

2012

# The Matheo Solution

What effect would implementation of the Matheo Solution have on Greece's economic situation?

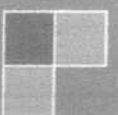
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# Table of contents

1. Introduction	3
2. Theoretic framework	5
1. The Matheo Solution	5
2. The theoretic effects of devaluation	6
3. The theoretic effects of TMS on Greece	7
3. Empirical analysis	8
1. Pre-crisis situations	9
2. Inflation	12
3. Trade balance	16
4. Debt	21
5. Investments	25
6. Summary of findings	29
4. The Greek Crisis	30
1. The situation	30
2. Empirical analysis: comparison and conclusion	32
5. Conclusion	33
6. Appendix	34
7. References	35

# 1. Introduction<sup>1</sup>

The European Economic and Monetary Union (EMU) is at an all time low. The banking crisis that broke out in 2008 has turned into a sovereign debt crisis. It has awoken the world, and made it doubt the foundations on which the Euro was built. At the heart of the crisis is the incapability of real economic convergence between the EMU's participants (Cliffe, 2011). Long before the introduction of the euro, some economists had pointed out that the single currency policy would, sooner or later, lead to economic and monetary problems, especially between the participating countries with economies unable to merge. But these warnings were ignored. Before the euro was introduced in 1999, it was possible for an economically weaker country to restore the economic imbalances relative to other countries. This was a possibility as the countries were able to devalue their currency relatively easy and at any moment. By devaluing its currency it was able to improve the competitiveness of its economy. By means of the flexible Exchange Rate Mechanism (ERM) of the former European Monetary System (EMS) many countries could use this monetary instrument successfully. However this possibility was taken away when the euro was introduced as the single currency with its coherent legislation. This has resulted in an eroding international competitive strength for the economically weaker countries and has lead to increasingly serious financial difficulties. It has become clear that countries that are not tightly linked by an economic union, or even a political union, cannot have a monetary union (Cliffe, 2011). The euro as the single currency, and therefore the only legal tender and the only mutual currency unit, will not work for countries of unequal economic strength.

When taking the current problems in the Eurozone into account, there would be two solutions which come to mind initially:

A monetary solution, in which you would discontinue the Euro as the single currency and return to the pre-1999 ERM of the EMS, with restoration of the original national currencies and direct devaluations of the weaker national currencies. The second solution is an economic solution, to maintain and enforce the Euro as the single currency in its present form, in combination with wage reductions (and thus lower price levels) in the weaker Euro countries.

At first look, both seem virtually ideal for solving the current problems. But returning from the euro to the original national currencies (the monetary solution) is obviously extremely complicated and costly. Furthermore it will have other harmful side effects as was investigated by ING Bank London in 2009. Chaos would arise with the flight of capital from the weaker to the stronger Euro countries, causing 'uncontrolled defaults', private sector collapse and the financial crisis would worsen. The EMU break-up would also be a major setback for the 'European idea'. The economic solution would simply create mass strikes, social unrest and political instability, which also have a negative effect on productivity (and therefore competitiveness) in those countries.

Both of these possible solutions are not realistic, nor desirable, but what is?

The Euro Pact has to be restructured in a way that satisfies two criteria (Ten Dam, 2010):

- a. Developing economic imbalances between the members of the Euro Pact should – by means of a 'flexible monetary mechanism', similar to the ERM of the former EMS – be able to be repaired easily and at any moment.
- b. In order to avoid chaos and further European (and global) economic slowdown, the Euro should be retained.

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<sup>1</sup> Based on ten Dam (2010a) and ten Dam (2011), unless stated otherwise.

In 2010 a Dutch economist, André ten Dam, came up with a solution that is called 'The Matheo Solution' (TMS). The core concept of this solution is the 'Euro Currencies Units-Exchange Rate Mechanism (ECU-ERM)'. The ECU-ERM is a flexible monetary mechanism that makes it possible to repair developing macro-economic imbalances between the euro countries in a relatively simple way.

Within the ECU-ERM, the euro will be the only legal tender (notes, coins and electronic transfers) in all Euro countries, and is also distinguished from the euro as a currency unit (Euro Currency Unit = ECU). The ECU-ERM will lend the opportunity to introduce national currency units (NCU's) in all individual Euro countries beside the ECU. The NCU will not be legal tender, but just a currency unit. These NCU's can then devalue or revalue against the ECU depending on required adjustments in the competitiveness of each individual euro country. Such decisions are based upon the economic situations of the individual countries. This permits economically weaker countries, such as Greece, to devalue its NCU meaning that the wages and prices of a country fall compared to other Euro countries.

However ten Dam briefly concluded that TMS would result in "a better and more solid economic future, long-term prosperity, financial stability, and political stability", he has not provided evidence considering the economic effect. This paper addresses one of these potential economic effects, related to the country in most difficult circumstances: Greece. Thus, this investigation will include what effect the implementation of TMS will have on the economic situation in Greece.

The primary concept that will be focussed on is the influence of devaluation<sup>2</sup> of the NCU. The method that will be used to research this is as follows: by looking at the theoretic framework considering what TMS includes and how devaluation is expected to affect an economy; by analysing the impact devaluation of an exchange rate has had in past situations and comparing these aforementioned situations to the one Greece is facing at the moment.

To provide a sufficient analysis of the past occurred effects, certain variables will have to be taken in to account. These general macro-economic variables are: inflation, the trade balance, debt, investments and interest rates.

The Euro crisis has numerous aspects to it: hence finding a perfect solution is basically impossible. But as the German Chancellor Angela Merkel said (2011): "if the euro fails, then Europe fails". Steps have to be taken to evaluate different solutions, and action must be stimulated, as giving aid to countries like Portugal, Italy, Ireland, Greece and Spain isn't preventing an EMU collapse, it's just delaying it. By means of this paper the effectiveness of TMS and its political and economic importance can be concluded, which will aid in the worldwide discussion on solutions for the Euro crisis.

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<sup>2</sup> In this paper the term devaluation is meant in a way to signify either a change in a pegged exchange rate regime (a devaluation) or a depreciation of the exchange rate in case of a floating exchange rate regime, which could be after the abandonment of a peg. It is often difficult to identify exchange rate regimes with precision. In many situations, especially in currency crises, governments who are formally following a floating system were de facto pegging the exchange rate (Borensztein & Gregorio, 1999).

## 2. Theoretic framework

### 2.1 The Matheo Solution<sup>3</sup>

TMS is a solution proposed by André ten Dam (2010). It is a plan that is supposed to save the Euro(zone) with the perspectives of sustainable economic growth in all euro countries and in a manner that the Euro can restore itself as a reliable and powerful international currency.

It suggests, as aforementioned, that the Euro Pact must be restructured in a way that satisfies two criteria:

- a. The developing economic imbalances between the members of the Euro Pact should – by means of a flexible monetary mechanism–, be able to be repaired in a simple way and at any given moment.
- b. The Euro must be retained, in order to avoid chaos and further European (and global) economic slowdown.

