

BABEŞ-BOLYAI UNIVERSITY
FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION
CLUJ-NAPOCA

BACHELOR THESIS

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The economy of fixed exchange rate regimes
with special focus on the adaptability of such a
system in Romania

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INTRODUCTORY SUMMARY

Exchange rates constitute a major consideration in modern economics. In this paper I analysed how exchange rates are determined, what types of quotation do exist, what are the possible predictions of currency rates, and what is the relation between exchange rates and major macroeconomic indicators. The concepts of bid and ask, real exchange rate, forward exchange rate, cross rates, intermarket arbitrage are developed. I present all types of exchange rate regimes currently existing and their historical evolution, while opposing fixed and flexible exchange rates.

In the second part of this thesis I deduct the adapted version of IS-LM Model by Robert Mundell, focusing on the effects of a currency peg. Short run and medium run consequences are differentiated; effects on fiscal and monetary policy are evidenced. The case of a currency crisis is presented, highlighting a major threat of fixed exchange rate regimes. A guideline for choosing between exchange rate regimes is presented.

In the practical part of this paper I focus on the case of Romania. Making an analysis on a regional level I demonstrate that in average, countries having a fixed exchange rate outperform those ones, who allow their currency to fluctuate. The macroeconomic variables used are inflation, GDP growth, unemployment, budget deficit and indebtedness.

I present the current system used by the National Bank of Romania (BNR) used to influence the exchange rate and later on highlight the volatility of the Romanian currency and the effects of volatility. Based on the BNR's official opinion I highlight some of the barriers preventing Romania from fixing its exchange rate to the Euro.

In the last part I analyse the converge criteria in relation to the Romanian Economy and conclude the advantages and disadvantages for the country of adopting the euro.

I. EXCHANGE RATE REGIMES

1. Exchange rates

The exchange rate or rate of exchange, foreign exchange rate, currency exchange rate is the ratio at which one currency will be exchanged for another. It can be also interpreted as the value of one country's currency in terms of another currency. For example, an exchange rate of 4.2 EURO/RON means that a person needs 4,2 Romanian New Leu to buy one unit from the European currency.

The quotation is a statement of willingness to buy or sell at an announced rate. Interbank quotes are expressed in two ways

- “European terms” – reflects the foreign currency price of one dollar, for example Sfr 1.6000/\$, meaning 1.600 Swiss francs per dollar.
- “American terms” – reflects the dollar price of a unit of foreign currency, for example \$0.6250/Sfr, which can be read as 0.625 dollars per Swiss franc.

1.1. Direct and indirect quotes

We distinguish between direct and indirect quotes. A direct quote is the exchange rate expressed as the home currency price of a unit of a foreign currency – for example Sfr 1.600/\$ is a direct quote in Switzerland. Direct quotes using a country's home currency as the price currency - for example EUR 0.80 = USD 1.00 in the euro zone - are used by most countries.

An indirect quote is a foreign currency price in a unit of the home currency – for example Sfr 1.600/\$ is an indirect quote in the US, but \$0.625/Sfr is a direct quote in the US and an indirect quote in Switzerland. Indirect quotes using a country's home currency as the unit currency- for example EUR 1.00 = USD 1.25 in the euro zone - are known as indirect quotation or quantity quotation and are used in British newspapers and are also common in Australia, New Zealand and in the Eurozone.

Using direct quotation, when the home currency appreciates - is strengthening or becoming more valuable - the exchange rate decreases, in the case when the foreign currency is appreciating, the exchange rate increases.

1.2. Bid and ask

In the retail currency exchange market, different buying rates and selling rates are determined by the money dealers: banks, currency exchange offices. The bid is the price at which a dealer will buy another currency. The ask or offer price is the rate at which a dealer will sell another currency. For example the bid and ask for spot euros would probably be shown “1.2170/78”. The spread, defined as the difference between the two quotes constitute the margin - or profit - of the dealer.

1.3. Cross Rates and intermarket arbitrage

Cross rate (Formula I.1.3) is the exchange rate between two currencies expressed as the ratio of two foreign exchange rates that are both expressed in terms of a third currency.

Formula I.1.3./1

$$\text{Cross rate } X/Y = \frac{\text{Spot rate } X/Z}{\text{Spot rate } Y/Z}$$

For example a Mexican importer can buy one US dollar for 11.4456 Mexican pesos and with that one dollar can also buy 110.73 yen. The cross rate would be:

Formula I.1.3./2

$$\frac{\text{Japanese yen/US dollar}}{\text{Mexican pesos/US dollar}} = \frac{\text{¥ 110.73/\$}}{\text{MXP 11,4456/\$}} = \text{¥9,6745/MXP}$$

Cross rates can be used also to check on opportunities for intermarket arbitrage. For example assume the following exchange rates are quoted:

Table I.1.3./1.

Bank A	\$1.3300/€
Bank B	\$1.5500/£
Bank C	€1.1700/£

The cross rate between Bank A and Bank B is

Formula 1.1.3./3

$$\frac{\$ 1,55/£}{\$1,33/€} = €1,1654/£$$

This cross rate is not the same as Dresdner's rate quote of €1.1700/£. Therefore, an opportunity exists for risk-less profit or arbitrage.

Starting with 1,000,000 USD: a trader can sell this amount to Bank B at USD 1,55/GBP and receives 645162 GBP. If he sells this amount of GBP to Bank C at EUR 1,17/GBP will receive EUR 754839. Then he sells this amount to Bank A at USD 1,33/EUR, and receives 1003935, ending up with a riskless profit of 3935\$.

This process is named 'Triangular Arbitrage' and defined as converting one currency to another, converting it again to a third currency and, finally, converting it back to the original currency within a short time span (Investopedia, Triangular Arbitrage, 2013). However, the opportunity for riskless profit – the possibility that exchange rates do not exactly match up - does not happen very often and when it does, it lasts only for a matter of seconds. Traders take advantage of this by automatizing the process using advanced computer programs.

1.4. Spot and forward exchange rate

The spot exchange rate is the current exchange rate. The forward exchange rate refers to an exchange rate that is quoted and traded today but for delivery and payment on a specific future date.

Spot in the interbank market means the purchase of foreign exchange, with delivery and payment normally, on the second following business day.

Outright forward translates to a delivery at a future value date of a specified amount of one currency for another (Michael H. Moffett, 2012). The exchange rate agreed upon at the time of the transaction, but payment and delivery are delayed. Contracts are quoted for value dates of one, two, three, six, nine and twelve month. Multinational corporations, banks, and other financial institutions enter into forward contracts to take advantage of the forward rate for hedging purposes (Madura).

Forward exchange rates have important theoretical implications for forecasting future spot exchange rates.

The simple, quoted forward exchange rate is determined by a parity relationship among the spot exchange rate and differences in interest rates between two countries, which reflects an economic equilibrium in the foreign exchange market under which arbitrage opportunities are eliminated.

When in equilibrium, and when interest rates vary across two countries, the parity condition implies that the forward rate includes a premium or discount reflecting the interest rate differential.

According to Investopedia the 'Covered Interest Rate Parity' refers to a condition where the relationship between interest rates and the spot and forward currency values of two countries are in equilibrium. As a result, there are no interest rate arbitrage opportunities between those two currencies.

For example, assume Country X's currency is trading at par with Country Z's currency, but the interest rate in Country X is 6% and the interest rate in country Z is 3%. All other things being equal, it would make good sense to borrow in the currency of Z, convert it in the spot market to currency X and invest the proceeds in Country X. However, in order to repay the loan in currency Z, one must enter into a forward contract to exchange the currency back from X to Z. Covered interest rate parity exists when the forward rate of converting X to Z eradicates all the profit from the transaction (Investopedia, Covered Interest Rate Parity, 2013) .

Built so there no arbitrage possibility exists, the forward-spot price-parity relation involves two riskless rates and the spot rate.

Formula I.1.4./1

$$F = S \frac{(1 + i_d)}{(1 + i_f)}$$

*F – forward rate S – the spot exchange rate, i_d
– the domestic interest rate, and i_f
– the foreign interest rate.*

This means that the forward rate derives its value from the pricing of spot contracts and the addition of information on available interest rates. Under this condition, a domestic investor would be indifferent to invest in domestic assets or convert currency at the spot exchange rate, investing in foreign currency assets in a country with a different interest rate, and exchanging the foreign currency for domestic currency at the negotiated forward exchange rate.

Therefore, the forward rate is said to contain a premium or discount, reflecting the interest rate differential between two countries.

For indirect quotes or quotes expressed in foreign currency terms, the formula is

Formula 1.1.4./2

$$f^{FC} = \frac{\text{Spot} - \text{Forward}}{\text{Forward}} \times \frac{360}{\text{days}} \times 100$$

For direct quotes or quotes expressed in home currency terms), the formula is

Formula 1.1.4./3

$$f^H = \frac{\text{Forward} - \text{Spot}}{\text{Spot}} \times \frac{360}{\text{days}} \times 100$$

The unbiasedness hypothesis states that given conditions of rational expectations and risk neutrality, the forward exchange rate is an unbiased predictor of the future spot exchange rate, without introducing a foreign exchange risk premium - due to the assumption of risk neutrality. Empirical evidence for cointegration between the forward rate and the future spot rate is mixed. (Michael H. Moffett, 2012) Researchers have published papers demonstrating empirical failure of the hypothesis by conducting regression analyses of the realized changes in spot exchange rates on forward premiums and finding negative slope coefficients (Zivot, 2000). These researchers offer numerous rationales for such failure. One rationale centers around the relaxation of risk neutrality, while still assuming rational expectations, such that a foreign exchange risk premium may exist that can account for differences between the forward rate and the future spot rate.

1.5. The Real Exchange Rate

The real exchange rate can be defined as the nominal exchange rate that takes the inflation differentials among the countries into account. Its importance stems from the fact that it can be used as an indicator of competitiveness in the foreign trade of a country (Ahmet N. Kıpıcı, 1997). According to the Purchasing Power Parity relation the real exchange rate (RER) can be defined in the long run as the nominal exchange rate (E) that is adjusted by the ratio of the domestic price level (P) to the foreign price level (P^f). Mathematically, it can be shown as:

Formula 1.1.5.

$$RER (or \epsilon) = E * \frac{P}{P^f}$$

In terms of this definition, the increase in RER can be interpreted as the real appreciation of the currency.

1.6. Factors Influencing the Exchange Rates

Exchange rates, as all equilibrium values in the economy, are determined by supply and demand. For example, if the demand for Romanian goods increases, this would lead to an appreciation, or increase in the value of the Romanian currency, the New Leu.

A currency with a higher value makes a country's exports more expensive and imports cheaper in foreign markets; a lower value currency makes a country's exports cheaper and its imports more expensive in foreign markets.

Inflation

If inflation in the country, suppose Romania is relatively lower than elsewhere, then Romanian exports will become more competitive and there will be an increase in demand for Romanian New Leu to buy Romanian goods. Also foreign goods will be less competitive and so Romanian citizens will buy less imported goods (Help, 2011). Therefore countries with lower inflation rates tend to see an appreciation in the value of their currency.

However, a recent econometrical study using time-series from 1991 to 2005 concluded, that there is a strong relationship between inflation and real exchange rates in Asian countries, but there is no such relation in the EU and North America (Noer Azam Achsani, 2010).

Interest Rates

If interest rates rise relative to elsewhere, it will become more attractive to deposit money in the country, since the investors earn a higher return. Therefore demand for the currency will rise, and the currency will appreciate. This has an important effect on the economy according to Blanchard, since the domestic goods will be more expensive relative to foreign goods, and this leads to a decrease in net exports, to a decrease in demand for domestic goods, to a decrease in output or GDP (Blanchard, 2009).

Speculation

Currency speculation involves buying, selling and holding currencies in order to make a profit from favourable fluctuations in exchange rates or searching for intermarket arbitrage possibilities. If speculators believe that a currency will appreciate in the future, they will demand more now to be able to make a profit. This increase in demand will cause the actual exchange rate to rise. Therefore movements in the exchange rate can not be explained always by economic fundamentals, can be often driven by sentiments, feelings, hypotheses, and beliefs of the financial markets. For example, if markets see news which makes an interest rate increase more likely, the value of the currency can rise in anticipation (Help, 2011).

Change in Competitiveness

Some countries have above-average real exchange rates. This holds because countries are not equally competitive. The Global Competitiveness Report of the World Economic Forum defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country". Change in competitiveness determines also a shift in the exchange rate. If Romanian goods become more attractive and competitive than the European ones, this will also cause

the value of the New Leu to rise. This aspect is important in determining the long run value of a currency.

Relative strength of other currencies

The value of a currency can rise because investors in the market are worried about all the other economies. In this case, despite low interest rates and low growth, the currency still appreciates.

Balance of Payments

If a country is importing more than it exports, its trade balance will be in deficit. If the negative sign on the current account is not financed by a surplus on the capital account, means that the country can not attract enough capital inflows to finance a current account deficit, so the nation will experience reduction in its foreign exchange reserves, which lowers the value of its currency. According to the Balance of payment model in the long run the cheaper currency renders the nation's exported goods more affordable in the global market, making imports more expensive. After an intermediate period, imports are forced down and exports rise, thus stabilizing the trade balance and the currency towards equilibrium (Economist, 2005).

Government Debt

The amount of government debt can influence the exchange rate. If markets fear a government may default on its debt, then investors will sell their bonds causing a fall in the value of the exchange rate (Help, 2011). Example for this is the case of Iceland, the debt crises in 2008 caused a rapid depreciation to the Icelandic currency.

Government Intervention

Some governments influence the value of their currency. For example, China has sought to keep its currency undervalued to make Chinese exports more competitive. They can do this by buying US dollar assets which increases the value of the US dollar to Chinese Yuan.

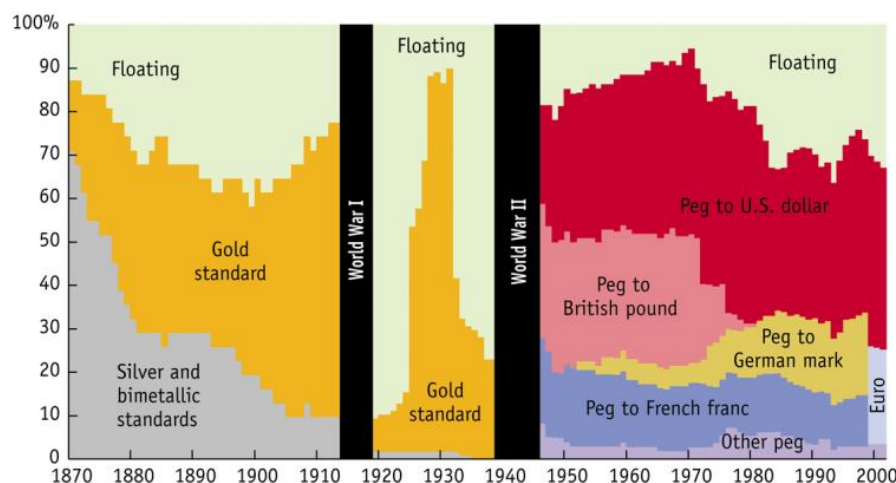
2. Types of exchange rate regimes

2.1. History

The first regimes known as The Gold Standard lasted from 1876 to 1913. Countries introduced fixed rates at which their currency unit could be converted into gold. For example: US\$ gold rate was \$20.67/oz, the British pound was pegged at £4.2474/oz. The US\$/£ rate calculation was $\$20.67 / \pounds 4.2472 = \$4.8665 / \pounds$. Money basis backed by gold, expanding money basis meant expanding gold reserves. The fixed inter-country money exchange rates were abolished because the I. World War interrupted the free movement of gold.

Figure I.2.1./1

Fraction of countries by type of regime (cumulative %)



Source: (Taylor, 2008)

From the Inter-War years until the II. World War wide fluctuation in terms of gold allowed, the value was determined by supply and demand of imports and exports.

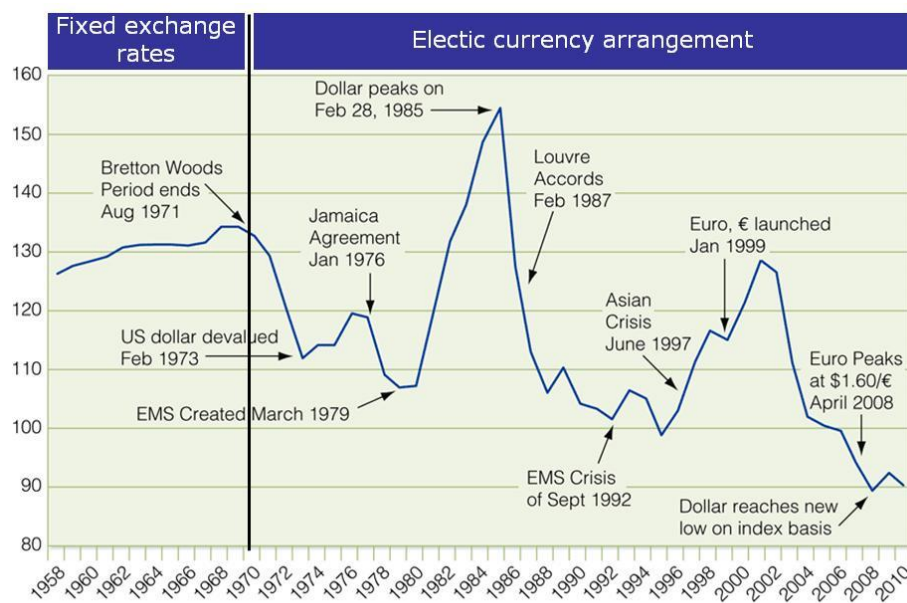
Exchange rates reflected each currency's value in terms of gold, the short selling was introduced: speculators sold weak currencies for a delivery at a future date expecting and causing the price of the asset to fall further. The regimes was abolished because proved no to be flexible enough (right to convert into to gold), and not stable (fluctuating exchange rates).

