	<b>Openness of the economy</b>
1988	0.227	6.500	17.848	85.25926	122.2593	14.550	1.262
1989	2.834	6.500	11.503	74.59259	127.4815	2.621	1.139
1990	7.606	6.500	4.981	82.74074	136.0741	4.912	1.106
1991	5.492	6.500	-17.486	67.11111	139.6667	0.749	0.974
1992	3.464	6.500	51.060	78.11111	132.0741	7.435	0.907
1993	4.291	6.500	-0.330	57.81482	134.3333	0.173	0.807
1994	1.009	6.500	19.178	50.40741	130	-2.418	0.746
1995	1.738	6.500	-0.100	42.66667	135.8148	7.611	0.680
1996	4.408	6.500	6.059	46.37037	131.8519	0.898	0.649
1997	0.444	6.500	27.171	46.11111	181.7407		

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