The core concept of TMS is the 'Euro Currencies Units–Exchange Rate Mechanism (ECU–ERM)'. The main elements are as follows:

The Euro will remain the currency unit (the Euro Currency Unit = ECU) and will remain the only legal tender. This is the only currency of all Euro zone countries, in which they will have notes, coins and do its electronic transfers in. Additional national currency units (NCU's) will be introduced in all Euro countries that will be legal in each respective country. All the existing state bonds and other debt contracts, which are valued in Euro's, will remain valued in ECU. This is done to prevent capital flight and chaos and to avoid legal complications. "The ECU will be the anchor currency unit of the ECU–ERM and will take part in the global currency system. The value of the Euro remains equal to the ECU."

Firstly all NCU's will be valued at 1.00 Euro / ECU when introduced, but then, by means of the monetary flexible ECU–ERM mechanism, a revaluation or devaluation of NCU's can take place. Until a NCU's value is changed, the rate is pegged to the ECU at a fixed rate. The decisions made are based upon the economic situations of the several countries. As all prices and wages are stated in the NCU, devaluation of a NCU would mean that these become lower compared to other Euro countries. A revaluation therefore achieves the opposite effect.

The European Central Bank (ECB) is the organisation that decides whether the NCU's revaluates or devaluates. This can be either at its own initiative, in colligation with the national central bank of the ECU–ERM country concerned, or after a request of that certain national bank.

As in the current situation, the ECB will control the monetary policy of the ECU–ERM zone and will determine and regulate the money supply according to the Treaty norm concerning 'sustainable price stability'. The ECB also makes the interest rate policy of the ECU and the NCU's on the basis of that norm. The ECB will solely decide on the interest rates on the ECU and the NCU's. The ECB shouldn't be influenced immoderately by pressure from the different national governments of the participating countries and their politics. Therefore the EU–Treaty and the ECB will need tougher regulations. The countries can issue their new national state bonds either in ECU or in their NCU and new private debt contracts may also be closed either in ECU or in the respective NCU.

The Matheo Solution also involves proposals to adapt the Stability and Growth Pact, introduce an 'Insolvency Pact' for insolvent euro countries, and to establish an 'ECB Safety Net' for

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<sup>3</sup> (Quotations) Based on ten Dam (2010a) and ten Dam (2011).

troubled banks to secure the stability of the financial system. I will not go into further detail about these amendments as they are not of great importance in my research.

## 2.2 The theoretic effects of devaluation<sup>4</sup>

As aforementioned Ten Dam concluded that the implementation of TMS will result in a better and more solid economic future, long-term prosperity and financial stability. For economically weaker countries, such as Greece, this would mean that they would have to improve their competitiveness, increase their trade surplus, improve the balance of payments, pay-off their large-scale debt, reduce unemployment and much more. But is devaluation a solution to these problems?

First of all, it is important to consider economic models and the theory of devaluation. What is expected to happen when a country devaluates its currency? The effects have to be distinguished in short run, medium run and long run. Initially, the domestic country is assumed to be in internal and external balance. In this way, it is easier to define the effect of devaluation itself. Moreover, *ceteris paribus* is assumed, meaning that all other relevant factors are kept constant, as they might interfere with examining the specific causal relationship.

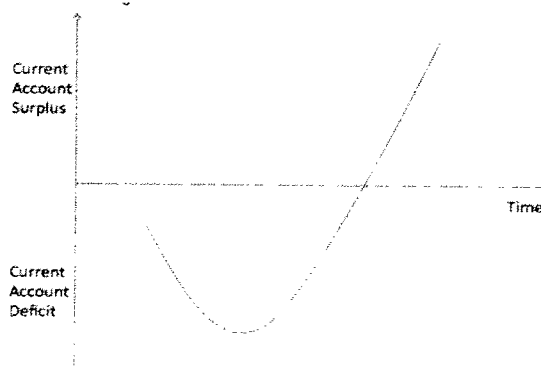
### The short run

The immediate effect of devaluation is that it will reduce the real exchange rate, therefore improving the country's competitiveness and its net exports. The domestic industries will be able to compete better with imports, as imports become more expensive, and the export industries will be able to compete better with foreign markets. Both resulting in a higher inflow of resources, but this response might be slow. Often there are contracts standing stuck to the old exchange rate, and it takes time for buyers to adjust to the lower prices and for sellers to increase their production capacity.

The Marshall-Lerner condition says that in the short run, when demand is inelastic, devaluation may worsen the trade balance. This is because the domestic prices of exported goods will still be the same, and the quantity of exports wouldn't have risen yet. So export revenue might only have risen a little. Import quantities haven't fallen that much, but if the foreign prices are unchanged, this will mean the domestic prices for the imported goods have risen. Therefore, the value of the imported goods is higher and the trade balance has worsened.

### The medium run

In a while, quantities will adjust: exports will increase and imports will decrease. This will improve the trade balance. This time lag is known as the J-curve: firstly it decreases, but later it will rise above its initial position. This is illustrated on the right. How much the exports will change depends on the elasticity of foreign demand for the country's exports and the elasticity of domestic supply of export goods. Similarly, the initial effect on the demand for imports depends upon the elasticity of domestic demand for imports and the elasticity of foreign supply of imports (Alexander, 1952). The subsequent effect depends chiefly on the aggregate supply. If the



<sup>4</sup> Based on the book: Economics, 8<sup>th</sup> edition, by Begg, Fisher and Dornbusch (2005).

economy of a country exists with Keynesian unemployment<sup>5</sup>, it will have spare resources that can be used to supply the new demand. Unemployment will fall and production can increase. If the economy is already at its potential output, it will not be able to do so and the prices will be driven up by the higher aggregate demand. In the case of domestic prices and wages rising as much as the currency was initially devaluated, the real exchange rate will return to its original level and therefore undoing the gain in competitiveness that was achieved by devaluation.

### **The long run**

The long-term effect is usually considered most important when evaluating devaluation as a monetary policy. The change in real variables is what creates a permanent effect, but can this be created by altering the nominal exchange rate?

If the economy is able to meet the higher demand, there won't be an upward pressure on prices from the demand-side, but the supply-side effects should also be considered. Domestic firms that import raw materials will have to deal with higher costs, because of the devaluation. These costs will be tried to be passed on, with as consequence higher prices. Consumers will also want to maintain their real wages, therefore demanding higher nominal wages. These price and wage rises will have an effect on other firms, who will then react in a similar way. Inflation will occur on national basis and accordingly the real exchange rate will rise. Eventually, devaluation will have had no effect. All real variables will be unchanged. Most observational evidence concludes that the effect of devaluation is completely cancelled out by a rise in domestic prices and wages after four or five years.

## **2.3 The theoretic effects of TMS on Greece<sup>6</sup>**

For each country in which TMS would be implemented, it would have different effects. Greece's economic situation is incomparable to that of Germany. What exactly does Ten Dam expect to see happen in Greece and what problems would TMS solve?