After the WWII only the USD remains convertible into gold. This period is known as the Bretton Woods, 1945-1973 and is characterized by fixed exchange rates in terms

of gold (but not required to exchange currencies in gold). The dollar was convertible into gold only by central banks, so each country established an exchange rate vis-à-vis the dollar. As the International Monetary Fund and World Bank were established countries agreed to maintain the currency values within a $\pm 1\%$ (later $\pm 2.25\%$) range, by buying or selling foreign or gold reserves. In this period devaluation was not used as competitive trade policy, only if currency became too weak to defend devaluation, a 10% decrease was allowed, but the approval of IMF for this was needed. Special Drawing Rights (SDR) were introduced as international IMF-reserve assets, weighted average of four major currencies (dollar, euro, yen, pound), weights updated every five years. The regimes was abolished because of diverging national monetary and fiscal policies, differential inflation rates, increasing US-deficit: foreign investors feared that US is unable to meet gold-payout obligation.

After this period currencies became freely floating and appreciated, the dollar devaluated. This is known as the Eclectic Currency Arrangement, in which exchange rates are more volatile and less predictable, changes occur frequently. Key events and external shocks have affected currency values in the last decades.

Figure I.2.1./2



Source: International Monetary Fund, *International Financial Statistics*, www.imfstatistics.org. 2005=100.

2.2. Contemporary Currency Regimes

Contemporary exchange rate regimes are composed of national currencies, artificial currencies (like SDR), and currencies of a community, like the euro. The classification supplied by the IMF distinguishes 8 categories of exchange rate regime:

a) In Exchange Arrangements with No Separate Legal Tender a currency of another country circulates as sole legal tender, or the member belongs to a monetary or currency union. The country has no right to print money. One type of this is the dollarization, the use of the US dollar as the official currency of the country. With this the country removes possibility of currency volatility, theoretically eliminates the possibility of future currency crises, establishes greater economic integration with the US and other dollar based markets, but suffers the loss of sovereignty over monetary policy, the loss of the ability to profit from its ability to print its own money, and the central bank of the country can no longer serve as lender of last resort. Hard pegs usually go hand in hand with sound fiscal and structural policies and low inflation. They tend to remain in place for a long time, thus providing a higher degree of certainty for pricing international transactions (Mark Stone, 2008).

b) Currency Board Arrangements refer to a monetary regime based on exchanging domestic currency for a specified foreign currency at a fixed rate. In Currency Boards a country's central bank commits to back its monetary base, money supply, entirely with foreign reserves at all times. A unit of the domestic currency cannot be introduced into the economy without an additional unit of foreign exchange reserves being obtained first.

c) Conventional Fixed Peg Arrangements represent a system where country pegs its currency at a fixed rate to a major currency or a basket of currencies, but the exchange rate fluctuates within a narrow margin; at most $\pm 1\%$ around central rate. Soft pegs maintain a firm “nominal anchor” (that is, a nominal price or quantity that serves as a target for monetary policy) to settle inflation expectations, they allow for a limited degree of monetary policy flexibility to deal with shocks. However, soft pegs can be vulnerable to financial crises—which can lead to a large devaluation or even

abandonment of the peg—and this type of regime tends not to be long lasting (Mark Stone, 2008).

d) In Pegged Exchange Rates or Horizontal Bands regimes value of the currency is maintained within margins of fluctuation around a formal or fixed peg that are wider than $\pm 1\%$ around central rate.

e) A Crawling Peg means that the Currency is adjusted periodically in small amounts at a fixed, preannounced rate in response to changes in certain quantitative measures.

f) Exchange Rates in Crawling Peg refer to currency, which value is maintained within certain fluctuation margins around a central rate that is adjusted periodically.

g) Managed Floating or No Preannounced Path for Exchange Rate regimes is a system in which the monetary authority influences the movements of the exchange rate through active intervention in foreign exchange markets without specifying a pre-announced path.

h) In The Independent Floating regime the exchange rate is market determined, with any foreign exchange intervention aimed at moderating the rate of change and preventing undue fluctuations in the exchange rate, rather than at establishing a level for it. In the free-Floating Regime the currency value is free to float up and down with international market forces. In countries that allow their exchange rates to float, the central banks intervene (through purchases or sales of foreign currency in exchange for local currency) mostly to limit short-term exchange rate fluctuations. Independent monetary policy and free movement of capital is allowed, but this causes loss of stability, and increases the volatility, that may be more than a small financial market can withstand. Also, financial instruments must be available to hedge the risks posed by a fluctuating exchange rate.

Currently, according to IMF, on a de facto basis, 48 countries have hard pegs, 60 countries have soft pegs, and 79 countries have floating rates, but 25 countries report that they are running a flexible arrangement, although they have a de facto

conventional peg. Another 14 countries report themselves as operating an independent float, although they have a de facto managed float. The discrepancy reflects the desire of countries to be perceived as market friendly.

2.3. Fixed versus Flexible Exchange Rates

Fixed exchange rates provide stability in international prices, those growths of international trade and lessen risks for all businesses. Fixed rates are anti-inflationary, requiring to follow restrictive monetary and fiscal policy, but this restrictiveness can be a burden to control high unemployment or slow economic growth. Fixed exchange rate necessitate that central banks maintain large quantities of international reserves to occasional defence of fixed rate.

On the other hand, flexible exchange rates reflect gradually and efficiently how the structure of an economy changes; trade relationships and balances evolve. In the fixed rate regimes these variations must be adjusted administratively, usually too late, too highly publicized, and enduring too large one time cost to the nation's economic health.

When comparing the domestic currency with a particular foreign currency, in this regime a higher demand for the foreign currency, all else equal, would lead to a depreciation of the domestic currency. Lower demand for the foreign currency, all else equal, would lead to an appreciation of the domestic currency. An increase in the supply of the foreign currency, all else equal, will lead to an appreciation of the domestic currency while a decrease in supply of the foreign currency, all else equal, will lead to a depreciation of the domestic currency (Weerapana, 2009).

Under a fixed exchange rate system, the Central Bank will not allow the exchange rate to adjust to the market clearing rate. In order to do so, the Central Bank must be prepared to absorb the excess demand or supply. In order to do this, the Central Bank must hold stocks of both foreign and domestic currency. Since the central bank prints domestic currency, holding stocks of domestic currency poses no problems. The difficulty comes in holding an adequate stock of foreign currency known as foreign exchange reserves. Although reserves could theoretically be held in the form of any currency, typically, most foreign exchange reserves are held in terms of dollars or

occasionally in the form of another major currency like the Euro or the yen (Weerapana, 2009).

As these advantages and disadvantages show, there is no one best exchange rate regimes. This is known as the Impossible Trinity, since cannot be satisfied the attributes of the ideal currency in the same time, each country must give up one of these three goals:

- Exchange rate stability: the value of the currency is fixed in relationship to other currencies so traders and investors can be relatively certain of the foreign exchange value of each currency in the present and near future
- Full financial integration: complete freedom of monetary flows would be allowed, so traders and investors could willingly and easily move funds from one country to another.
- Monetary independence: domestic monetary and interest rate policies would be set by each individual country to pursue desired national economic policies.

In the European Union the exchange rate stability, and the full integration holds, in the USA the full integration and monetary independence, while China operates with exchange rate stability and monetary independence.

II. MACROECONOMIC CONSEQUENCES OF FIXED EXCHANGE RATE REGIMES

1. The Short Run - Macroeconomic model incorporating fixed exchange rates

For modelling what happens in a small open economy, which tries to adopt a fixed exchange rate regime, I will use the IS-LM Model first put together by Robert Mundell (Columbia University, Nobel Prize in Economics 1999) and Marcus Fleming (International Monetary Fund - IMF). Economists consider, that however the model has certain assumptions that do not always hold, it is useful to predict that changes that certain macroeconomic decisions can cause in the economy. The model is still in use today, used by analysts of the IMF and the World Bank.

1.1. Equilibrium in goods market

According to Macroeconomics textbooks (Blanchard, 2009), the equilibrium in the goods market can be described as the equilibrium condition, where

Formula II.1.1/1

$$Y = C(Y - T) + I(Y, r) + G - \frac{IM(Y, \epsilon)}{\epsilon} + X(Y^*, \epsilon)$$

Where Y – Output (must be equal to the demand for domestic goods); C – Consumption (depending positively on disposable income: Income (Y) – Taxes (T)); I – Investment (depending positively on output, and negatively on real interest rate (r)); G – government spending; IM – quantity of imports depending positively both on output and real exchange rate (ϵ) – in terms of domestic goods divided by the real exchange rate; X – exports, depending positively on foreign output (Y^*) and negatively on the RER (ϵ).

Assuming that the Marshall-Lerner condition holds, net exports can be redefined as:

Formula II.1.1/2

$$NX(Y, Y^*, \epsilon) = \frac{IM(Y, \epsilon)}{\epsilon} + X(Y^*, \epsilon)$$

(–, +, –)

According to this model an increase in the real interest rate leads to a decrease in investment spending, as a result, to a decrease in demand for domestic goods, and through the multiplier, to a decrease in output. An increase in the real exchange rate is followed by a shift in demand toward foreign goods and as a result, to a decrease in net exports, which decreases the output.

Assuming that in the short-run the price level in the domestic and the foreign country is given and doesn't change, the real and the nominal exchange rates will move together. Because we subtract the prices from our model, the inflation will not be incorporated neither.

With these simplifications the equation becomes:

Formula II.1.1/3

$$Y = C(Y - T) + I(Y, r) + G + NX(Y, Y^*, E)$$

(+) (+, -) (+) (-, +, -)

, where the signs + and - represent the effect on the output in case the variable increases.

1.2. Equilibrium in Financial markets

Supply of money must be equal to the demand for money as

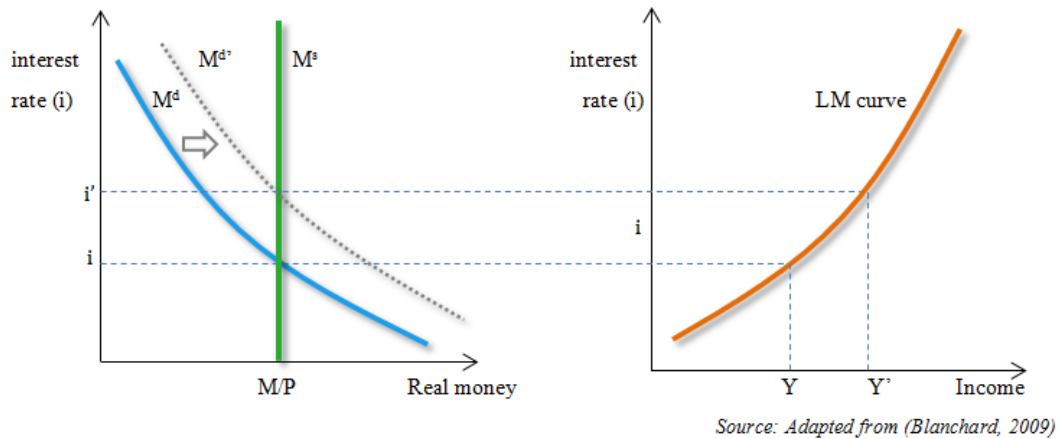
Formula II.1.2/1

$$\frac{M}{P} = YL(i)$$

Where M/P – real money supply; M – nominal money stock determined by the central bank; P – price level, Y – real income, $L(i)$ – opportunity cost of holding money rather than bonds; i – nominal interest rate on bonds.

The interest rate must be such that the supply of money and the demand for money are equal. An increase in money supply leads to a decrease in the interest rate. An increase in money demand, result of an increase in output, leads to an increase in interest rate.

Figure II.1.2/1



If the income increases from Y to Y' , people will increase their demand for money at any given interest rate. Money supply being given the new equilibrium is a new interest rate: i' .

An increase in the money supply (monetary tightening or expansion) controlled by the central bank, given a fixed price level, increases the real money supply (M/P). The interest rate given unchanged money demand will decrease, shifting the LM curve down, causing a decrease in output.

However, in the open economy, we do not have only one interest rate. Let's assume we have two different ones: a domestic and a foreign. According to the Interest Parity condition, all other things equal (for example country risks are subtracted from the model), since all financial investors go for the highest expected return, following the arbitrage relation, in equilibrium, domestic bonds and foreign bonds have the same expected return:

Formula II.1.2/2

$$(1 + i_t) = (1 + i_t^*) \left(\frac{E_t}{E_{t+1}^e} \right)$$

Where i_t - domestic interest rate; i_t^* - foreign interest rate; E_t – current exchange rate; E_{t+1}^e - future expected exchange rate.

If we take the expected exchange rate as given ($\bar{E}_e$), the interest parity relation becomes:

Formula II.1.2/3

$$E = \frac{(1 + i)}{(1 + i^*)} \bar{E}_e$$

This tells us that the current exchange rate depends positively on the domestic interest rate, negatively on the foreign exchange rate and a higher expected future exchange rate leads to an increase in the current exchange rate.

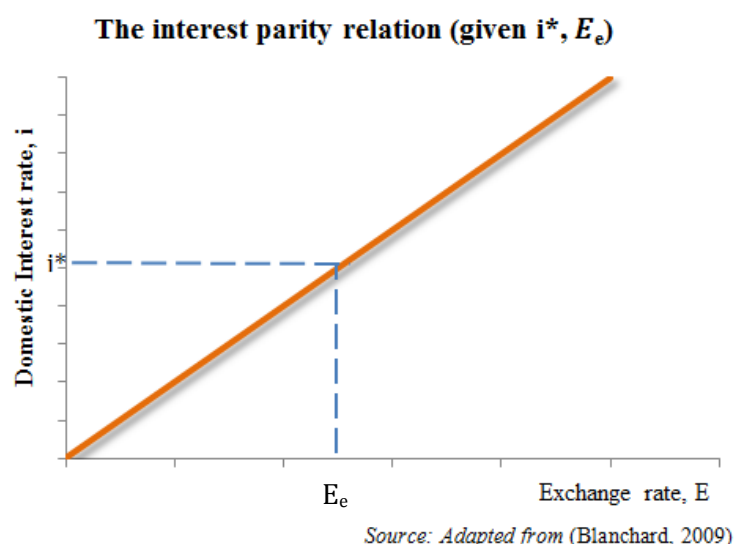
Table II.1.2/1

Scenarios	Effects
One-year interest rate on US bonds = 5% One-year interest rate on Euro bonds = 5% Current exchange rate = 100 (1 dollar worth 100 euro) Expected exchange rate = 100	Both US and Euro bonds have the same expected returns in dollars, so the interest parity condition holds.
One-year interest rate on US bonds = 5% One-year interest rate on Euro bonds = 5% Current exchange rate = 100 (1 dollar worth 100 euro) Expected exchange rate = 110	US bonds are more attractive, since the euro one year from is expected to be worth 10% less in terms of dollars. So, investors in Europe would like to shift to dollar bonds, and then use dollars to buy these securities. The dollar appreciates, $E = (1.05/1.05) * 110 = 110$, by 10% today.
One-year interest rate on US bonds = 8% One-year interest rate on Euro bonds =	US bonds are more attractive than the euro denominated ones, so investors would like to shift to euro bonds, causing an

5%	appreciation of the dollar $E = (1.08/1.05)*100=103$, by 3%. Conclusion: the increase in the domestic interest rate relative to the foreign one causes an appreciation.
Current exchange rate = 100 (1 dollar worth 100 euro)	
Expected exchange rate = 100	

The higher the domestic interest rate, the higher is the exchange rate. When the domestic interest rate is equal to the foreign exchange rate, the exchange rate is equal to the expected one.

Figure II.1.2/2



1.3. Putting the goods and financial markets together

Putting the relations determined so far together, we can write the following two equations:

i^*

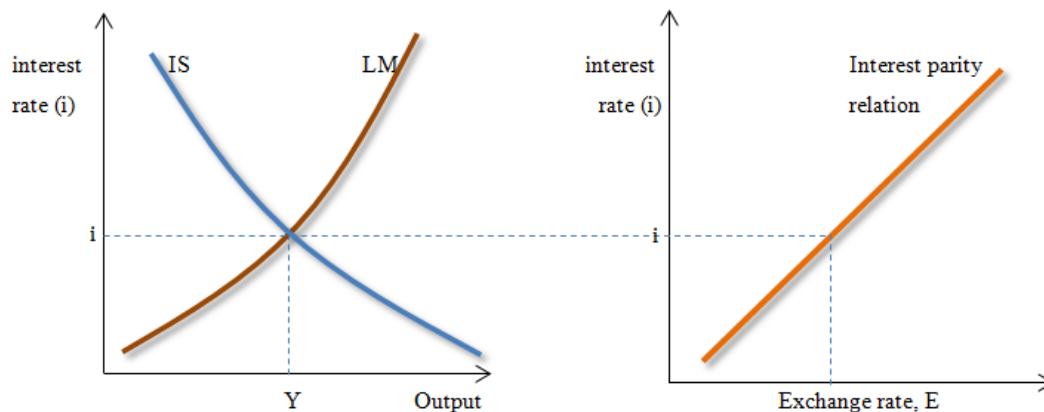
Formula II.1.3/1

$$IS: Y = C(Y - T) + I(Y, r) + G + NX\left(Y, Y^*, \frac{(1+i)}{(1+i^*)} \bar{E}_e\right)$$

$$LM: \frac{M}{P} = YL(i)$$

The IS relation will show the effects of an increase in the interest rate on output. The interest rate has now two effects. A higher interest rate leads to a decrease in investment, a decrease in demand for domestic goods and those, a decrease in output. The increase of the interest rate also causes an increase on the exchange rate, an appreciation, which makes domestic goods more expensive relative to foreign goods, leading to a decrease in net exports, and therefore, a decrease in the output. From this, we can draw the IS curve, which is downward sloping, an increase in the interest rate leading to a direct and indirect decrease in output. The LM curve is upward sloping: an increase in income increases the demand for money, leading to an increase in the interest rate. The equilibrium value is given by the intersection of the two curves.