When Greece introduces a NCU, the ECB will to devalue the Greek NCU versus the ECU. The national level of prices and wages in Greece will therefore be lower compared to the level in other countries. Because of these adjustments, exports, which are based on NCU-costs and set in those prices, become cheaper in euro's. Hence, Greek exporters become more competitive and exports are expected to rise. Imports will become more expensive and therefore the demand will fall. As the economic situation improves, a better and more stable investment environment will be created. This will result in a greater attraction of foreign capital investments. Likewise, tourism will increase, because of the lower local prices, which are calculated in NCU's, for tourists. As the industry recovers and the economy improves, unemployment will decrease and government tax revenues will rise. Theoretically, it is expected that the real Greek GDP will grow and the Greek budget deficit will fall.

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<sup>5</sup> Keynesian unemployment, or involuntary unemployment, is the result of a demand deficit (Begg, Fischer and Dornbusch, 2005).

<sup>6</sup> Based on ten Dam (2010b)

### 3. Empirical analysis

It is important to understand the difference of the theoretical effect of exchange rate devaluation –as aforementioned– and the effects in the real world. The exchange rate is a key factor in the modern world of international trade. Understanding the real effect it would have is therefore of utter importance. In the real world there are many more deviations and variables than those taking into account in theory. Relevant experience and evidence are two highly valued points when analyzing a solution or any decision in that matter. In this case looking at what effect devaluation of a currency has had on its domestic economy can give us an idea of its possible effect in Greece.

For the empirical analysis mainly data from five recent large currency devaluations will be used: Argentina (2002), Brazil (1999), Korea (1997), Mexico (1994), and Thailand (1997). These give enough data to analyse short term and long term effects they have encountered.

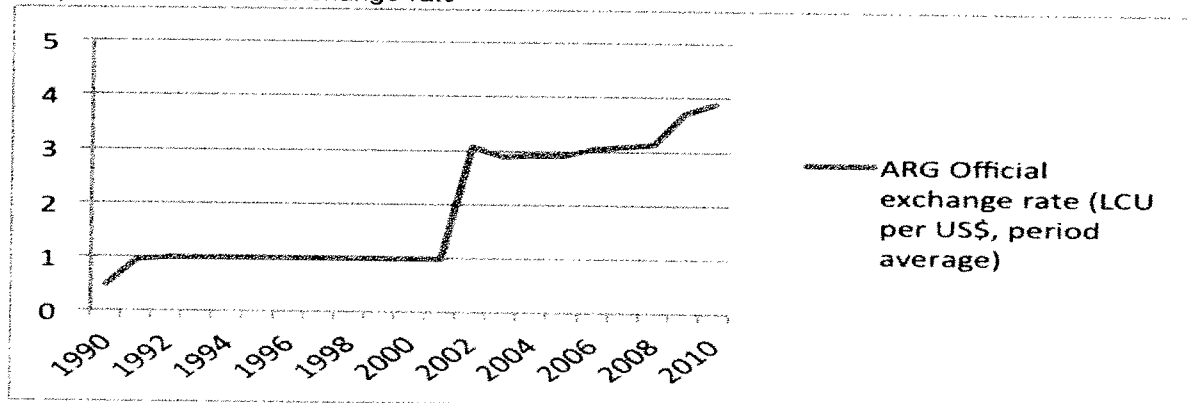
Firstly I will look at the situations aforementioned countries found itself in which led to the currency crises. This will also be of importance later on, in section 4, when Greece's situation is analysed.

## 3.1 Pre-crisis situations

### Argentina

Since 1991 the Argentine peso was pegged to the dollar at one peso per dollar. The following ten years the American dollar became increasingly stronger (World Bank, 2011). Because the Argentine exchange rate was overvalued, Argentina exported too little and imported too much. This trade imbalance made it impossible for Argentina to pay the interest on its foreign debt. However, due to the perceived increased risk, the interest rates Argentina had to pay on refinancing the debt increased, causing the debt burden to grow ever larger. When, in 2002, it became clear that Argentina wouldn't be able to repay its debt, it was forced to default and devalue its peso (Feldstein, 2002).

Graph 3.1.1: Official exchange rate

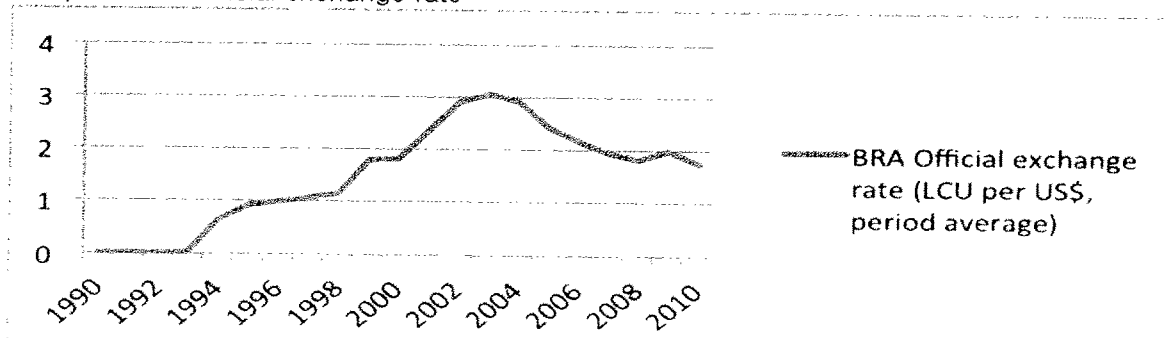


Based on: World data Bank, 2011

### Brazil

In 1994 the Real Plan was introduced in Brazil. The main reason for this was the hyperinflation the country had just before this period. The Real Plan pegged the currency, the real, at a high value relative to the U.S. dollar. Firstly it appreciated, but since 1995 it started a gradual depreciation process. (IMF, 2002) By 1999, the current account was in deficit, exchange rate reserves were declining, and unemployment reached its highest level in over a decade. (World Bank, 2010) Combined with experience gained from the Russian default and recent East Asian crisis, in which those countries also unpegged from the US dollar, the Brazilian Central Bank (BCB) devalued the real, as they thought they could not maintain the crawling peg any longer (Baig and Goldfain, 2000).