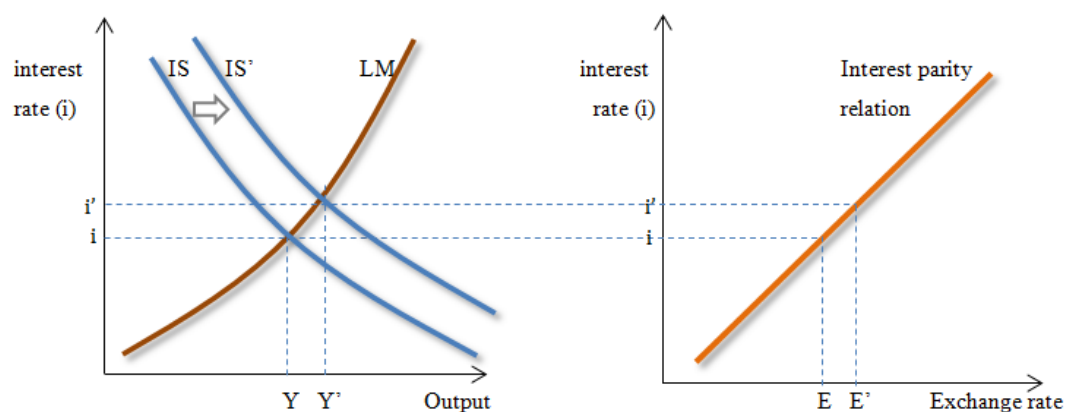
Figure II.1.3



1.4. Effects of fiscal and monetary policy

In this model, a change in fiscal policy, more precisely government spending without raising taxes, however creates a budget deficit, increases the output at a given interest rate (increase in the population's consumption), shifting the IS curve to the right. The LM curve will not shift. The new equilibrium will be on a higher level of output, but also higher level of interest rate. This leads to an increase in the exchange rate – appreciation.

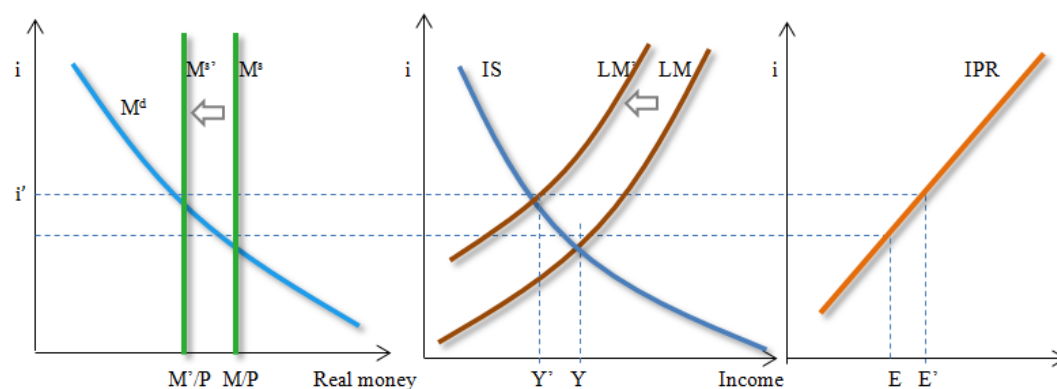
Figure II.1.4/1



As output increases, so does the demand for money, leading to upward pressure on the interest rate. The increase in the interest rate makes domestic bonds more attractive, leading to an appreciation. The higher interest rate and the appreciation both decrease the domestic demand for goods, offsetting some of the effect of government spending on demand and output. The increase in output has in all a negative effect on the net exports, however it increases imports (more disposable income), but the higher exchange rate makes the domestic goods more expensive to foreigners, and the budget deficit leads to a deterioration of the trade balance.

Having a look at monetary policy, at any given level of output a decrease in the money stock (monetary contraction for example by selling government securities), leads to an increase in the interest rate. The LM Curve shifts up, and the increase in the interest rate leads to an appreciation.

Figure II.1.4/2



A monetary contraction leads to an increase in the interest rate, making domestic bonds more attractive and triggering an appreciation. The higher interest rate and the appreciation both decrease demand and output.

1.5. Fiscal and monetary policy under fixed exchange rates

Supposing that a government chooses a value, denoted by $\bar{E}$ as the fixed exchange rate, it must take measures to prevail it in the foreign exchange market.

Formula II.1.5/1

$$(1 + i_t) = (1 + i_t^*) \left(\frac{E_t}{E_{t+1}^e} \right)$$

Re-establishing the interest parity condition the current exchange rate E_t will equal $\bar{E}$. If the fixed exchange regime is trustful, so the investors believe that the government and the central bank will maintain the value of the currency, also the expected exchange rate E_{t+1}^e must equal $\bar{E}$. This leads us to the following conclusion:

Formula II.1.5/2

$$(1 + i_t) = (1 + i_t^*) \Rightarrow i = i^*$$

If investors expect an exchange rate to remain stable, they will require the same interest rate in both countries. Under a fixed exchange rate and perfect capital mobility, the domestic interest rate must be equal to the foreign interest rate. This condition has also an important implication in the equilibrium between the supply and demand for money.

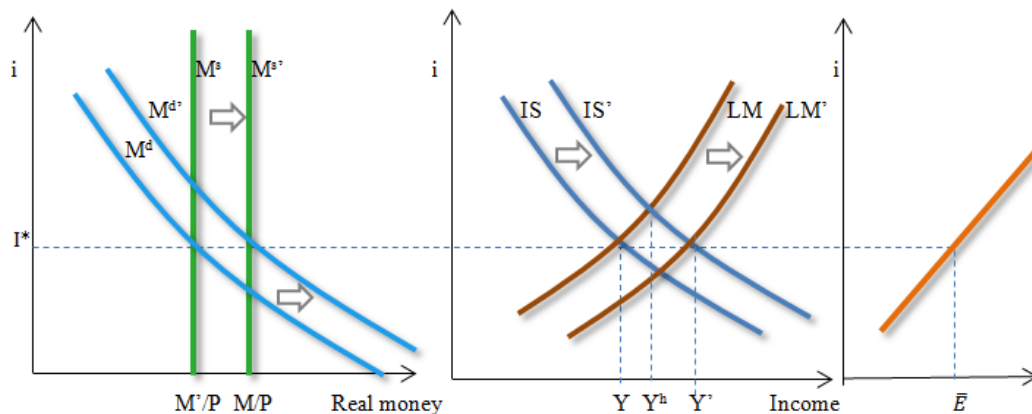
Formula II.1.5/3

$$\frac{M}{P} = YL(i^*)$$

If domestic output increases (to Y^h – output hypothetical) the demand for money, under flexible exchange rates, the central bank could leave the money stock unchanged, the result would be a increase in the interest rate and an appreciation. But under fixed exchange rates, the central bank cannot keep the money stock unchanged, because the domestic interest rate would increase above the foreign one, leading to

appreciation. To maintain the exchange rate, the supply of money must increase with the increase in demand for money, so the equilibrium interest rate does not change. This means, that under fixed exchange rates, the central bank gives up monetary policy as an instrument. However, a fiscal policy is still a tool that can be used by governments. In case of a flexible exchange rate, a fiscal expansion (increase in government spending) shifted the IS curve to the right, the money stock remained unchanged, leading to an increase in output and an appreciation. Under a fixed exchange rate, the central bank cannot let the currency's value move, so the increase in demand for money must be compensated by an increased money supply, to keep the interest rate and the exchange rate unchanged.

Figure II.1.5



The central bank will shift the LM curve down as the IS curve shifts to the right, and the equilibrium output value will be higher than in case of the flexible interest rate regimes. Under fixed exchange rate, the fiscal policy is more powerful, since triggers monetary accommodation. But this is true only in the short run, when the price level is assumed to be constant and under perfect capital mobility.

2. The Medium Run and the exchange rate crises

In the previous section we focused on the effects of certain types of exchange rates in the short run. Using a flexible exchange rate a country could achieve a real depreciation (for example in order to reduce trade deficit or get out of recession) by an expansionary monetary policy ($\uparrow M_S$), which leads to a decrease in the interest rate ($i \downarrow$) and depreciation ($E \downarrow$). Under fixed exchange rate the country loses this instrument.

However, in the medium time span, the country reaches the same exchange rate, whether it operates under fixed or flexible regimes. The adjustment of real exchange rate ($\varepsilon = \frac{EP}{P^*}$) in case of the flexible exchange rate regime is realized through the nominal exchange rate, under fixed exchange rate regime through change in domestic price level relative to foreign price level. To see why this is true, we must use the aggregate demand and the aggregate supply relation for an open economy, under fixed exchange rates.

2.1. The AD-AS curves in an open economy with fixed but adjustable exchange rate

The aggregate demand relation can be written as:

Formula II.2.1/1

$$Y = Y\left(\frac{\bar{E}P}{P^*}, G, T\right)$$

$$(-, +, -)$$

Where Y (medium run output – or GDP) depends on the real exchange rate $\left(\frac{\bar{E}P}{P^*}\right)$ - $\bar{E}$ denoting the fixed exchange rate. An increase in the real exchange rate leads to a real appreciation, a decrease in output. Because of this the slope of the AD curve is downward sloping: we have a negative relation between price level and output.

The rationale behind the adjustments is different for the closed and for the open economy. In the closed one, the process can be shortly described as follows ($\downarrow$ denoting a decrease in the variable, $\uparrow$ representing an increase):

Formula II.2.1/2

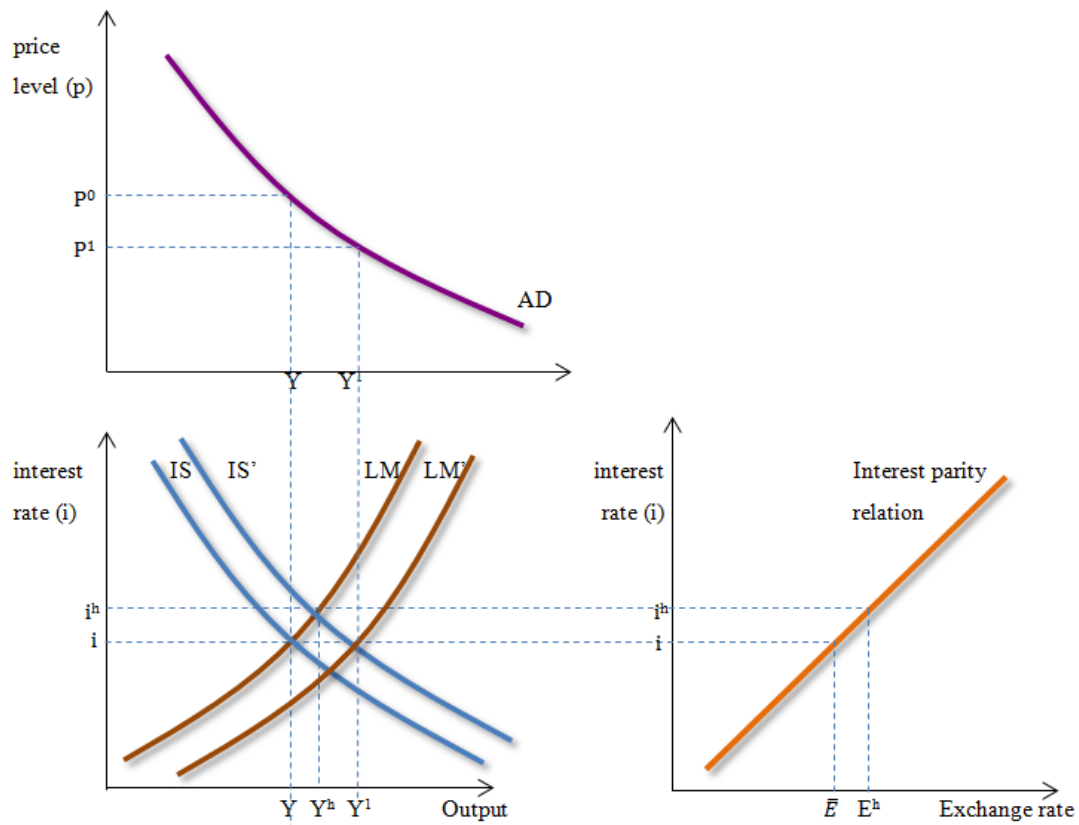
$$P \downarrow \rightarrow \frac{\bar{M}}{P} \uparrow \rightarrow i \downarrow \rightarrow I \uparrow \rightarrow Z \uparrow \rightarrow Y \uparrow$$

The conclusion is that in closed economies the Central Bank could change interest rate and affect output by controlling money supply. In the open economy the adjustment process's description:

$$P \downarrow \rightarrow \frac{\bar{E}P}{P^*} \downarrow \rightarrow \text{Competitiveness} \uparrow \rightarrow NX \uparrow \rightarrow Y \uparrow$$

The decrease in domestic price level (real exchange rate) leads to an increase in output. Graphically, this can be represented as follows:

Figure II.2.1/1



The AD curve can be derived also by starting from the output relation used in the previous section:

$$Y = C(Y - \bar{T}) + I(Y, r) + \bar{G} + NX(Y, Y^*, \varepsilon)$$

Where $r = i$ (expected inflation = 0) = i^* (has to be equal to foreign rate because of fixed exchange rate).

$$Y = C(Y - \bar{T}) + I(Y, i^*) + \bar{G} + NX(Y, Y^*, \frac{\bar{E}P}{P^*})$$

$$Y = Y\left(\frac{\bar{E}P}{P^*}, \bar{G}, \bar{T}; Y^*, i^*\right)$$

$$Y = Y(P, \bar{E}, P^*, \bar{G}, \bar{T}; Y^*, i^*)$$

$$(-, -, +, +, -, +, -)$$

The conclusion is that the AD shifts to the right because of the following reasons: $G \uparrow$, $T \downarrow$, $Y^* \uparrow$, $i^* \downarrow$, $\bar{E} \downarrow$, or $P^* \uparrow$. The aggregate supply relation can be written as follows:

Formula II.2.1/5

$$P = P^e (1 + \mu) F\left(1 - \frac{Y}{L}, z\right)$$

Where

μ – markup of price over cost; z –

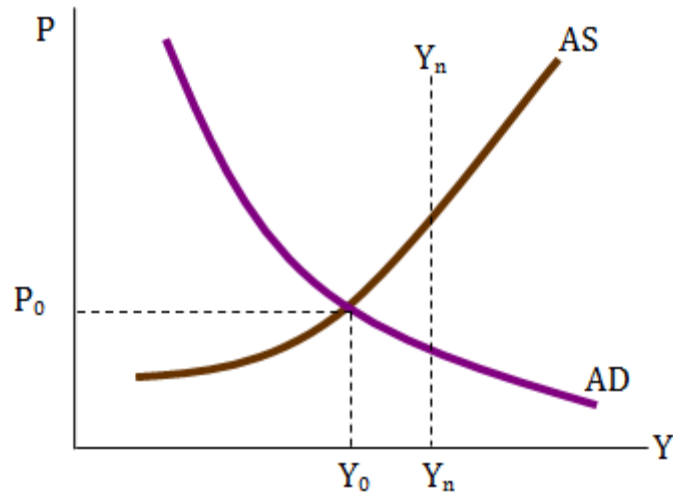
catchall variable (ex. unemployment insurance) L – labor force.

The AS relation implies that the prices increase if output increases ($Y \uparrow \rightarrow N \uparrow \rightarrow U \downarrow \rightarrow \uparrow W \rightarrow \uparrow P$ levels set by firm, where N is employment, U is unemployment, W is wages) and prices increase if expected price level increases ($\uparrow P_e \rightarrow P \uparrow$ ($\uparrow P_e \rightarrow W \uparrow \rightarrow$ cost of firms $\uparrow \rightarrow \uparrow P$ set by firms)). The explanation for this: the price level depends on the expected price level, because that affects nominal wages (bargaining of workers), which in turn affect the price level (firms establish higher prices to be able to pay higher wages). Higher output leads to higher employment, which leads to lower unemployment, which leads to higher wages, and to higher price level. Because of this, the AS curve is upward sloping ($\uparrow Y \rightarrow \uparrow P$).

The short-run equilibrium is given by the intersection of the AD and AS curve. We have to introduce here the concept of natural level of output. The natural rate of unemployment (sometimes called the structural unemployment rate) represents the hypothetical unemployment rate consistent with aggregate production being at the "medium-run" level. This level is consistent with aggregate production in the absence of various temporary frictions such as incomplete price adjustment in labour and goods markets.

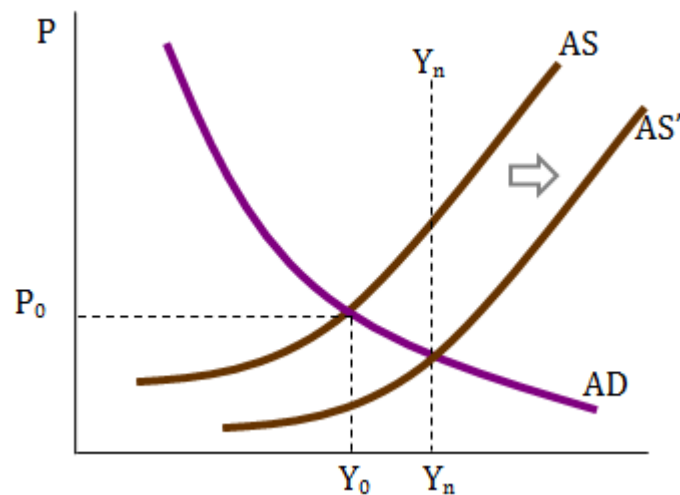
We can state when the output is below its natural level, the price level turns out to be lower than was expected.

Figure II.2.1/2



This leads wage setters to revise their expectations of the price downward, leading to a lower price level at a given level of output – a downward shift of the aggregate supply curve. Then the economy moves over time along the aggregate demand curve until it reaches the natural level of output. The price level is lower than it was, the real exchange rate is lower, leading to a steady real depreciation.

Figure II.2.1/3

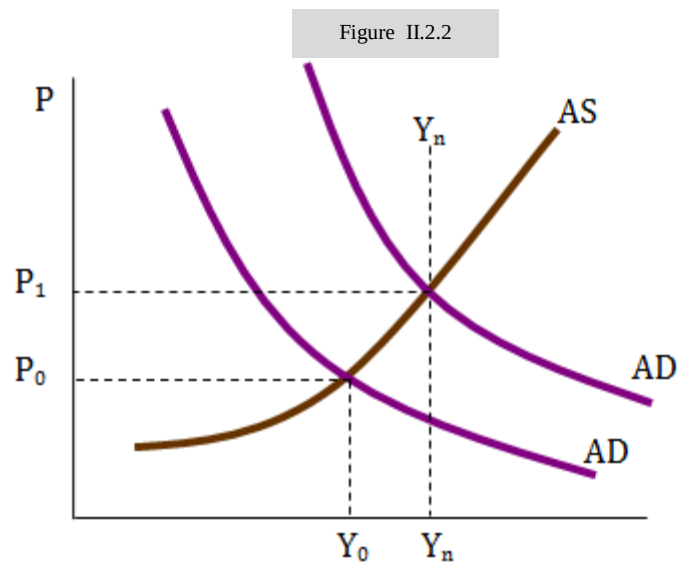


So, in the medium run, despite the fact that the nominal exchange rate is fixed, the economy can still achieve the real depreciation needed to boost output to its natural level through movement in the price level. All of this is true if the assumption, that the foreign price is constant over time.

2.2. One time devaluation in the medium run

In medium run economy returns to equilibrium level of output, but output may remain too low and unemployment too high for a long time. The government can decide in this case to keep the fixed exchange rate regime, but realize a one-time devaluation.

For a given price level, a devaluation leads to a real depreciation, and therefore, an increase in output. This shifts the aggregate demand curve to the right: output is higher at a given price level. This can take the economy direct to the natural level of output.



Achieving the right size of devaluation is easier to achieve in the graph than in reality (Blanchard, 2009). The effects on output do not happen right away, the initial effects of depreciation on output can be contractionary, as people pay more for imports, and the quantities of imports and exports have not adjusted yet. Also, there is likely to be a direct effects on the price level, as the price of imported goods increases, the price of a consumption basket increases. This will lead workers to ask for higher nominal wages, forcing firms to increase their prices as well.

When a country with a fixed exchange regime faces large trade deficit or recession, there is large pressure for devaluation. But too much willingness from government to devalue increases the likelihood of exchange rate crises.

2.3. Exchange rate crises

A country with fixed exchange rate may experience an exchange rate crises if the expected exchange rate increases ($E_e \uparrow$).

Financial investors may think that devaluation is coming, because:

❖ The real exchange rate (ε) may be too high – the case of the overvalued currency. Although in the medium run a real depreciation could be solved without intervention, financial investors may think the government chooses the quicker way, and devalues. For example a country pegs its nominal E rate to a currency with lower inflation (relative higher $\pi \rightarrow$ domestic goods relative more expensive to foreigners $\rightarrow \downarrow X \rightarrow \downarrow NX$).

❖ Internal conditions may call for decrease domestic interest rate. This can be achieved if country shifts to flexible exchange rate regime and adjusts ($i \downarrow \rightarrow \downarrow E$)/

If financial markets believe that devaluation is coming – the country can keep its exchange rate only with increasing the interest rate:

Formula 11.2.3

$$\uparrow i_t = i_t^* \frac{(\uparrow E_{t+1}^e - E_t)}{E_t}$$

If the financial markets expect that the exchange rate will be 2% lower one months from now, they will hold domestic bonds only if the one-month domestic interest rate exceeds the one-months foreign interest rate by 2%.

Under fixed exchange rates, the current exchange rate, is set at $\bar{E}$. If markets expect that the parity will hold, then the interest parity condition simply argues that the domestic and foreign interest rate will be equal. But if a devaluation is anticipated, a decrease in the exchange rate has to be prevented by the central bank. Suppose investors believe that there is a 75% chance that the parity will be maintained in the next month and a 25% chance that there will be a 20% devaluation. The term of the equation $\frac{(E_{t+1}^e - E_t)}{E_t}$ previously equal to 0 now will be -5%. This means, that the central bank has now to set a 5% higher monthly interest rate needed to convince investors to hold domestic bonds rather than foreign ones.

In cases where the credibility is lost, the government has the following choices:

- ✓ Convince markets that they don't have intention to devalue. This rarely convinces the investors.
- ✓ Increase interest rate by less than needed to satisfy equation. This causes a large capital outflow from the country, because the investors still prefer to get rid of domestic bonds. If investors want to sell the currency, the central bank has to intervene and buy it to keep exchange rate fixed. This requires large reserves of foreign currency.
- ✓ After some weeks, the government has no other chances than to devalue or increase interest rate enough to satisfy the equation. This leads to a decrease investment and borrowing at high interest rate, a potential recession.

So, even if there is no intention to devalue, if financial markets believe it will happen, the government must devalue (the cost of maintaining parity would be long period of high interest rate and recession).

3. Choosing between exchange rate regimes

In the table below I summarized the advantages and disadvantages of the two (extreme) types of exchange rate regimes.

Table II.3

Fixed Exchange Rate		Flexible Exchange Rate	
Advantages	Disadvantages	Advantages	Disadvantages
Due to less volatile exchange rate the volume and speed of international trade is bigger than in a country with flexible exchange rate regime	in short run, the country gives up two macroeconomic instruments: the ability to change interest rate and exchange rate	The possibility of using the both macroeconomic tools: namely fiscal and monetary policy	Exchange rate is likely to fluctuate, has a high volatility, which has a negative impact on international

Fiscal policy is more efficient, because the Central Bank has to use the monetary policy as well	An anticipation of devaluation leads to very high interest rates, making the economic situation worse and putting a pressure in the country to devalue		trade's volume
The possibility to devalue the currency exist -> improve trade balance, increase output	Conducting a contractionary fiscal policy reduces output	Exchange rate immediately reacts and reflects changes in expectations	uncertainty regarding i rate can drive investment down
If common currency area -> transaction cost are reduced	If common currency area, macroeconomic shocks are country specific, and factor-mobility is low, Fixed E is harmful		

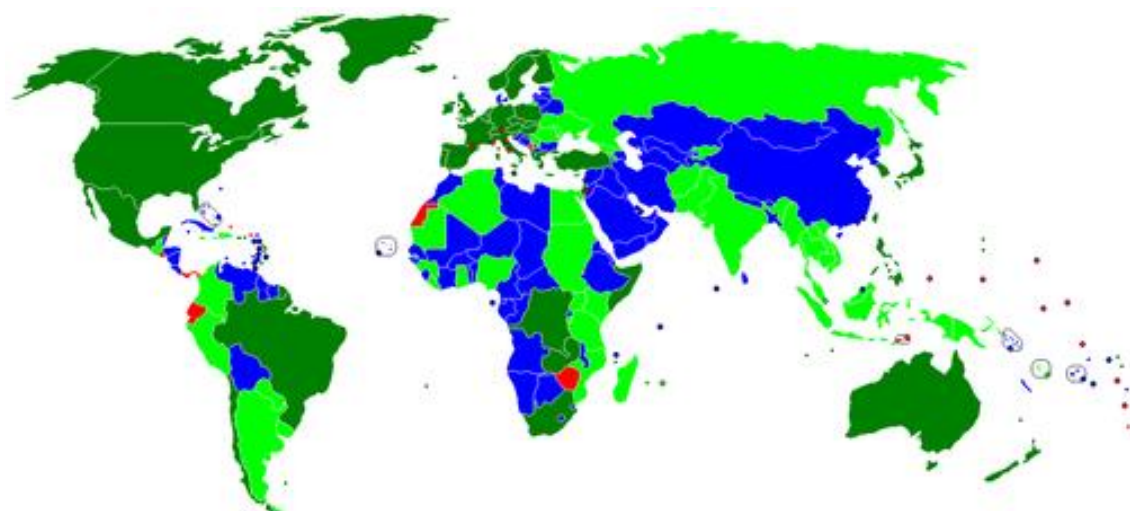
III. CASE STUDY

1. Macroeconomic performance of exchange rate regimes

According to the IMF in 2009 the preferred exchange rate regime in the world was the conventional fixed peg arrangement with 68 countries adopting it. The second most popular system is the managed floating one, with no pre-determined path for the exchange rate, 44 countries used it, while only 40 countries had a real independently floating currency (the entire list of different exchange rate regimes and countries adopting in *Appendix no.1.*)

Figure III.1/1.

The world map of currency exchange regimes



■ free float regime ■ managed float regime ■ different types of currency peg ■ foreign currency usage

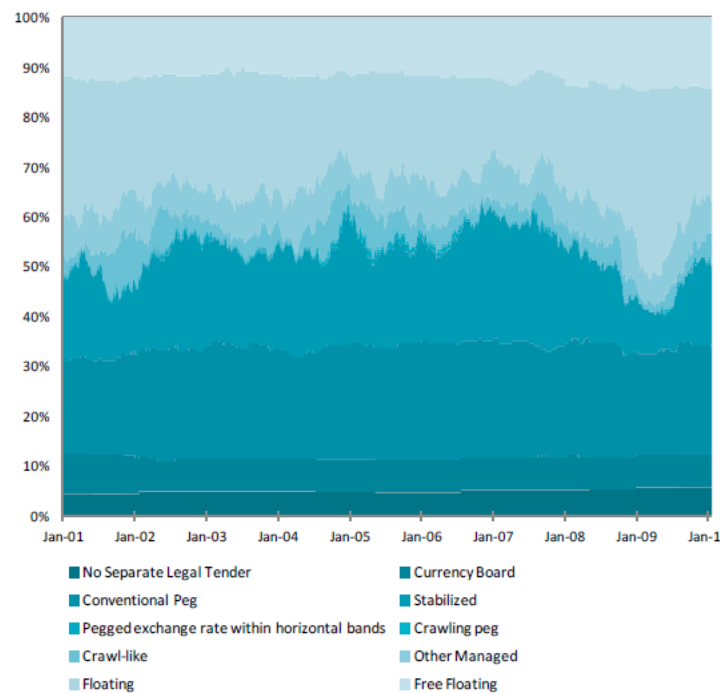
Source: (Alinor, 2010)

In this case study I will use the expression *fixed exchange rate regimes* for countries with exchange arrangements with no separate legal tender, currency board arrangements, conventional fixed peg arrangements, pegged exchange rates within horizontal bands, crawling pegs and crawling bands, while the managed floating with no pre-determined path for the exchange rate and the independently floating systems I will denote with the *floating exchange rate regime* term.

In the first part of this case study I try to measure the performance of different type of exchange rate regimes by some key macroeconomic variables: GDP growth, inflation, unemployment, budgetary deficit, government debt. I selected only these variables because of they are relative measures (expressed in percentage rates) and because of data availability.

Figure III.1/2.

Exchange rate regime classifications 2001-2009



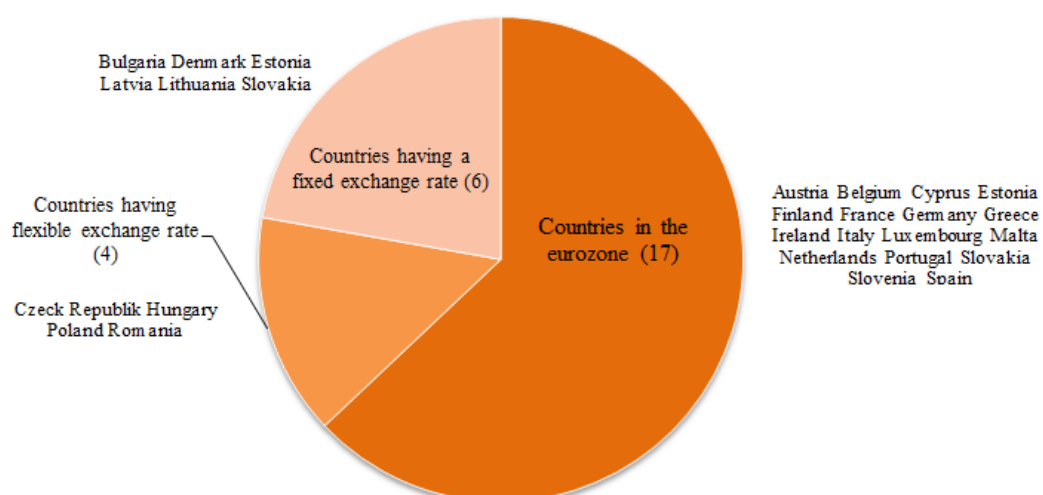
Source: (Tsangarides, 2010)

Because of this case study's special focus on Romania, I wanted to select the country sample in order to be the most comparable (regional level), so I did not consider a suitable benchmark the whole World's country datasheet. In European Union most of the countries adopted a common currency, which creates a special category: there exchange rate compared to the other currencies is floating; however, their major

trading partners¹ are also part of the Eurozone, so they share the same monetary characteristics.

Figure III.1/3.

Exchange rate regime distribution in the European Union



Source: Own depiction based on the data from the International Monetary Fund (IMF)

Since only four countries in the European Union have flexible, and six fixed exchange rate regimes besides the ones adopting the Euro, I completed the country sample with countries from Europe and Central Asia. Finally, because of data availability the following 44 countries' macroeconomic data was included in the sample:

Table III.1.

Fixed exchange rate regimes	Floating exchange rate regimes	Countries in the Eurozone
Armenia	Czech Republic	Austria
Azerbaijan	Georgia	Belgium
Belarus	Hungary	Cyprus

¹ Individually for each European Union member trade with all other European Union members collectively is greater than any other trading partner (Source: World Trade Organization Trade Profiles database, loaded 2010)

Bosnia and Herzegovina	Iceland	Finland
Bulgaria	Moldova	France
Croatia	Norway	Germany
Denmark	Poland	Greece
Estonia	Romania	Ireland
Kazakhstan	Serbia	Italy
Latvia	Sweden	Luxembourg
Lithuania	Switzerland	Netherlands
Macedonia, FYR	Turkey	Portugal
Russian Federation	Ukraine	Slovenia
San Marino		Spain
Slovak Republic		United Kingdom
Tajikistan		

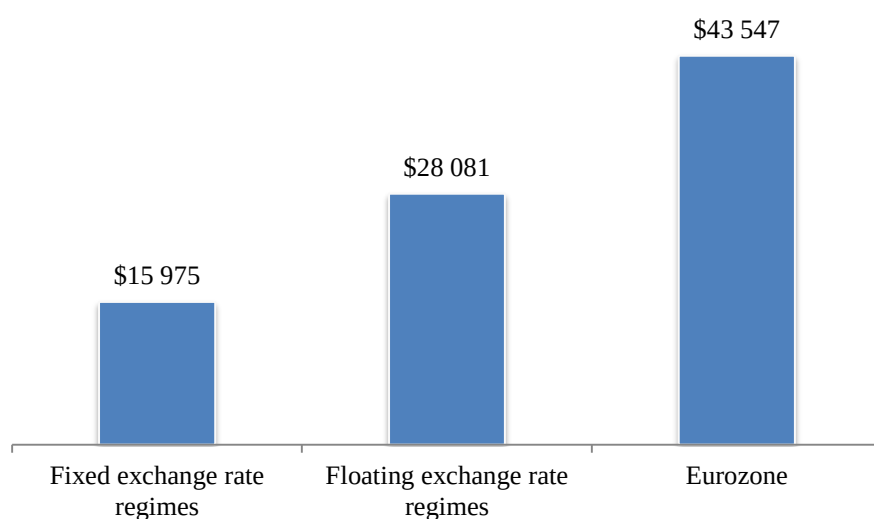
The reason for creating a special category for the countries in the Eurozone is not only the fact that their exchange rate with their major trading partners is pegged, but also the fact that they are considered to be developed countries. Haizhou Huang and Priyanka Malhotra from the research centre of the International Monetary Fund found that for advanced European countries, the choice of regime does not seem to affect the rate of economic growth or its variability, although more flexible exchange regimes are associated with slightly higher growth rates, while for developing and emerging economies the choice of regime does affect the economic growth rate, but does not affect the variability of growth (Malhotra, 2004).