Graph 3.1.2: Official exchange rate

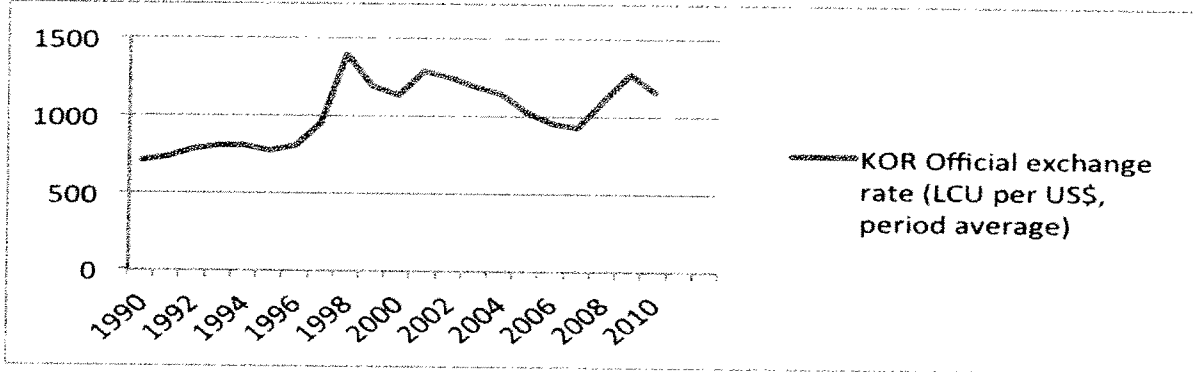


Based on: World data Bank, 2011

## Korea

The first signs of the Korean crisis were in 1996: the current account deficit had widened, the foreign debt rose, the rate of growth of GNP fell as well as that of the exports. The slowdown of exports was due to a fall in competitiveness. Korea's currency had appreciated relatively due to the decline of the yen, recessions in Japan and Europe and a fall in world market prices of various goods which made up 50% of Korea's exports (Kihwan, 2006). Many businesses failed to ensure returns and profitability, and lots of them defaulted. Moody's downgraded Korea's credit rating, and the Seoul stock exchange plunged. (World Bank, 2011) First of all, the won was loosely pegged to the dollar, but in 1997 the exchange rate of the Korean Won was allowed to float freely, this resulted in an immense devaluation. (IMF 1998)

Graph 3.1.3: Official exchange rate

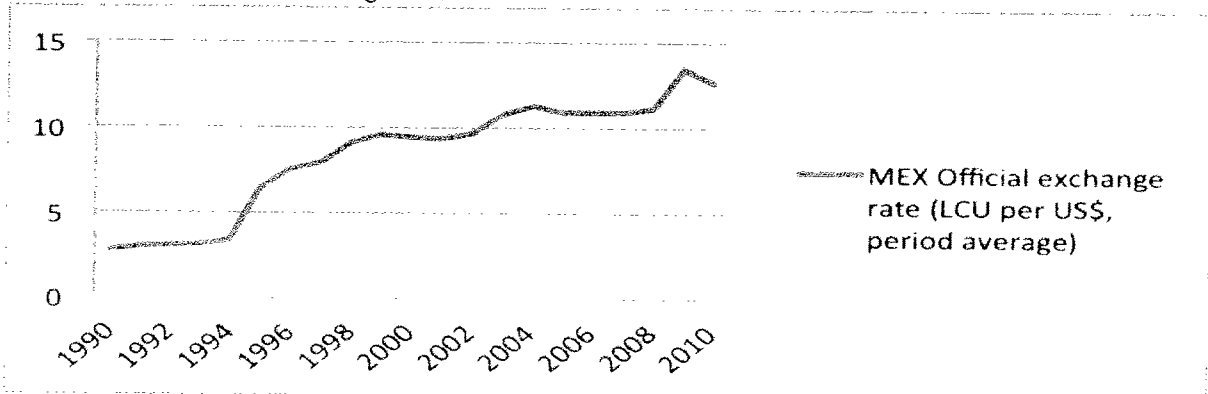


Based on: World data Bank, 2011

## Mexico

Many reasons were assigned as cause of the Mexican financial crisis in 1994, mainly by mishandling of the Mexican government. It was the end of his presidential term, the president Carlos Salinas de Gortari launched a high spending splurge and a high deficit (Sachsasb, 1996). To finance the deficit, Salinas issued the Tesobonos, a type of debt instrument denominated in pesos but indexed to dollars. On January 1<sup>st</sup>, an insurgent rebellion, officially declared war on the government. Although the conflict ended within two weeks, an uncertain political outlook made investors place a larger risk premium on Mexican assets. Mexico had a fixed exchange rate, but lacked sufficient foreign reserves to maintain the rate and by the end of 1994 it was running out of dollars (World Bank, 2011). The peso had to be devalued despite the fixed rate, which raised its risk profile (and hence increasing the interest rate for Mexico to be paid on the international capital market) (Sachsasb, 1996). The government tried to roll over some of its debt which was coming due, but investors weren't buying the bonds, a default seemed likely. Many investors started to sell the Tesobonos rapidly, making the central bank reserves even lower. The government, being unable even to hold the current exchange rate, decided to let it float, the peso crashed.

Graph 3.1.4: Official exchange rate

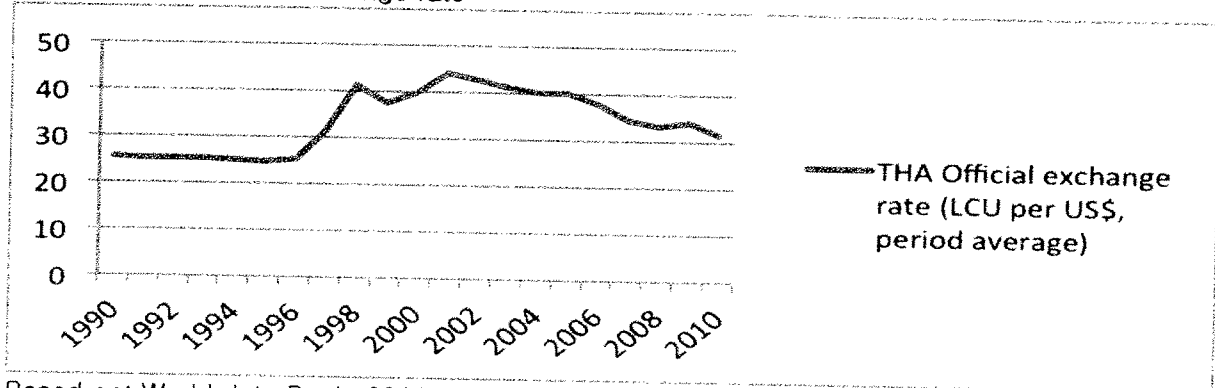


Based on: World data Bank, 2011

### Thailand

Before the crisis in Thailand, it had a soaring economic growth and a large capital inflow. Initially the Thai currency, the baht, was pegged to the US dollar. This made Thailand even more attractive for foreign direct investment (Lai, 2000). Its quick growth and the US dollar-baht peg made it overconfident and resulted in careless lending and borrowing and the accumulation of nonperforming loans in the financial sector. This expressed itself in increasing current account problems. When the US dollar started to appreciate, Thailand became less competitive in the world's market and its net exports declined. In order to promote exports Thailand abandoned the dollar peg and devaluated its currency (Lai, 2000). Because of the rapidly increasing external debt, the international financial market's confidence in the Thai economy subsided (Lai, 2000). Investors began selling the Thai baht in the summer of 1997 and therefore the baht devaluated severely (World Bank, 2011).

Graph 3.1.5: Official exchange rate



Based on: World data Bank, 2011

### Resemblances

When looking at the causes of these currency crises, there are striking resemblances. Before the crises all currencies are overvalued because of their pegs to the U.S. dollar, often as part of stabilisation or structural programmes (García-Solanes, 2010). Meanwhile, the governments have difficulties maintaining the peg. This overvaluation mostly resulted in deteriorating foreign reserves, a growing current account deficit and debt. This sparked speculation and insecurity on the international capital market, making investors draw capital away from the country and making interest rates soar.