The data selected for the analysis is from 2001 to 2011. The data sample is derived from the database of the World Bank, the IMF and of the Eurostat. The categorization in fixed, floating regimes is done by observing the status quo, the current regime

adopted (reason: data availability and robustness). Among the selected countries there is a huge difference in development level, as expressed in terms of GDP/capita. The Eurozone countries are advanced economies, while based on the average GDP/capita the countries selected in the categories of fixed and floating exchange regimes classify in the developing to developed nation's group. Because of the development-differential the findings of this analysis of macroeconomic variables may be subject to misapprehension, therefore all the results should be treated in an orientative manner.

Figure III.1/4.

Average GDP/capita of selected countries (2011)



1.1. Inflation performance

According to a recent study realized by the IMF (Atish R. Ghosh, 2009), there is ample evidence that, for developing and emerging market countries, pegged exchange rate regimes are associated with the best inflation performance. The only exception occurs when the peg is at an undervalued rate and the country is unable to offset the growth of the money supply that occurs when persistent current account surpluses and resulting accumulation of foreign reserves translate into excessive monetary growth; in such cases (a small minority in the IMF data set), the inflation benefit from pegs does not occur.

An important part of a peg's inflation benefit comes from the credibility of a formal commitment by the central bank to maintain the parity—not just from its de facto

foreign exchange intervention or the behaviour of the exchange rate. In nearly every case in which the central bank makes a formal commitment to a pegged exchange rate regime, it in fact maintains that peg. In other words, when it comes to pegging the exchange rate, deeds nearly always back words.

The same conclusion is found Feenstra and Taylor in 2008, mentioning that average consumer price increased more in countries with floating exchange rates than in the fixed ones. This is true also for developed countries and emerging and developing countries.

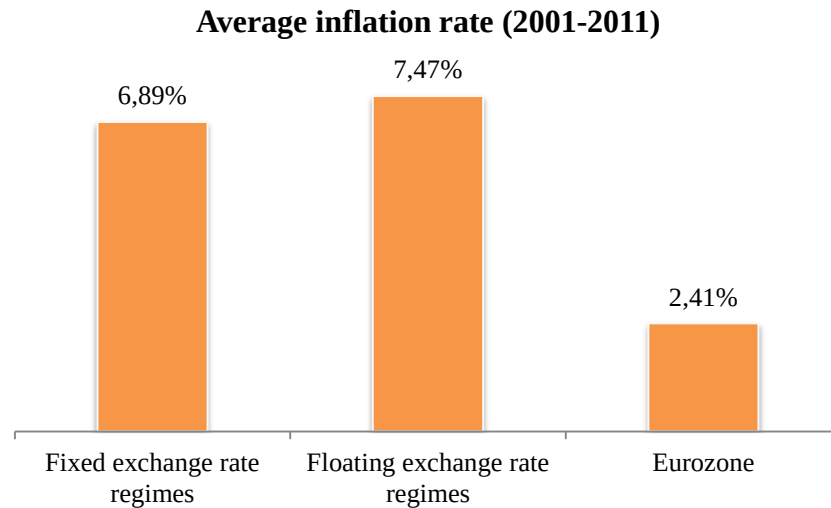
Table III.1.1.

Exchange rate regime	Developed Countries	Emerging and developing countries (excluding the year after the regime change)
Fixed	4,8%	8,8%
Limited flexibility	8,3%	10,8%
Managed floating	7,8%	14,7%
Freely floating	3,5%	15,8%

Source: Inflation Performance and the Exchange Rate Regime, Feenstra and Taylor: International Economics, First Edition, 2008

The above mentioned finding was made regarding the world's all countries. The results of the analysis made in this case study are more nuanced, with Eurozone countries outperforming fixed exchange rate countries, which show similar average inflation than the floaters.

Figure III.1.1.

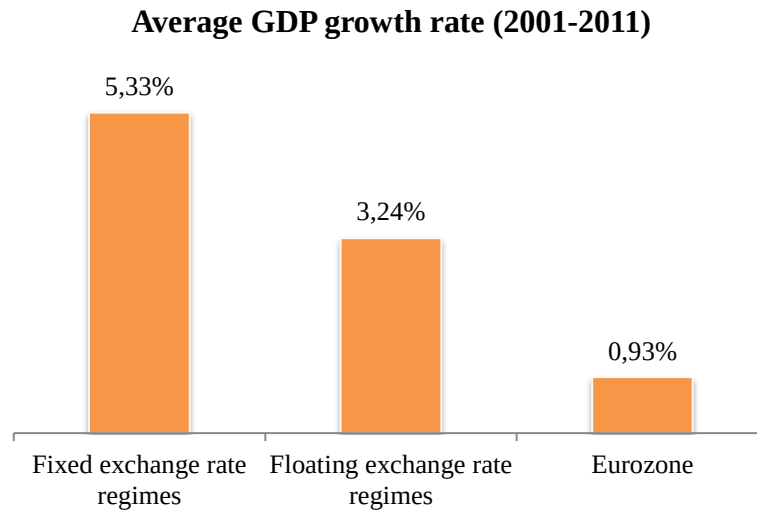


1.2. GDP growth

Pegged exchange rate regimes are associated with better growth performance than floating regimes—but only if they are able to avoid real exchange rate overvaluation and loss of competitiveness. According to the IMF study growth performance is best under intermediate exchange rate regimes—those that maintain relatively rigid exchange rates but do not formally peg to a single anchor currency. This is largely because such intermediate regimes represent a happy balance between pegs and free floats (Atish R. Ghosh, 2009). Pegged regimes are associated with lower inflation, lower nominal and real exchange rate volatility, and greater trade openness—all of which are associated with faster growth. But pegged regimes are also more susceptible to exchange rate overvaluation, which hurts competitiveness and undermines growth performance.

The analysis of macroeconomic variables leads to the result that fixed exchange rate regimes demonstrated the highest growth rate from the three categories. Here is important to mention again that there is a substantial discrepancy in the GDP/capita of the three categories.

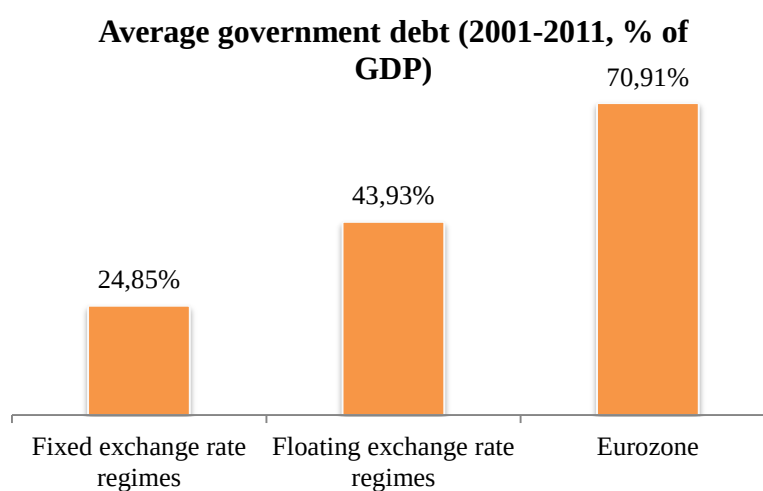
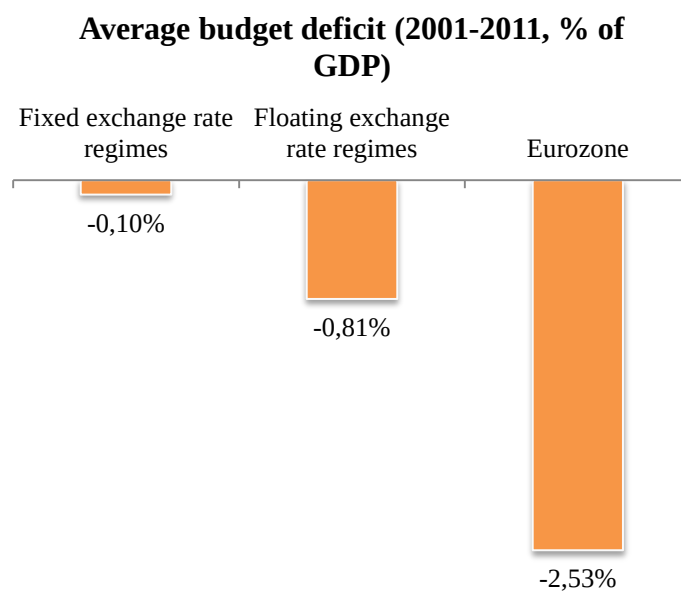
Figure III.1.2.



1.3. Budget deficit and indebtedness

The study concludes that fixed exchange regimes are cautious with the state budget, they tend to have lower deficits and also the level of the government indebtedness is lower compared to the countries with flexible currencies. The reason for this according to several studies is that countercyclical fiscal policy—cutting taxes and increasing government spending to counter economic downturns and vice versa—is heavily constrained under pegged exchange rate regimes. This presumably happens because capital flows are related to the business cycle in most emerging market and developing countries. Because expansionary fiscal policy in a downturn could lead to a loss of confidence and trigger further capital outflows, which would threaten the viability of the peg, there is less scope for countercyclical fiscal policy in countries with pegs.

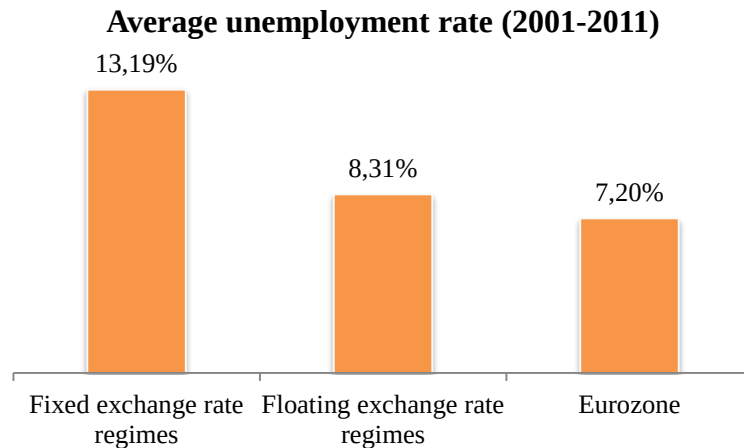
Figure III.1.3.



1.4. Unemployment

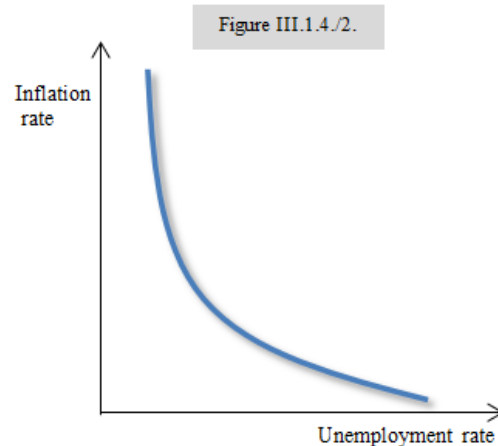
This paper states that the unemployment rate in countries with more rigid currency systems was significantly higher than in the floating regimes, which leads to a contradiction to other studies.

Figure III.1.4./1.



Using data on 78 countries over 1980 to 2008 Horst Feldmann finds that switching from a floating regime to a pegged or an intermediate regime is likely to substantially reduce unemployment. The estimated effect of switching to a pegged regime is around two percentage points (around one percentage point) after 2 years. Other scientific papers arrive to similar conclusions.

The higher unemployment rate in the studied fixed exchange rate regimes sample can be partly explained by country-specific factors, and the Phillips curve. It is known that there exists a historical inverse relationship between the rate of unemployment and the rate of inflation in an economy. Stated simply, lower unemployment in an economy is correlated with a higher rate of inflation. Since the studied countries with more rigid exchange rates experienced lower inflation rates than the flexible ones, it is reasonable to find higher unemployment rates in them.



1.5. Statistical significance of the results

All the results presented so far, deriving from macroeconomic data analysis are simple arithmetic average, and, however, the differences on the specific indicators level seem relevant, there is a need to check if these measures are statistically significant.

From the data table available I created pooled tables, and counted differences in means of the categories (fixed, floating, Eurozone) for all the five variables (inflation,

GDP growth, unemployment, government debt, government deficit), for all the ten year (2001-2011) analysed. The pooled data table can be found in *Annex no.2*.

After this, I conducted a One-way Anova analysis, which in statistics is a technique used to compare means of two or more samples, using the F distribution. The hypothesis in all the five cases (the five different macroeconomic variables) is as follows:

Formula III.1.5./1.

$$H_0: Mean_{fixed} = Mean_{floating} = Mean_{Eurozone}$$

H₁: at least two of the groups have different means

The ANOVA tests the null hypothesis that samples in two or more groups are drawn from populations with the same mean values. To do this, two estimates are made of the population variance. The ANOVA produces an F-statistic, the ratio of the variance calculated among the means to the variance within the samples. If the group means are drawn from populations with the same mean values, the variance between the group means should be lower than the variance of the samples, following the central limit theorem. A higher ratio therefore implies that the samples were drawn from populations with different mean values (Howell, 2002).

Formula III.1.5./2.

$$F = \frac{\text{the variance between the groups}}{\text{the variance within the groups}}$$

The larger the F-statistic, the more likely that the groups have different means (reject H₀). I conducted the ANOVA test by using an $\alpha = 0,05$.

Table III.1.5.

Variable	F		F crit	P value	Significance
GDP growth	6,721	>	3,315	0,003872	***

Inflation	13,214	>	3,315	0,000076	***
Deficit	5,479	>	3,315	0,0093	***
Debt	97,412	>	3,315	7,57E-14	***
Unemployment	24,80553	>	3,3152	0,00000043	***

Since all the probabilities are within the confidence interval, we can state statistically proved that the exchange rate regime choice does affect the macroeconomic performance of the studied countries.

1.6. Findings

From the five analysed aspects four lead to favourable results for fixed exchange regimes, however, this cannot be considered a policy advice. For that we would have to tailor the country-specific circumstances.

What we can state is that regimes that are more rigid help countries anchor inflation expectations, sustain output growth, and foster deeper economic integration. But they also constrain the use of macroeconomic policies, increase vulnerability to crisis, experience higher unemployment rates and impede external adjustment.

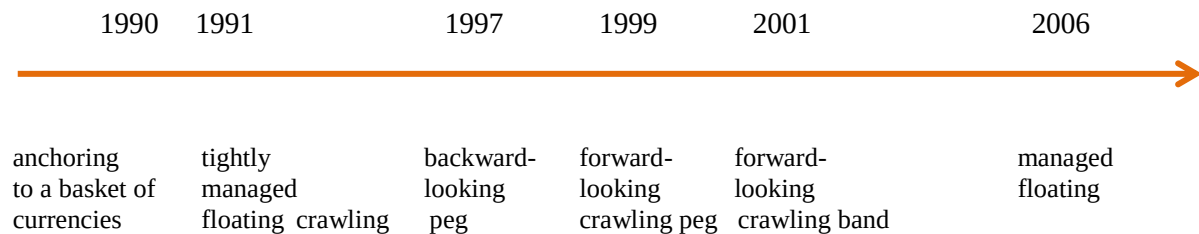
2. Applicability in Romania of a fixed exchange rate regime

2.1. Romania's exchange rate regime

Romania officially operates under the *managed floating with no pre-determined path for the exchange rate* system, so, however central bank intervention is allowed and common, the exchange rate is considered to be a floater.

Figure III.2.1./1.

The evolution of the Romanian exchange rate regime



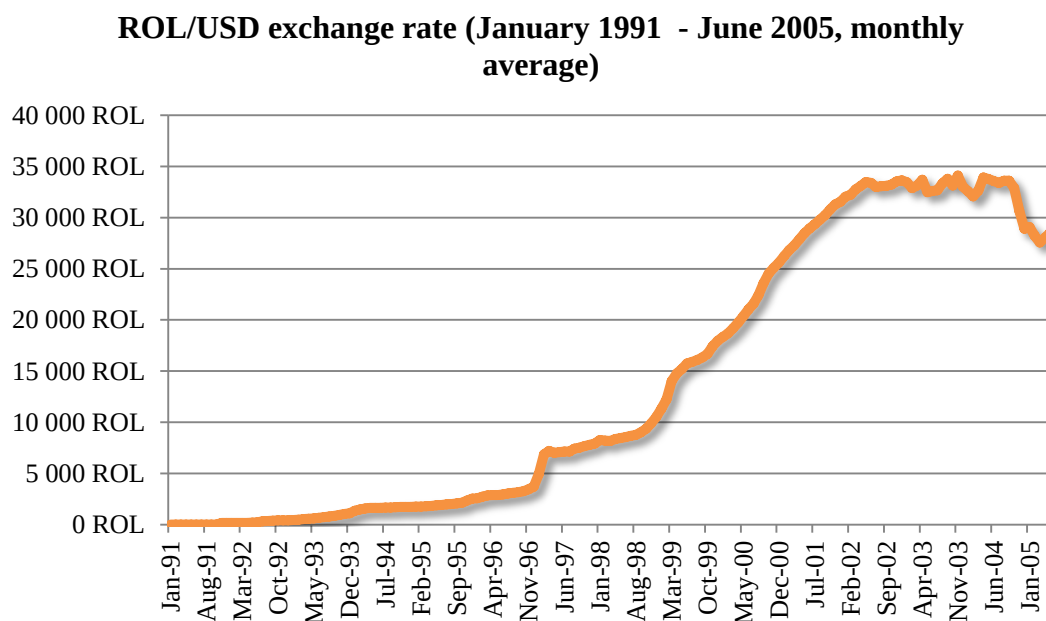
Adapted from (Dobrotă, 2009)

After the political transition from 1989 the history of the Romanian exchange rate systems starts with a fast deterioration in the balance of payments. The official exchange rate was established in January 1990 to the parity of 21 lei / dollar, while the empirical rate observed was over 80 lei/dollar. This was unfavourable for exports, while boosted imports². Artificial maintaining of this rate led to a rapid decrease in the central bank's reserves and to a serious deterioration of the trade balance. Opening of the interbank currency market in 1991 resulted in the use of a dual rate system, there being both the official rate and the interbank market rate. The major discrepancies recorded between the two rates determined the need for unification. At the beginning of 1992, in an attempt to limit the inflationary process, the exchange rate was frozen. The effects recorded were: significant increase of import demands, continuous reduction of exports, domestic inflationary process, and national bank's inability to meet the demand for foreign currency.

The fixing at an overvalued level of the domestic currency rate did not work, even though the NBR adopted new monetary packages, the exports continuously fell, the transactions on the black market intensified, confidence in the market was eroded, causing the maintenance of above average consumer price increases. Because of these, a mechanism of continuous and integrated foreign exchange market was introduced in 1992, resulting in depreciation (Dobrotă, 2009).

² The short presentation of the Romanian historical exchange rate regimes is redacted summary of the article *Policy and the trade regime in Romania after 1990* by Prof. PhD. Dobrotă Gabriela, "Constantin Brâncuși" University of Târgu Jiu (2009).

Figure III.2.1./2.



Source: Own depiction based on the data from the National Bank of Romania (BNR)

The central bank continued to make a series of interventions on the foreign exchange market, but the maintenance of an overvalued rate in 1996 generated the increase of trade balance deficit by over 50% compared to 1995. All this led to amplification of the parallel market. Through liberalization of the foreign exchange market at 18 February 1997 a considerable reduction of differences between the empirical and the official exchange rate has been achieved. However, in order to maintain control over inflation, priority of the currency policy was to avoid an accentuated depreciation of the Leu.

Liberalisation of all current account transactions and of the access of population to foreign currency represented an important step in strengthening the foreign exchange market, as did also the acceptance of the IMF Statute (commitment not to introduce any future restrictions). The real appreciation trend of the exchange rate shown especially during 2001-2005 resulted in a considerable reduction in inflation.

Taking over the role of reference by the euro currency in 2003 led to a significant reduction in the volatility of national currencies exchange rate. From 2004, NBR has reduced its interventions on the foreign exchange market, which resulted in strengthening of the national currency.

The National Bank of Romania abandoned the strategy of monetary aggregate targeting system and adopted the inflation targeting system in August 2005. This is also the moment when the Romanian currency became a floater. However, the liberalization of the foreign exchange market began already in November 2004. The regime change was seen as a necessary step for the liberalization of the capital account of the country (non-resident citizens can construct deposits in lei from April 2005, and also residents are allowed to build deposits abroad).

Table III.2.1.

Advantages of monetary targeting	Disadvantages of monetary targeting
- focuses mainly on domestic interests and its activities are transparent. - quite independent from other countries - accountancy of CB activities increases, time inconsistency decreases. - it is easier for CB to control M0 and M1 than inflation rate.	- no stable and predictable relationship between intermediate variables (monetary aggregates) and inflation - broader monetary aggregates like e.g. M2 and M3 are less controllable

The monetary targeting was a strategy in which the central bank observed and targeted monetary aggregates (i.e. M0, M1, M2 or M3). The system relies on information signaled by monetary aggregates evolution, announces targeted level of monetary aggregates, has controllable mechanism eliminating big gaps from assigned objectives.

The current system, the inflation targeting creates a framework of policy decisions by an explicit commitment to meet a publicly announced numerical inflation target. It has five key elements:

- the public announcement of medium-term numerical targets for inflation;
- commitment to price stability as the primary goal of monetary policy;
- a strategy comprising many variables to establish the policy instruments;

- increased transparency of the monetary policy strategy;
- increased accountability of the CB for attaining the inflation targets.

For the inflation targeting system to be sustainable, the central bank must have a considerable degree of independence, should not be constrained to finance the government budget, refrain from targeting the level of any other nominal variable, must have an effective monetary policy instrument, the ability to forecast inflation and a relevant price index that is to be targeted.

The motivation for adopting the inflation targeting (IT) in Romania was that the relation between monetary aggregates and inflation in the short term proved to be unstable, and central bank officials found it incompatible with the flexible exchange rate (however, Bulgaria has a fixed exchange rate and still could adopt the inflation targeting model!). IT grants flexibility and credibility to the monetary policy, and is considered to improve the performance of inflation by lowering the expected level of inflation (Beju, 2012).

As in the IT system, the targeted price index is the Consumer Price Index (CPI) in Romania the inflation target is set as a fixed number within a band (+/-1%). For analytical purposes, the central bank calculates the core inflation, defined as:

Formula III.2.1.

$$CORE\ 1 = CPI - administrative\ prices$$

$$CORE\ 2 = CORE\ 1 - highly\ volatile\ prices$$

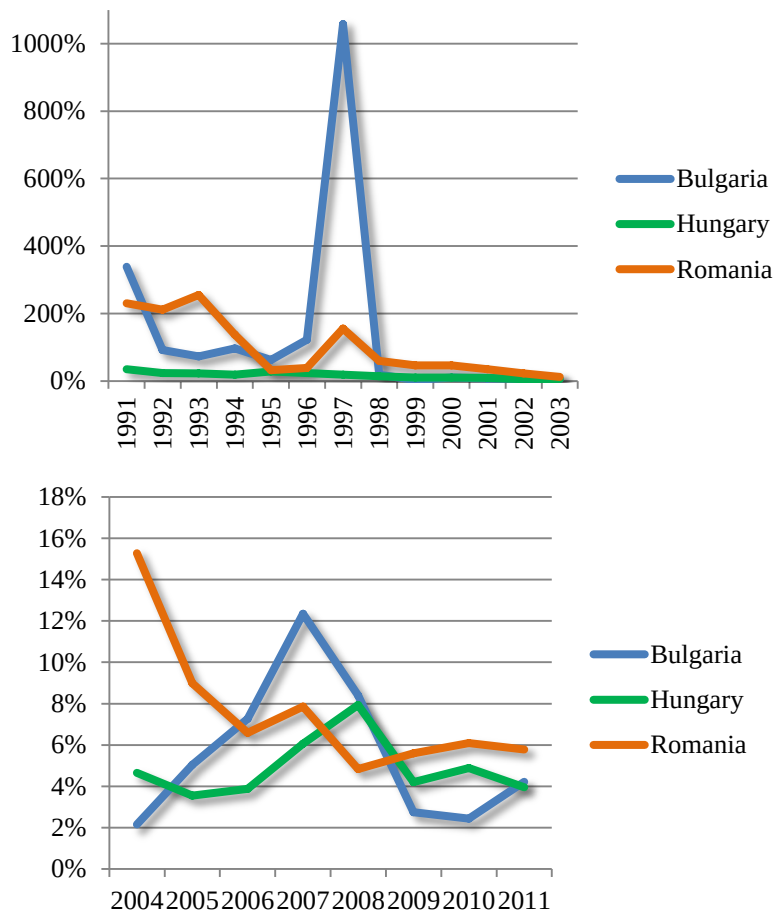
The National Bank of Romania considers that deviations from the targeted inflation rate can occur because of the following factors:

- Substantial growth in the external prices of energy sources;
- Natural catastrophes
- Fluctuations of the exchange rate of RON caused by factors outside the national economic and monetary policy;
- Major deviation of the prices from those announced by the Government
- Deviation of fiscal and income policy from the schedule of their implementation.

The inflation targeting system, introduced in Romania in 2005 is also common on a regional level: Hungary adopted it in 2001, Bulgaria in 2006. In all these countries inflation rate has decreased after the adoption of this new strategy.

Figure III.2.1./3.

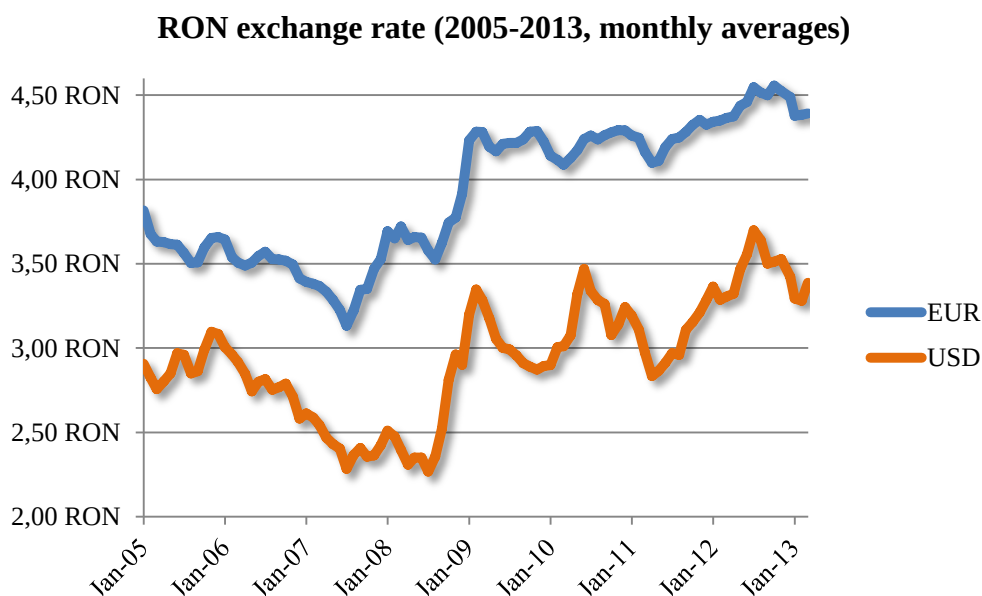
**Inflation rate on a regional level (1991-2011,
%, consumer prices)**



Source: Own depiction based on the data from the World Data Bank

Through inflation targeting also the relative stability of the exchange rate has been attained in Romania, however reality has proved that the system has not caused the extension of the foreign currency market role in establishing the exchange rate. (Dobrotă, 2009) Many times, the central bank has exercised interventions on the foreign currency market (2004-2007 period and the period after the financial crisis burst, including in 2009), promoting a controlled floating exchange rate.

Figure III.2.1./4.



Source: Own depiction based on the data from the National Bank of Romania (BNR)

In six years, from 2007 to 2013 the RON lost 31,56% of its value compared to the euro and 26,09% compared to the American dollar.

2.2. Volatility of the Romanian currency and the effects of volatility

Since the Romanian currency's value is floating, it experiences depreciation and appreciations according to market movements. To see the magnitude of these changes, I calculated the relative standard deviation of the EUR/RON exchange rate for last few years.

Table III.2.2./1.

The volatility of the EUR/RON			
Year	Standard deviation	Mean	Relative standard deviation
2012	0,0812	4,4573	1,82%
2011	0,0820	4,2374	1,93%
2010	0,0753	4,2110	1,79%
2009	0,0480	4,2376	1,13%
2008	0,1087	3,6823	2,95%
2007	0,1093	3,3337	3,28%
2006	0,0558	3,5258	1,58%
Average yearly relative st. deviation			2,07%

I used this measure, since financial risk is most commonly measured in terms of the variance or standard deviation of a variable. Standard deviation represents exchange rate risk by the amount exchange rates deviate, on average, from the mean exchange rate in a probability distribution. A higher standard deviation signals a greater currency risk (Moosa, 2003). In probability theory and statistics, the relative standard deviation is the absolute value of the coefficient of variation expressed as a percentage - is a measure of a statistical estimate's reliability obtained by dividing the standard error by the estimate (Dodge, 2003).

In order to have a comparison on a regional level, I calculated also the volatility of the Hungarian Forint's relative standard deviation. I found that it is more volatile compared to the Romanian New Leu.

Table III.2.2./2.

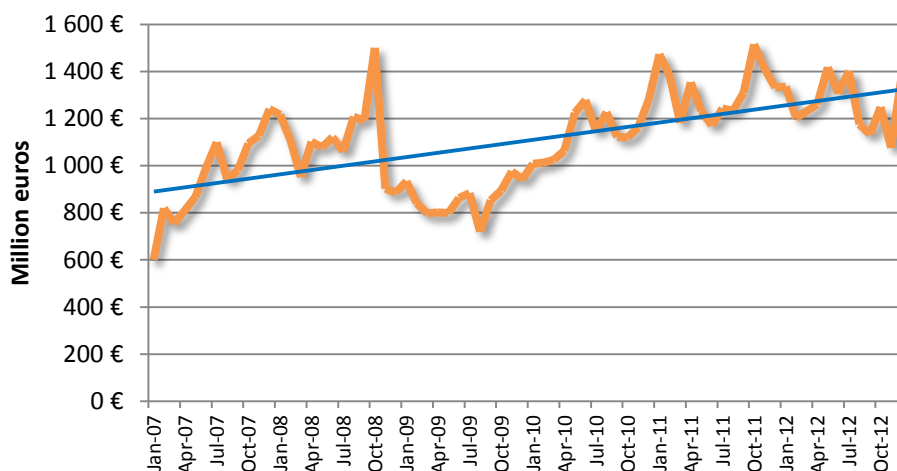
The volatility of the EUR/HUF			
Year	St. dev	Mean	Relative standard deviation
2006	9,5081	264,31	3,60%
2007	3,5881	251,35	1,43%
2008	12,0691	251,51	4,80%
2009	12,4173	280,33	4,43%
2010	6,6697	275,48	2,42%
2011	15,1245	279,24	5,42%
2012	8,5755	289,25	2,96%
Average yearly relative st. deviation			3,58%

I had no reason to do the same calculations for the Bulgarian lev, since its value is fixed at EUR 1 = BGN 1,9558; and it didn't change since 2006.

But why is the volatility of the exchange rate a problem? There are several reason, from the easily observable to more complicated ones. The need for foreign currencies in the country is increasing, as the following diagram depicts.

Figure III.2.2./1.

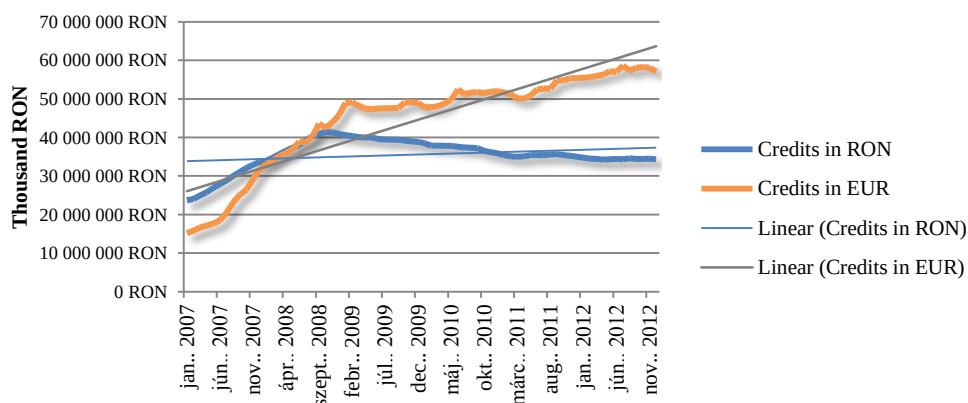
Average daily transactions in foreign currencies in Romania (million euros, monthly data, 2007-2012)



The dependence on the exchange rate can be observed on the level of households: in Romania more and more prices tend to be expressed in euros: energy and telecommunication bills, apartment rents, fees (ex. railway tax) are euro-denominated – their value depend on the daily exchange rate. Not only consumables' price is strictly correlated to the currency's value, but also the value of debts. The following diagram reflects that from 2008 euro-denominated credits start to dominate the loan-market, at the end of 2012 their value being almost double compared to the lei-credits. The linear-trend line shows that loans in Euro in Romania increase more rapidly than those in RON.

Figure III.2.2./2.

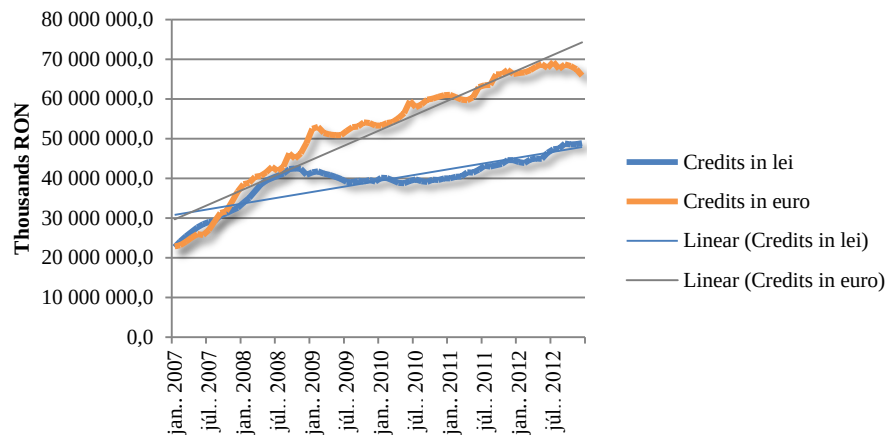
Loans of the Romanian households (thousands RON, 2007-2012)



The penetration of euro-denominated loans is observed also on the level of companies.

Figure III.2.2./3.