When the problems that Greece is facing at the moment are analysed (for more information, see chapter 4), the same problems are found. Because of the euro's high exchange rate, Greece's current account deficit grew. As well as the growing debt and rising interest rates.

The mistake all countries made was waiting too long to devalue their currency, until reserves ran low, and so that by then there was no good way out (Frankel, 2003). This might also be the case for Greece, and therefore – if TMS results being a good solution – Greece should act fast.

In the coming sections the effects of the devaluation of the several currencies will be assessed. Inflation, the trade balance, debt situation, investments and interest rates will be the main focus points.

## 3.2 Inflation

When a government devaluates its currency it hopes that it will be an effective means of changing its prices relatively: the real exchange rate. If this is achieved the country will have a higher competitiveness in the world market (see chapter 2). To determine the real exchange rate and how it develops, the inflation rate has to be taken into account.

In this section the inflationary effects of large, sudden devaluations will be investigated. There are some questions that will have to be answered. Are domestic prices immediately largely affected by changes in the exchange rate? How does the inflationary impact develop over time? Is the effect dependent on the initial conditions of the economy? The aforementioned questions will be answered by an analysis of the recent currency crises used earlier in this paper.

These questions are important when looking at the effect of an implementation of TMS. Large and sudden devaluations usually have occurred when an exchange rate peg is abandoned, often in combination with strong market pressure or a balance of payments crisis. All these criteria were present in the aforementioned countries, and are applicable for Greece too.

In the literature of currency crises among emerging market economies, whether and how much inflation heightens due to a sharp depreciation would make a difference in the recovery process from a crisis. If domestic prices would respond to the nominal exchange rate depreciation one-to-one, so if there is complete pass through—not only to import prices, but to Consumer Price Index (CPI) as well—the real exchange rate would not change at all meaning that any export competitiveness gained from nominal depreciation would be cancelled out. While this stays unchanged, corporations and financial institutions that have net foreign-currency liabilities would become burdened by larger real debts and nonperforming loans and investor confidence will generally erode (Ito and Sato, 2008).

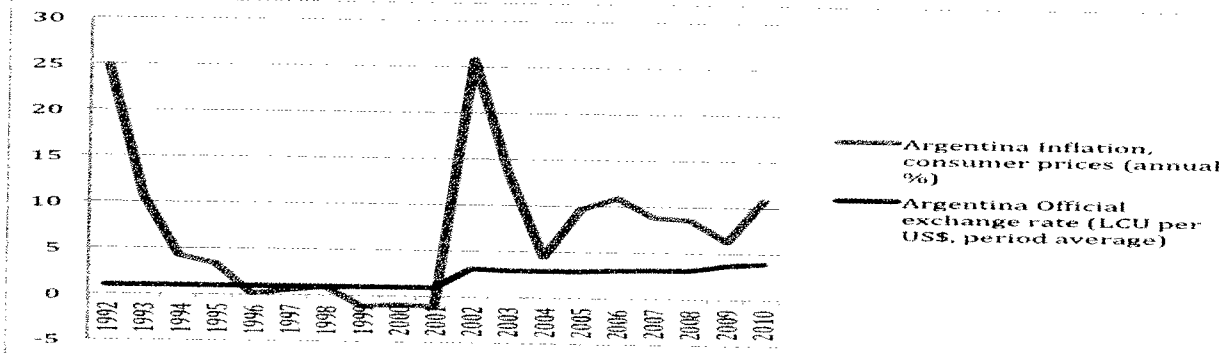
This would worsen the crisis that had already arisen. Thus, the speed with which domestic prices rise after a sudden devaluation and the degree to which they do becomes the decisive factor.

Hence, from the viewpoint of using the exchange rate changes as an instrument for improving (reducing deficits and possibly making surpluses in) the trade balance, the pass-through to import prices and possibly wholesale/producer prices to force expenditure switching is good, but the pass-through to CPI, raising all price levels, is bad (Ito and Sato, 2008). Therefore, I will mainly be focusing on CPI based inflation data for my assumptions and conclusions. Another reason for this is that the primary objective of the ECB's monetary policy is to maintain price stability. The ECB aims at inflation rates of below, but close to, 2% over the medium term (ECB, 2011). If the devaluation has a large, negative effect on inflation, this policy might not be acceptable to the ECB and therefore will not be a relevant solution.

## Argentina

During the first months of the devaluation in 2002, Argentina was in a state of hyperinflation – 25.9%– (World Bank, 2011). In part, this was caused by the relatively higher import costs caused by the devaluation, which were passed on to the consumers. Another reason was the ending of the currency board, whereby all the dollar deposits were converted into pesos, causing the money supply (of pesos) to rise. When this is not met with an increase in production, inflation arises. About mid 2002, there was a substantial growth in exports, therefore economic growth. The excess supply of money was met by the extra production and consumption, and inflation dropped. In comparison to other countries the inflation rate was still relatively high. From 2006, the government made price agreements with certain sectors and firms and started several policies to keep inflation low. This resulted in a lower inflation, visible in the graph.

Graph 3.2.1: Inflation rate and exchange rate

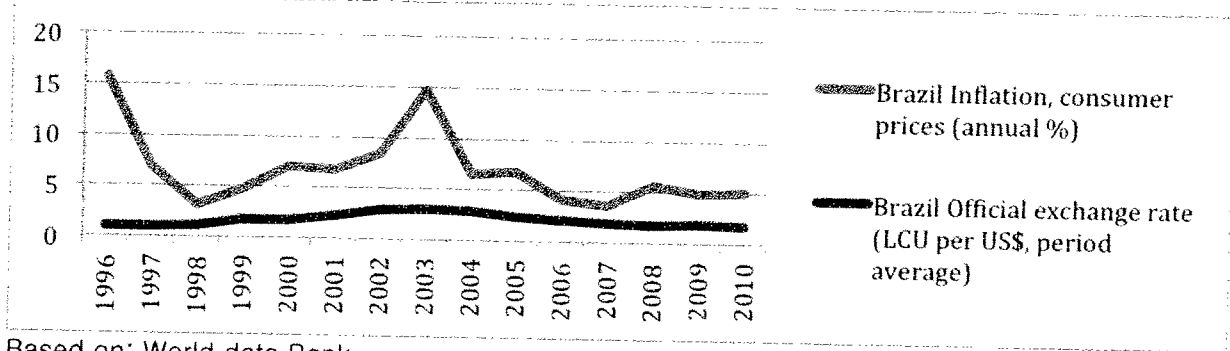


Based on: World data Bank, 2011

## Brazil

In the beginning of 1999 Brazil was hit by an unavoidable crisis that resulted in a 'maxi-devaluation' of the real. The Brazilian real/US dollar exchange rate rose 57% in just two months, that is, from 1.21 in December 1998 to 1.90 in February 1999. After that the exchange rate dropped a little and then remained around 1.84 during the rest of 1999, which is at a level 52% higher than before the crisis. Soon the Brazilian government started an inflation-targeting plan in order to control the inflation and to coordinate market expectations (Barbosa-Filho, 2008). In theory the exchange rate was free to float, but in practice the country ended up with a dirty floating regime. Inflation targeting managed to reduce inflation in Brazil after its 1999 and 2002 currency crises, with a substantial help of exchange-rate appreciation. Immediately after a currency crisis, there was a 1.7 percentage point (pp) increase in inflation in 1999 when compared to 1998. The next year, it moved up from 4.9% to 7.0%. In 2002, because of financial instability, the exchange rate shot up. The Brazilian inflation rate followed soon after and reached double-digit levels at the end of 2002. Years following, the Brazilian real appreciated due to several reasons, and the inflation rate dropped consequently.

Graph 3.2.2: Inflation rate and exchange rate

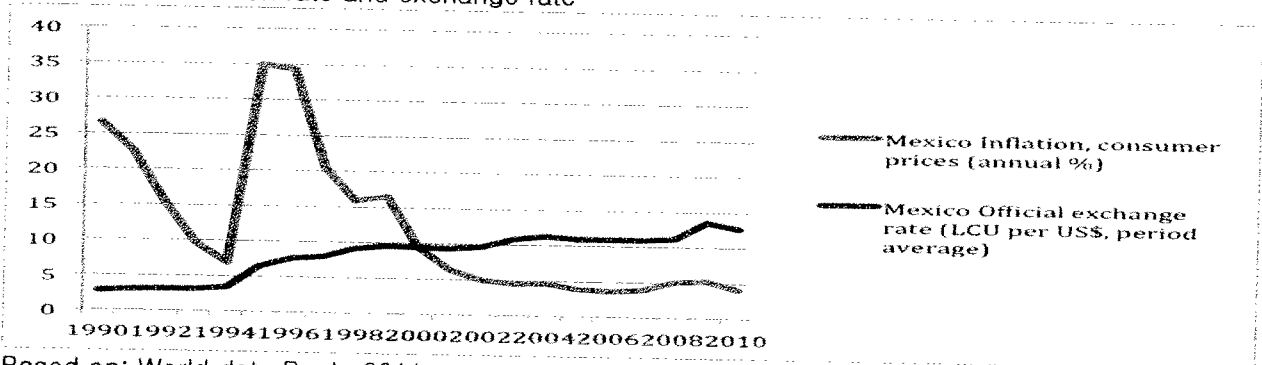


Based on: World data Bank

### Mexico

In 1994 Mexico's inflation rate was only 7%, the lowest it had been in 20 years. In 1995, after the devaluation of almost 100% within 6 months, the inflation soared up to 52% by the end of 1995, averaging at 35%. This was mainly due to the fact that the prices of imported goods in the index more than doubled, which was passed through to the consumers. By late 1995 confidence was clearly recovering (Mussa and Savastano, 2000). The IMF (1996) wrote that, tight fiscal and monetary policies helped reduce actual and expected inflation in the first half of 1995, which contributed to the gains in confidence, declines in interest rates, and the stabilization of the peso. In 1996 growth jumped to 5%, and inflation fell by 15 percentage points. This fall of inflation kept going until 2002, since when it has stabilised at an average of 4%.

Graph 3.2.3: Inflation rate and exchange rate

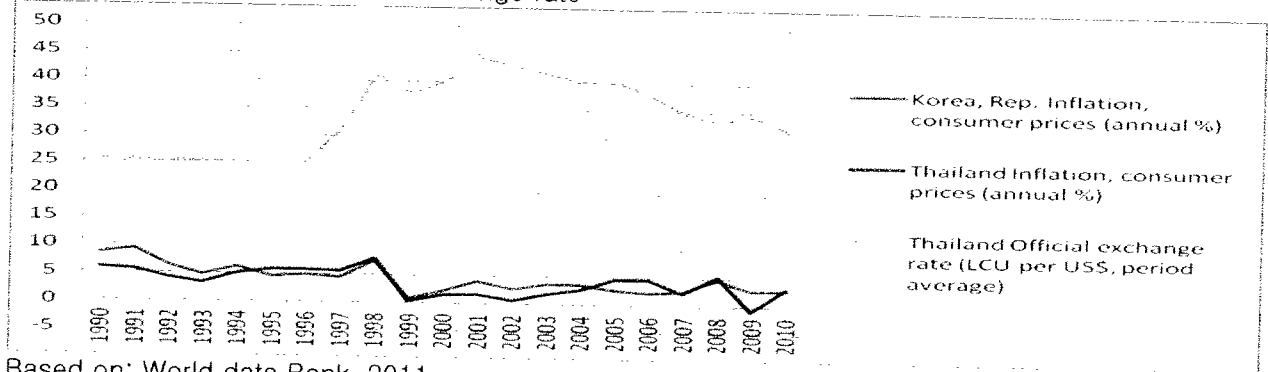


Based on: World data Bank, 2011

### Korea and Thailand

The devaluation of both Korea and Thailand started in 1997, but the inflation only visibly started to increase in 1998. The effect wasn't that big though: the inflation rate rose from about 5.6% to 8% for both countries. Then, in 1999, the rate dropped significantly to 0.5%. Although the exchange rate remained at a much more devaluated level compared to the pre-crisis years, the inflation hadn't experienced a, generally expected, rise.

Graph 3.2.4: Inflation rate and exchange rate



Based on: World data Bank, 2011

### Resemblances

The reaction on inflation caused by the devaluation has been varied. In both Mexico and Argentina, inflation rates shot up immediately, but fell dramatically again in about two years. This fall could partly be explained by the price agreements the Argentine government made with certain sectors. Although it could be argued that this goes against the free market mechanism, the inflationary effects were effectively lowered.

In the Asian countries, there was a visible rise in inflation, but within a year both dropped to a level lower than the level in the pre-crisis years.

Except Brazil, all countries' inflation rate dropped within two or three years to a rate lower than that in the pre-crisis years. An explanation for the division could be that for all countries, – again except Brazil – the nominal exchange rate became relatively stable after the massive devaluation, where as for the Brazilian real it kept on devaluating strongly until 2003. Afterwards, when it started appreciating, the inflation rate dropped too. The surprising thing though is that Brazil's government had set up a specific inflation targeting plan. In the short run, the inflation rate did not shoot up as much as in the other countries, but in the long run the policy had not been that efficient.

The inflationary effects of devaluation generally depend on the policies applied and their responses after the crisis (Borensztein & Gregorio, 1999). It is very difficult, however, to describe and control the policy's response. As for Brazil it didn't reduce inflationary effects remarkably, but the policies Mexico implemented did do so.

### 3.3 Trade balance

When countries are in difficulty of repaying debt, the natural way to increase the potential of repayment is to increase the trade surplus of goods and non-factor payments (Ziesemer, 2005). Devaluations are available as an instrument to stabilize the trade balance, but as aforementioned the Marshall-Lerner condition states that devaluation might initially lead to a worsening of the balance.

In this section it will be assessed whether devaluation of the currency has had a contractionary or expansionary effect on the trade balance in the sample crises.