Loans of Romanian companies (thousands lei, 2007-2012)

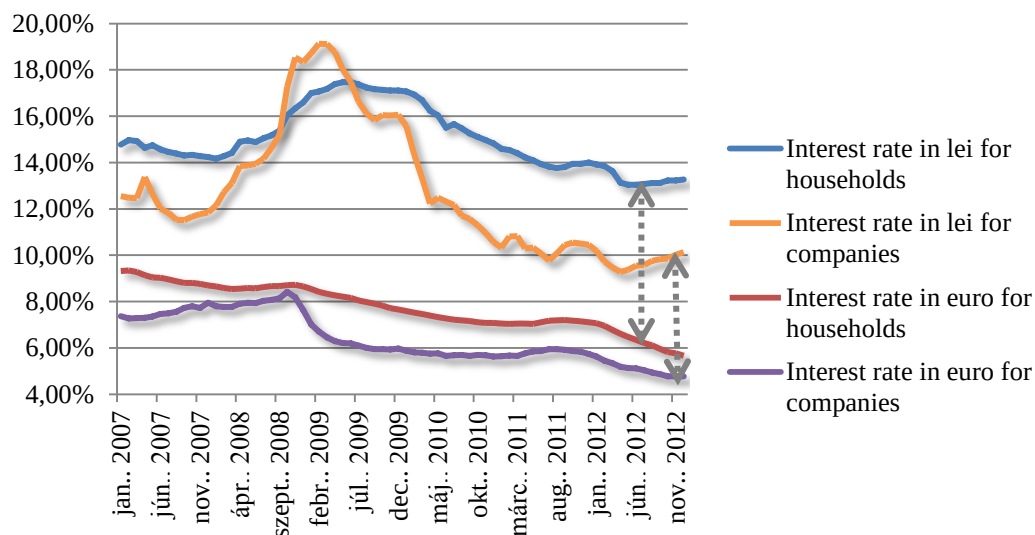


Source: Own depiction based on the data from the National Bank of Romania (BNR)

The fact that euro-loans are wide spread in Romania is explained by the interest rate differential.

Figure III.2.2./4.

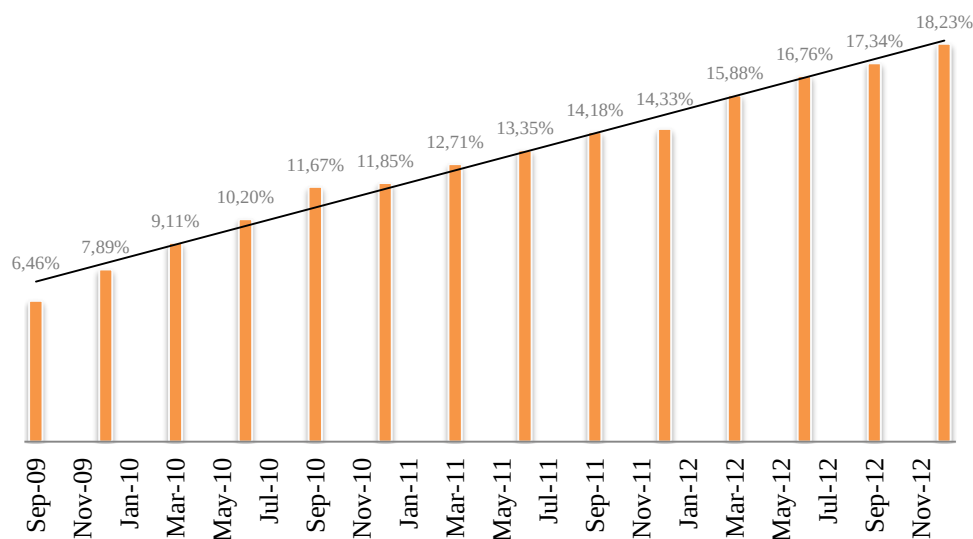
Interest rate on existing loans in Romania (% , 2007-2013)



However, the fact that the size of credits in euro is increasing in the country, carries a great macroeconomic risk for the country through the banking system. The following diagram depicts that the occurrence of loan default is increasing. Part of these non-performances is due to the currency risk.

Figure III.2.2./5.

Non-performing loans in Romania (% of total loans)



Remaining on the firm's level: a recent study³ realized by pWc (PriceWaterCoopers) concludes that 82% of the Romanian CEOs find the volatility of the exchange rate is a gatekeeper of their company's growth, and think this is the third most serious problem affecting the macroeconomic outlook of Romania.

A recent study from the University of London highlights another negative effect of exchange rate volatility on firms. "Floating exchange rates allow central banks to respond to aggregate demand fluctuations by changing their interest rates. However, such fluctuations create inertia in the labour market by increasing the cost of hiring and firing workers. A regime of flexible exchange rates can cause rigidities in labour markets similar to those caused by legalised firing restrictions. Exchange rate volatility makes firms wait before hiring new workers and firing existing ones. Thus the adoption of a common currency has effects very similar to the removal of employment-protection legislation and other direct restrictions on hiring and firing. Exchange-rate volatility is more harmful for the entry of new firms than employment-protection legislation, particularly promising, high-risk ventures (Yu-Fu Chen, 2012)."

The dependence on exchange rate can be observed also on the governmental level. According to the Romanian government's statistics the country has a debt of 51

³ Source: 16th Annual Global CEO Survey by pWc <available at: <http://www.pwc.com/gx/en/ceo-survey/index.jhtml> >

billion euros, but only 40% of it is in the national currency⁴, the other part being foreign-currency denominated, and those, subject to variability if the exchange rate deviates.

2.3. The appropriateness of a fixed exchange rate

So far we states that fixed exchange rate regimes in developing countries tend to outperform the ones with floating currencies, while Romania is dependent in a great proportion to the euro. All these factors tend to raise the question if a euro-based fixed exchange rate regime would be applicable in Romania.

Before looking at pro and contra arguments I had the hypothesis that most of the time the value of the Leu and of the euro move together; based on recent events: every time bad news appear in relation to the future of the Eurozone, for example bad statistics from the Mediterranean, highly indebted countries, the euro and the Leu depreciates in the same time compared to the American dollar. To see if this observation is valid, I calculated the Pearson product-moment correlation coefficient, which is a measure of the correlation (linear dependence) between two variables, giving a value between +1 and -1 inclusive, widely used in the sciences to see the strength of linear dependence between two variables (Rodgers & Nicewande, 1988). The hypothesis was confirmed by observing a 94% positive correlation between the USD/RON and EURO/USD exchange rate.

Table III.2.3./1.

The euro and the RON move together

investigated period: 2013-2009

Covariance (USD/RON, EURO/USD)	0,0082
Standard deviation (USD/RON)	0,2274
Standard deviation (EUR/USD)	0,0383
Coefficient of correlation	0,94

This drives me to the conclusion that even though Romania is not part of the Eurozone, it is highly dependent on the events affecting the value of the common European currency. However, Romania, as part of the European Union is also

⁴ Source: Victor Ponta's (prime-minister) presentation with the title "State of Romania" from 11 January 2013; redacted in various newspapers

required to adopt the euro and join the euro area, but to do this, must meet certain conditions known as 'convergence criteria'.

According to the European Commission adopting the single currency is a crucial step in a Member State's economy, since its exchange rate is irrevocably fixed and monetary policy is transferred to the hands of the European Central Bank, which conducts it independently for the entire euro area. The economic entry conditions are designed to ensure that a Member State's economy is sufficiently prepared for adoption of the single currency and can integrate smoothly into the monetary regime of the euro area without risk of disruption for the Member State or the euro area as a whole. In short, the economic entry criteria are intended to ensure economic convergence – they are known as the 'convergence criteria' (or 'Maastricht criteria') and were agreed by the EU Member States in 1991 as part of the preparations for introduction of the euro. In addition to meeting the economic convergence criteria, a euro-area candidate country must make changes to national laws and rules, notably governing its national central bank and other monetary issues, in order to make them compatible with the Treaty. In particular, national central banks must be independent, such that the monetary policy decided by the European Central Bank is also independent.

The convergence criteria are formally defined as a set of macroeconomic indicators which measure price stability, to show inflation is controlled; soundness and sustainability of public finances, through limits on government borrowing and national debt to avoid excessive deficit; exchange-rate stability, through participation in the Exchange Rate Mechanism (ERM II) for at least two years without strong deviations from the ERM II central rate; long-term interest rates, to assess the durability of the convergence achieved by fulfilling the other criteria.

The exchange-rate stability criterion is chosen to demonstrate that a Member State can manage its economy without recourse to excessive currency fluctuations, which mimics the conditions when the Member State joins the euro area and its control of monetary policy passes to the European Central Bank (ECB). It also provides an indication of the appropriate conversion rate that should be applied when the Member State qualifies and its currency is irrevocably fixed.

Table III.2.3./2.

Romania and the Maastricht Criteria's (as of 31 March 2013)		
Measure	Criteria	Romania
Price stability (consumer price index)	Not more than 1.5 percentage points above the rate of the three best performing Member States max. 2.5%	3.9% (not fulfilled)
Sound public finances (government deficit as % of GDP)	Reference value: not more than 3%	2.9% (fulfilled)
Sustainable public finances (Government debt as % of GDP)	Reference value: not more than 60%	37.8% (fulfilled)
Durability of convergence 12-months average of 10yr bond yields)	Not more than 2 percentage points above the rate of the three best performing Member States in terms of price stability max. 4.81%	6.43% (not fulfilled)
Exchange rate stability (Deviation from a central rate)	Participation in ERM II for at least 2 years without severe tensions	Yet not part of the ERM II

Source: European Commission and own calculations based on data from the National Institute of Statistics (INS)

At the moment of writing this thesis Romania did not fulfil the nominal criteria for adopting the euro as part of the Eurozone. Despite the fact that Government of Romania in 2009 in its revised Convergence Program 2008-2011 stated that the

country can join the ERM II in 2012 and introduce the euro in 2014 (which was later delayed to 2015), the latest Convergence Program 2013-2016 sent to the European Commission in April 2013 is the first document of such a type sent by Romania not stating a target year at all. Currently both the prime-minister and the president of the country are arguing that the possible year of introduction could be around 2020.

However, it is important to state by virtue of specific monetary agreements with the EU any country can adapt the euro (or fix its currency rate to it). In fact in 2009 the Financial Times⁵ the citing a confidential report stated that The International Monetary Fund suggest for crisis-hit EU nations in central and eastern Europe to adopt the euro without formally joining the Eurozone, without seats on the governing council of the European Central Bank. "For countries in the EU, 'euroisation' offers the largest benefits in terms of resolving the foreign currency debt overhang (accumulation), removing uncertainty and restoring confidence," the IMF report said. However, the AFP reports that such an initiative encountered serious opposition from Eurozone members and the ECB opposed to easing euro entry rules. Also financial analysts concluded that the likelihood of this step was low. However, the technical possibility of unilateral adoption still exists, in the last years Kosovo and Montenegro have unilaterally chosen to adopt the euro although neither country formally belongs to the Eurozone. The list of unilateral adopters and countries pegging their currency to the euro can be found below.

Table III.2.3./3.

Countries unilaterally adopting the euro	Countries pegging to the euro
Andorra Monaco San Marino Vatican City Akrotiri and Dhekeliaó Mayotte Saint Pierre and Miquelon French Southern and Antarctic Lands Saint-Barthélemy Kosovo Montenegro	Bosnia and Herzegovina Bulgaria Comoros Denmark Cape Verde Latvia Lithuania Morocco São Tomé and Príncipe XOF currency Union (Benin, Burkina Faso Guinea-Bissau, Ivory Coast, Mali, Niger,

⁵ The article IMF urges eastern EU to adopt euro By Stefan Wagstyl, Eastern Europe Editor appeared on April 5, 2009 in the Financial Times newspaper.

	Senegal, Togo) XAF Currency Union (Cameroon, Central African Republic, Chad, Republic of the Congo, Equatorial Guinea, Gabon) XPF Currency Union (French Polynesia, New Caledonia, Wallis and Futuna)
--	--

About the advantages, disadvantages, the state of Romanian economy in the process of the adoption of the European currency, I formulated an official request, sent to the National Bank of Romania. The answer, cited in *Appendix no.3.*, highlights only generalities, like the convergence criteria, and states that the decision is made by Government of Romania.

2.3.1. Advantages of fixing to the euro

It is already well known that countries which are in a monetary union have deeper trade links, but the already quoted IMF study (Atish R. Ghosh, 2009) establishes that similar benefits for trade integration derive from simple pegs (and, to a lesser degree, even from intermediate regimes). The study also finds that—crises aside— “capital flows under pegged and intermediate regimes tend to be more consistent with consumption smoothing than capital flows under floats. One explanation is that the lower real exchange rate volatility under more rigid regimes fosters greater “stable” forms of capital flows—such as foreign direct investment—than “hot money” portfolio flows. Indeed, promoting greater trade and cross-border investment was the economic motivation behind fixed exchange rates and eventual monetary union in Europe.”

Looking specifically on the case of Romania, pegging the exchange rate would have positive effect on households and firms by eliminated the currency risks (credits, rents, consumables), it would boost also trade (trough predictability – clear image for investors and lower transaction costs) and cause more rapid GDP growth (evidence for this in the first part of this case study). A fixed exchange rate can be considered also to create better incentives for timely implementation of structural reforms for the government, lower incentive for fiscal relaxation.

Fiscal policy is more efficient under fixed exchange rate regimes (the reason for this in part II of this thesis), because the Central Bank has to use the monetary policy as well, sustaining the government's incentives.

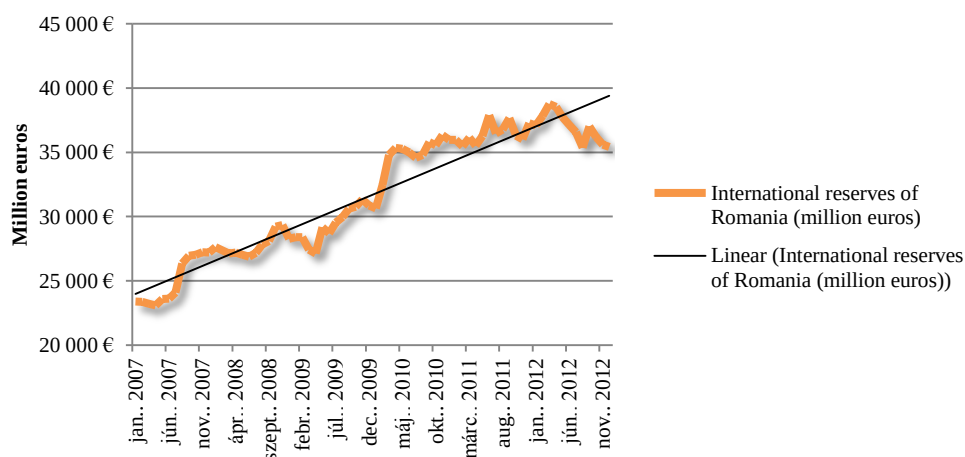
A pegged exchange rate incorporates also the possibility to devalue the currency to improve trade balance, increase output in case of a crises, but as we have seen in part II, this leads to a rapid deterioration of reserves because of the loss of credibility of the regime.

One more question should be raised: if the National Bank of Romania has the necessary reserves to protect the currency. The answer for this is hard to find, however, we can compare the international reserves of Romania to Bulgaria's.

We can see that Romania had in last few years an average of 33 billion euro international reserve. Bulgaria in the last few years had an average 17 billion dollars reserve, which at the end March 2013 according to the Bulgarian National Bank was of 14,49 billion euro. We can state while Bulgaria's population is third of Romania's, that Romania almost has the necessary reserves for sustaining a fixed exchange rate regime.

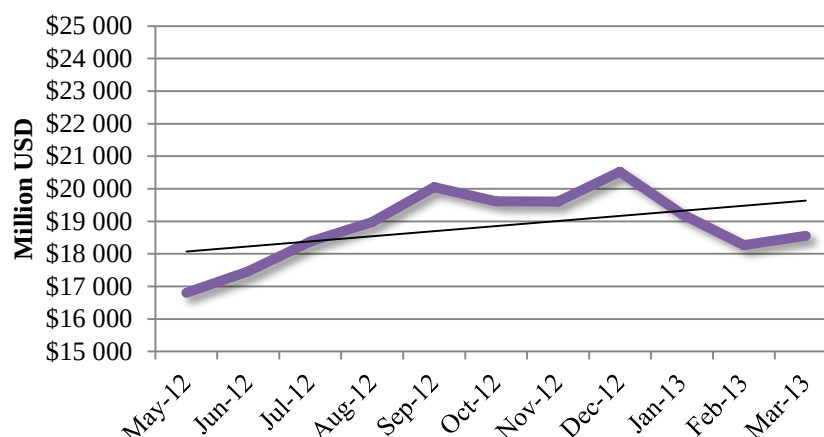
Figure III.2.3.1.

International reserves of Romania (million euros, 2007-2012)



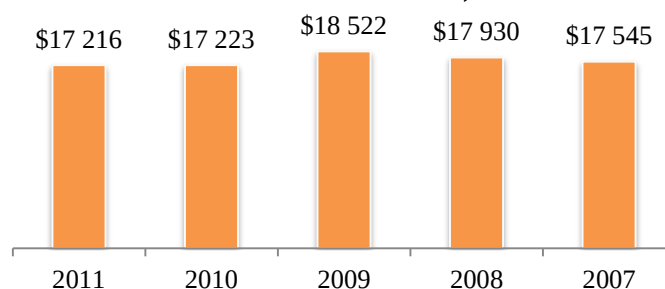
Source: Own depiction based on the data from BNR

International reserves of Bulgaria (million US dollars, 2012-2013)



Source: Own depiction based on the data from IMF

International reserves of Bulgaria (2001-2011; million USD)



Source: Own depiction based on the data from World Bank

2.3.2. Disadvantages of fixing to the euro

As illustrated in Part II under fixed exchange rate regimes conducting a contractionary fiscal policy reduces output. The country gives up two macroeconomic instruments: the ability to change interest rate and exchange rate. This means that when there is too much money on the market, the central bank, with increasing the interest rate, could not stop an inflation spiral, and there were no possibilities for the national bank to boost GDP growth neither, losing the instrument of helping exports by depreciating the currency.

An IMF Working Paper found that first, during the crisis, growth performance for pegs was not different from that of floats, but for the recovery in 2010–11, they present evidence that pegs are experiencing slower growth than floats (Tsangarides,

2010). Slower growth after crises represents a major disadvantage of pegged exchange rate regimes, so does also the crises management toolbox.

In common currency areas, like the Eurozone, if the macroeconomic shocks are country specific, and factor-mobility is low, the fixed exchange is especially harmful. We have recently seen evidence for this in case of Greece, Spain, Italy: these countries, however, did fulfil the Maastricht criteria, did not sustain the macroeconomic indicators at the required level, and now, being highly indebted, a weaker currency and a higher inflation would help their recovery, but this is currently not possible being part of a currency union in which the other countries are interested in low inflation to sustain their growth.

Not only a “Euro-crises” represents a disadvantage of fixing the Romanian currency to the euro, but also a possibility of an internal imbalance. In such of a crises (caused by internal political crises, such as seen in summer of 2012), even an anticipation of devaluation leads to very high interest rates, making the economic situation worse and putting a pressure in the country to devalue. Fixing the currency to the euro and not adopting the euro would mean that Romania would not have right to take part in the decisions in the ECB, however, based on its size, otherwise would have significant power. This would mean that even in a case of unfavourable decisions, the country would lose its independence, passively suffering the other’s choices. However, a lot of currencies have unilaterally fixed their currency to the euro, it is possible that Romania would be found too big by the European decision-takers for approving such a step, and also the country would be reluctant carrying out the structural reforms and putting in order the macroeconomic indicators before fixing its exchange rate – negative examples for what happens in the this case are easily found today also inside the Eurozone.

IV. CONCLUSIONS AND PROPOSALS

Currently 68 countries of the world use fixed peg arrangements. Due to less volatile exchange rate the volume and speed of international trade is higher in these countries, which tend to experience higher growth (based on significant macroeconomic indicators it can be concluded that on a regional level countries having a fixed exchange rate outperform those ones, who have a fluctuating currency), but they must give up for this two important macroeconomic instruments: the ability to change interest rate and exchange rate. This means that when there is too much money on the market, the central bank, with increasing the interest rate, could not stop an inflation spiral, and there were no possibilities for the national bank to boost GDP growth neither, losing the instrument of helping exports by depreciating the currency.

Looking specifically on the case of Romania, pegging the exchange rate would have positive effect on households and firms by eliminating the currency risks, it would boost also trade and cause more rapid GDP growth (evidence for this in the first part of this case study). A fixed exchange rate can be considered also to create better incentives for timely implementation of structural reforms for the government, lower incentive for fiscal relaxation. Fiscal policy is more efficient under fixed exchange rate regimes, because the Central Bank has to use the monetary policy as well, sustaining the government's incentives.

A pegged exchange rate incorporates also the possibility to devalue the currency to improve trade balance, increase output in case of a crisis, but this leads to a rapid deterioration of reserves because of the loss of credibility of the regime. Comparing the reserves of Bulgaria to Romania's it can be assumed that the National Bank of Romania has the necessary reserves to protect the currency in case of a peg. However, under fixed exchange rate regimes a contractionary fiscal policy reduces output, and also the threat of a currency crisis constitutes a major barrier.

Entrance in common currency areas, like the Eurozone, is advantageous only if macroeconomic shocks are not country specific, and factor-mobility is high. Recently seen internal and external shocks evidenced that the need for the Romanian currency to be able to adopt is grounded. A unilateral adoption of the Euro may be also restrained by the European decision-makers.

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VI. ANNEXES

Appendix no.1. List of countries and their exchange rate regimes

Type of exchange rate regime and explanation given by the IMF	Countries adapting this kind of regime
Exchange arrangement with no separate legal tender (10) <i>involves the confirmation of the country authorities' de jure exchange rate arrangement. The currency of another country circulates as the sole legal tender (formal dollarization). Adopting such an arrangement implies the complete surrender of the monetary authorities' control over domestic monetary policy.</i>	Ecuador El Salvador Marshall Islands Micronesia, Fed. States of Palau Panama Timor-Leste Montenegro San Marino Kiribati
Currency board arrangement (13) <i>it involves the confirmation of the country authorities' de jure exchange rate arrangement. A currency board arrangement is a monetary arrangement based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfillment of its legal obligation.</i> <i>This implies that domestic currency will be issued only against foreign exchange and that it remains fully backed by foreign assets, eliminating traditional central bank functions such as monetary control and lender-of-last-resort, and leaving little scope for discretionary monetary policy. Some flexibility may still be afforded, depending on the strictness of the banking rules of the currency board arrangement.</i>	Antigua and Barbuda Djibouti Dominica Grenada Hong Kong SAR St. Kitts and Nevis St. Lucia St. Vincent and the Grenadines Bosnia and Herzegovina Bulgaria Estonia Lithuania Brunei Darussalam
Conventional fixed peg arrangement (68) <i>For classification as a conventional pegged arrangement, the country formally (de jure) pegs its currency at a fixed rate to another currency or a basket of currencies, where the basket is formed, for example, from the currencies of major trading or financial partners, and weights reflect the geographic distribution of trade, services, or capital flows. The anchor currency or basket weights are public or notified to the IMF. The country</i>	Angola Argentina Aruba Bahamas, The Bahrain Bangladesh Barbados Belarus Belize Eritrea Guyana Honduras

authorities stand ready to maintain the fixed parity through direct intervention (i.e., via sale or purchase of foreign exchange in the market) or indirect intervention (e.g., via exchange rate related use of interest rate policy, imposition of foreign exchange regulations, exercise of moral suasion that constrains foreign exchange activity, or intervention by other public institutions). There is no commitment to irrevocably keep the parity, but the formal arrangement must be confirmed empirically: the exchange rate may fluctuate within narrow margins of less than $\pm 1\%$ around a central rate—or the maximum and minimum value of the spot market exchange rate must remain within a narrow margin of 2%—for at least six months.

Jordan
Kazakhstan
Lebanon
Malawi
Maldives
Mongolia
Netherlands Antilles
Oman
Qatar
Rwanda
Saudi Arabia
Seychelles
Sierra Leone
Solomon Islands
Sri Lanka
Suriname
Tajikistan
Trinidad and Tobago
Turkmenistan
United Arab Emirates
Venezuela, Rep. Bolivariana de
Vietnam
Yemen, Rep. Of
Zimbabwe
Benin
Burkina Faso
Cameroon
Cape Verde
Central African Rep.
Chad
Comoros
Congo, Rep. Of
Côte d'Ivoire
Croatia
Denmark
Equatorial Guinea
Gabon
Guinea-Bissau
Latvia
Macedonia, FYR
Mali
Niger
Senegal
Togo
Fiji
Kuwait
Libya
Morocco
Russian Federation
Samoa
Tunisia
Bhutan
Lesotho
Namibia
Nepal

	Swaziland Argentina Malawi Rwanda Sierra Leone
Pegged exchange rate within horizontal bands (3) <i>The value of the currency is maintained within certain margins of fluctuation of more than ± 1 percent around a fixed central rate or the margin between the maximum and minimum value of the exchange rate exceeds 2 percent. As in the case of conventional fixed pegs, reference may be made to a single currency, a cooperative arrangement, or a currency composite. There is a limited degree of monetary policy discretion, depending on the band width.</i>	Slovak Rep. Syria. Tonga
Crawling peg (8) <i>The currency is adjusted periodically in small amounts at a fixed rate or in response to changes in selective quantitative indicators, such as past inflation differentials vis-à-vis major trading partners, differentials between the inflation target and expected inflation in major trading partners. The rate of crawl can be set to adjust for measured inflation or other indicators (backward looking), or set at a preannounced fixed rate and/or below the projected inflation differentials (forward looking). Maintaining a crawling peg imposes constraints on monetary policy in a manner similar to a fixed peg system.</i>	Bolivia China Ethiopia Iraq Nicaragua Uzbekistan Botswana Iran, I.R. of.
Crawling band (2) <i>The currency is maintained within certain fluctuation margins of at least ± 1 percent around a central rate—or the margin between the maximum and minimum value of the exchange rate exceeds 2 percent—and the central rate or margins are adjusted periodically at a fixed rate or in response to changes in selective quantitative indicators. The degree of exchange rate flexibility is a function of the band width. Bands are either symmetric around a crawling central parity or widen gradually with an asymmetric choice of the crawl of upper and lower bands (in the latter case, there may be no preannounced central rate). The commitment</i>	Costa Rica Azerbaijan

<i>to maintain the exchange rate within the band imposes constraints on monetary policy, with the degree of policy independence being a function of the band width.</i>	
Managed floating with no pre-determined path for the exchange rate (44) <i>The monetary authority attempts to influence the exchange rate without having a specific exchange rate path or target. Indicators for managing the rate are broadly judgmental (e.g., balance of payments position, international reserves, parallel market developments), and adjustments may not be automatic. Intervention may be direct or indirect.</i>	Cambodia Kyrgyz Rep. Lao P.D.R. Liberia Mauritania Mauritius Myanmar Ukraine Algeria Singapore Vanuatu Afghanistan, I.R. of Burundi Gambia, The Georgia Guinea Haiti Jamaica Kenya Madagascar Moldova Mozambique Nigeria Papua New Guinea São Tomé and Príncipe Sudan Tanzania Uganda Armenia Colombia Ghana Guatemala Indonesia Peru Romania Serbia Thailand Uruguay Dominican Rep. Egypt India Malaysia Pakistan Paraguay
Independently floating (40)	Zambia Albania Australia

<i>The exchange rate is market-determined, with any official foreign exchange market intervention aimed at moderating the rate of change and preventing undue fluctuations in the exchange rate, rather than at establishing a level for it.</i>	Austria Belgium Brazil Canada Chile Cyprus Czech Rep. Finland France Germany Greece Hungary Iceland Ireland Israel Italy Korea, Rep. Of Luxembourg Malta Mexico Netherlands New Zealand Norway Philippines Poland Portugal Slovenia South Africa Spain Sweden Turkey United Kingdom Congo, Dem. Rep. Of Japan Somalia Switzerland United States
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Source: IMF - De Facto Classification of Exchange Rate Regimes and Monetary Policy Frameworks (2008) available at <http://www.imf.org/external/np/mfd/er/2008/eng/0408.htm>

Annex no.2. Pooled data table

GDP growth

	Fixed	Floating	Eurozone
2011	5,13	3,42	0,00
2010	2,91	2,72	0,82
2009	-5,77	-5,32	-5,06
2008	4,57	2,38	-0,20
2007	9,42	4,80	3,18
2006	7,92	5,15	2,93
2005	8,27	4,88	1,84
2004	7,07	6,44	2,32
2003	6,80	4,34	1,07
2002	5,79	3,58	1,42
2001	5,65	3,28	1,92

	Fixed-floating	Fixed-euro	Flo.-Euro.
2011	1,72	5,13	3,41
2010	0,19	2,09	1,90
2009	-0,44	-0,71	-0,26
2008	2,19	4,76	2,57
2007	4,62	6,24	1,62
2006	2,77	5,00	2,22
2005	3,39	6,43	3,04
2004	0,62	4,74	4,12
2003	2,46	5,73	3,27
2002	2,21	4,37	2,16
2001	2,38	3,74	1,36

Inflation

	fixed	floating	Eurozone
2011	8,81	5,10	3,02
2010	3,93	4,87	1,83
2009	3,48	4,60	0,14
2008	11,21	9,07	3,69
2007	6,67	5,86	2,51
2006	5,60	6,07	2,31
2005	5,08	6,42	2,27
2004	5,77	6,05	2,10
2003	6,47	6,51	2,55
2002	7,26	8,98	2,84
2001	12,13	18,64	3,25

	Fixed-float	Fixed-eurc	Flo.-Euro.
2011	3,72	5,79	2,08
2010	-0,94	2,10	3,04
2009	-1,11	3,34	4,45
2008	2,14	7,53	5,38
2007	0,81	4,16	3,35
2006	-0,47	3,29	3,75
2005	-1,34	2,81	4,15
2004	-0,28	3,67	3,95
2003	-0,04	3,92	3,97
2002	-1,73	4,42	6,14
2001	-6,51	8,88	15,39

Budget deficit

	fixed	floating	Eurozone
2011	-0,78	-0,92	-4,70
2010	-2,92	-3,27	-6,99
2009	-3,12	-4,14	-6,67
2008	0,86	-0,78	-1,67
2007	1,54	1,27	0,03
2006	1,86	0,95	-0,68
2005	1,84	0,64	-1,61
2004	-0,11	-0,56	-1,94
2003	-0,59	-1,19	-1,67
2002	0,42	-1,43	-1,13
2001	-0,67	0,56	-0,25

	Fixed-float	Fixed-eurc	Flo.-Euro.
2011	0,14	3,92	3,78
2010	0,35	4,08	3,73
2009	1,01	3,55	2,54
2008	1,65	2,53	0,88
2007	0,27	1,51	1,24
2006	0,91	2,53	1,62
2005	1,21	3,45	2,24
2004	0,45	1,83	1,38
2003	0,60	1,08	0,48
2002	1,85	1,55	-0,30
2001	-1,23	-0,42	0,81

Government debt

	fixed	floating	Eurozone
2011	29,82	47,36	80,90
2010	25,28	49,70	78,73
2009	22,12	48,69	74,45
2008	19,58	40,02	68,62
2007	20,53	37,45	59,74
2006	22,12	40,78	67,16
2005	22,80	39,98	70,01
2004	31,99	43,95	70,47
2003	28,82	45,24	70,12
2002	23,46	45,75	70,33
2001	32,39	44,44	69,47

	Fixed-float	Fixed-eurc	Flo.-Euro.
2011	-17,54	-51,08	-33,54
2010	-24,42	-53,44	-29,02
2009	-26,57	-52,33	-25,76
2008	-20,44	-49,03	-28,59
2007	-16,93	-39,21	-22,28
2006	-18,66	-45,04	-26,38
2005	-17,18	-47,21	-30,03
2004	-11,95	-38,48	-26,52
2003	-16,42	-41,30	-24,88
2002	-22,29	-46,87	-24,58
2001	-12,05	-37,08	-25,03

Unemployment

	fixed	floating	Eurozone
2011	13,78	8,01	9,46
2010	14,62	9,42	8,87
2009	12,97	9,02	8,11
2008	11,62	7,05	6,17
2007	11,56	7,42	6,13
2006	11,38	8,61	6,69
2005	11,77	9,15	7,09
2004	12,99	9,08	7,14
2003	13,84	8,09	6,87
2002	14,11	7,98	6,52
2001	17,45	7,47	6,11

	Fixed-float	Fixed-eurc	Flo.-Euro.
2011	5,77	4,32	-1,45
2010	5,20	5,74	0,54
2009	3,94	4,85	0,91
2008	4,56	5,45	0,89
2007	4,14	5,43	1,29
2006	2,77	4,68	1,91
2005	2,62	4,69	2,07
2004	3,91	5,85	1,94
2003	5,75	6,97	1,23
2002	6,13	7,59	1,46
2001	9,99	11,35	1,36

Appendix no.3. The answer of the National Bank of Romania

Domnului Szocs Csongor-Erno

Stimate domn,

Ca urmare a solicitarii dvs. transmise prin posta electronica institutiei noastre, va aducem la cunostinta ca, in conformitate cu prevederile art. 2 din Legea nr. 312/2004 privind Statutul Bancii Nationale a Romaniei, una dintre atributiile principale ale bancii centrale o constituie elaborarea si aplicarea politicii monetare si a politicii de curs de schimb.

In prezent, strategia de politica monetara a bancii centrale este strategia de tintire directa a inflatiei, adoptata de B.N.R. in august 2005, iar regimul cursului de schimb al leului este cel de flotare controlata, acesta fiind in concordanta cu utilizarea tintelor de inflatie ca ancora nominala a politicii monetare si permite un raspuns flexibil al acestei politici la socurile neprevazute ce pot afecta economia.

In privinta adoptarii monedei unice europene, va aducem la cunostinta ca aceasta este conditionata de indeplinirea intr-o maniera sustenabila a criteriilor de convergenta nominala si a celor de convergenta juridica. Pentru examinarea gradului de sustenabilitate a procesului de convergenta se iau in considerare o serie de indicatori economici care definesc asa numita convergenta reala, precum: nivelul PIB pe cap de locuitor, gradul de deschidere a economiei, structura economiei, finantarea deficitului de cont curent, costul fortei de munca, gradul de intermediere financiara etc.

Stabilirea coordonatelor procesului de adoptare a monedei unice europene necesita o evaluare bine fundamentata a gradului de integrare economica in zona euro, iar asumarea publica a procesului de adoptare a monedei euro face obiectul deciziei Guvernului Romaniei, prin intermediul Comitetului interministerial pentru trecerea la euro, condus de primul-ministru.

Cu consideratie,

Serviciul Informare Publica

Banca Nationala a Romaniei