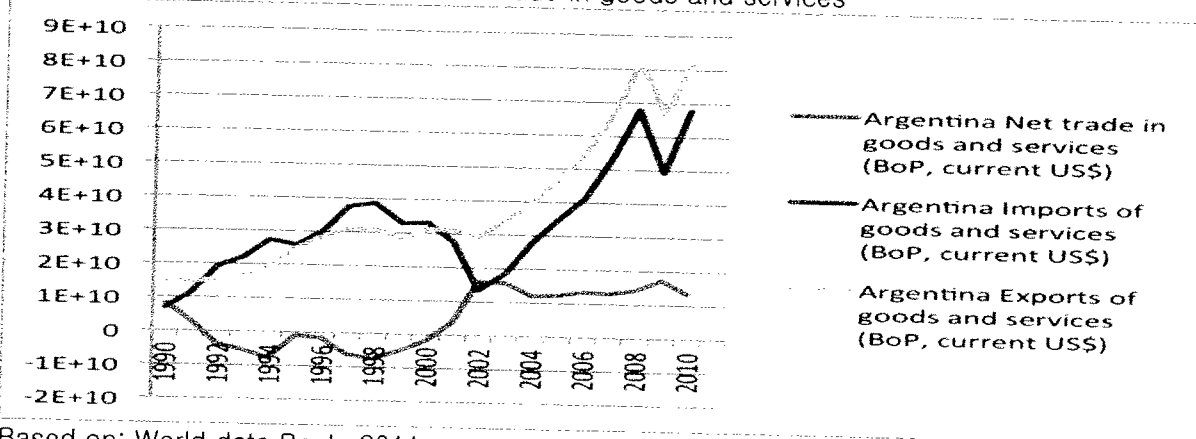
A number of empirical studies, such as certain econometric studies by Kamin and Rogers (2000) and Upadhyaya (2000), have indicated that devaluations lead to reduced economic activity and there is little evidence for sequential reversal. These results were mostly found using data from Mexican and other Latin American experiences. Upadhyaya (2000) reasoned that this effect comes from the nominal exchange rate and not the price level. On the other hand, Kim and Ying (2007) found that in the majority of cases in South East Asia, including Korea and Thailand, there was no indication that devaluation was contractionary, but instead output had increased strongly.

These conclusions will be compared to the effects on the trade balance of each respective country. Did the trade balance improve after the devaluation and what were the main amendments and perhaps underlying causes?

## Argentina

The initial effect on the exports after the devaluation in 1994 was not that significant: a 3% increase. On the other hand, imports fell dramatically right from the start. This resulted in a great improvement of the trade balance. Although it took some time until exports experienced a large-scale growth, it did happen. One of the main reasons for this was the increased demand for Argentine products like soybeans and soy oil. Firstly because of an improved quality, but secondly also due to the gained competitiveness caused by the devaluation (INDEC, 2007). Since 2002, imports started increasing at a vast rate. This was caused mainly by growth in purchasing power and the fact that Argentina joined a custom union, implying that trade with other Latin-American countries was duty-free, creating an incentive for the Argentines to import more (INDEC, 2007). Although the imports grew with a slightly faster rate compared to that of the exports, a trade surplus was kept stable ever since.

Graph 3.3.1: Imports, exports and net trade in goods and services

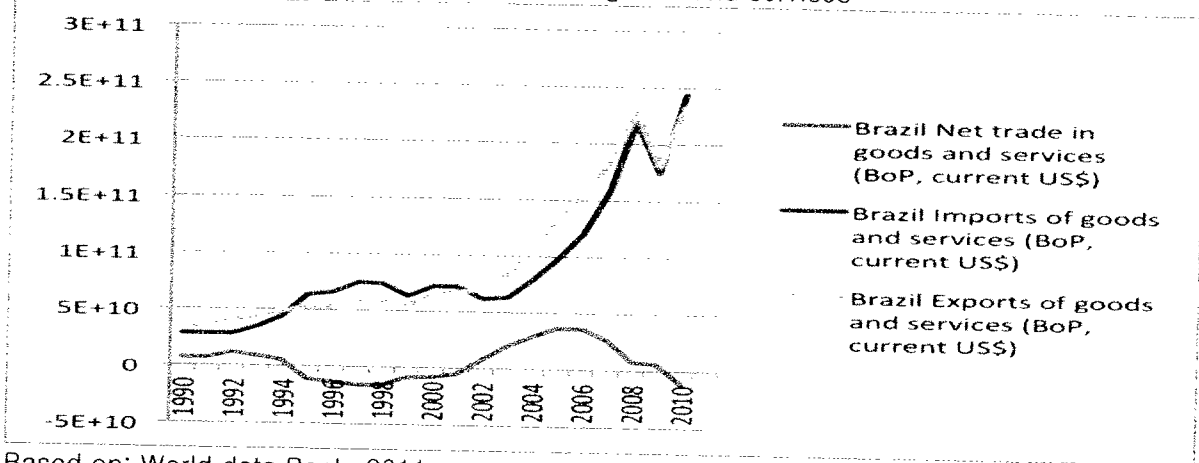


Based on: World data Bank, 2011

## Brazil

The main concern the Brazilian government had about the devaluation in 1999 was whether it would rekindle the hyperinflation of the past (Amann, 2003). In addition, because the government would have to restrict the scale of devaluation and inflationary pressure through additional tightening of monetary policy, there was a fear that economic activity would be further repressed. Due to an increasingly accommodative nature of monetary policy in Brazil after the devaluation of 1999, economic activity began to pick up. Before the devaluation the GDP was contracting, but immediately afterwards, the growth rate was slightly positive and in 2000 jumped to over 4%. This was mainly due to an expansion in agricultural and services output (Amann, 2003). The price of these products were not affected negatively by the devaluation – due to higher import cost applicable at others –, but only had a positive effect. This has become visible in the trade balance that became less negative immediately, and experienced a vast increase until 2007.

Graph 3.3.2: Imports, exports and net trade in goods and services

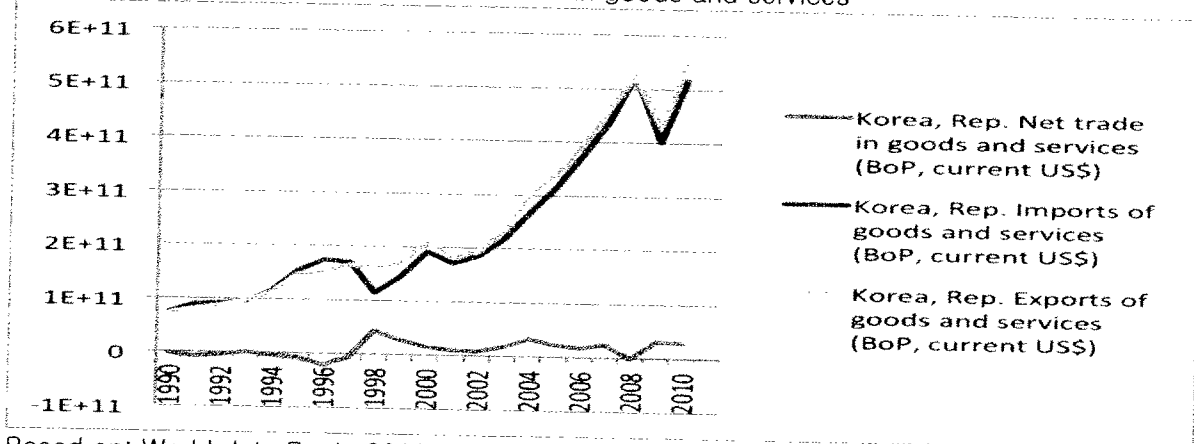


Based on: World data Bank, 2011

### Korea

Being only 1–3 months into the crisis in 1997, the Korean trade balance turned from deficit to surplus. Unfortunately, the reason for the increased trade balance is a fall in income and imports rather than an increase in exports. Nevertheless, reserves start to rise again (Frankel, 2003). Within three years the trade balance stabilised at a slightly lower amount, still being positive though. The exports and imports have been growing cohesively ever since. It seems that the devaluation has been a good incentive to bring Korea in a stable equilibrium.

Graph 3.3.3: Imports, exports and net trade in goods and services



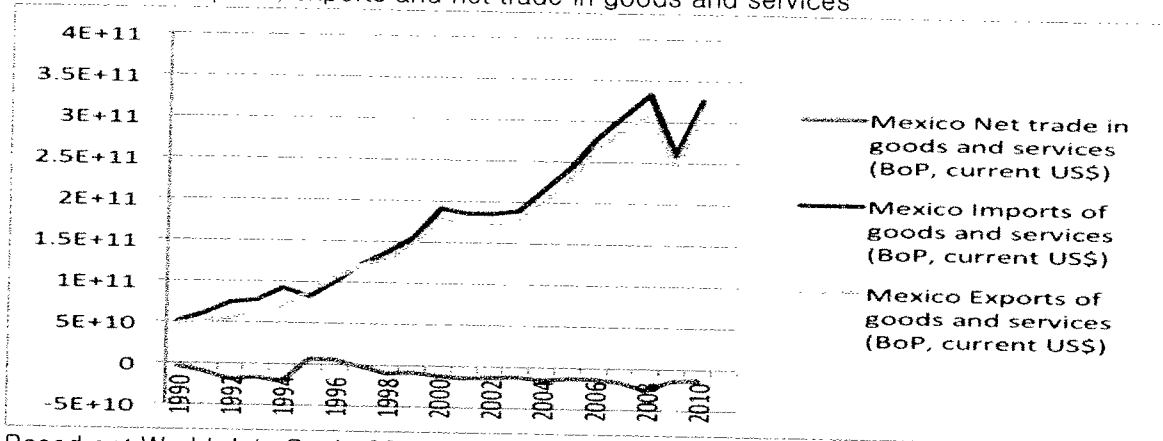
Based on: World data Bank, 2011

### Mexico

An immediate effect of the devaluation at the end of 1994 was the improvement of the trade balance. In that year, there was a rapid reversal in imports, with their rate of growth dropping from 19.17 percent in the last quarter of 1994 to a negative growth of -19.81 percent in the second quarter of 1995. Imports showed negative rates of growth throughout 1995, even though all trade liberalisation policies remained intact. It could have also been due to the tight – therefore usually contractionary – fiscal and monetary policies that helped reduce inflation in the first half of 1995. Exports, on the other hand, continued to grow, but they were not affected significantly by the devaluation; it remained on a certain trend line, which can be seen in the graph.

During the period of recovery from the crisis –1996 to 1999– export growth slowed, even though they remained among the more dynamic components of demand. Their average rate of growth was 12.99%. Imports, on the other hand, grew increasingly – by 18.43%–, which was much higher than the average growth rates of all the demand components (Lederman, Menendez, Perry & Stiglitz, 2000). Since 1997, imports have overtaken exports, resulting in a negative trade balance.

Graph 3.3.4: Imports, exports and net trade in goods and services



Based on: World data Bank, 2011

### Thailand

As in the Korean economy, the devaluation resulted in an immediate positive effect on the trade balance of Thailand, but again mainly caused by a large fall of the imports. In the pre-crisis years, Thailand had a constant negative trade balance, but since the devaluation this has been positive. Like Kim and Ying (2007) concluded there was no contradictory effect on the trade balance, but instead a huge improvement and massive growth in export.

Graph 3.3.5: Imports, exports and net trade in goods and services



Based on: World data Bank, 2011

### Resemblances

A visible pattern is found in most of the countries economies: first of all, the imports fall after the devaluation, resulting in an immediate improvement of the trade balance. After a certain time lag, the exports see a vast growth. In section 2.2 there has been explained that in theory a J-curve is expected, but in contradiction to this, it has not been found in any of the countries. This is a surprisingly positive result. Especially agricultural exports gain competitiveness after the devaluation, as their price is not affected that much by higher import costs. The result is visible in Argentina and Brazil, whose exports experienced a boom. Another remarkable pattern found, is that all countries – except Mexico and Brazil– resulted in a higher, positive and stable trade balance. This means that the goal of devaluation that is often assumed and hoped for – an improvement in the trade balance– has been achieved in the long run for these countries. This is a positive sign in regards to TMS and its possible effects on Greece.

### 3.4 Debt

The Greek financial crisis, which might be the first of a number of sovereign debt crises that the euro area can experience in the next few years, has had a severe impact on the economic and financial environment in Europe. This is mainly because of an unexpected, massive amount of uncertainty about economic prospects, future fiscal and monetary policy it has evoked (Gerlach, 2010). To overcome this, Greece will have to give reassurance of future prosperity and a healthy financial situation.

Fiscal imbalances have been at the centre of the recent currency crises as discussed above, but also others like Russia in 1998 and Turkey in 2000/2001 (Corsetti and Mackowiak, 2001). For this reason, analysing these crises and the effect the currency devaluation had will provide a relevant idea on how this might affect Greece.

The main point in discussions of the emerging market crises of the 1990's has become the currency composition of debt. For example, Mishkin (1999, as cited in Aquiar, 2005) argues that the typical debt contract in Mexico and East Asia was dominated by foreign currency, and in combination with its short duration, it developed the currency crisis into a full-fledged financial crisis.

Therefore focus has to be put on the external debt<sup>7</sup>. Since external debt is mostly denominated in foreign currency, when it is expressed in local currency terms, it balloons after currency devaluations. Since assets are typically denominated in domestic currency, there is no simultaneous increase in the value of firm assets, resulting in a deterioration of the firms' balance sheets<sup>8</sup>. This means that there will be less financial protection provided to lenders. Furthermore, the decline in net worth increases moral hazard incentives for firms, who will take on greater risks because they have less to lose if the loans go sour (Radelet and Sachs, 1998). "Because lenders are now subject to much higher risks of losses, there is a decline in lending and hence a decline in investment and economic activity" (Mishkin, 1999, as cited in Aquiar, 2005). This decreases the chance of coming out of a debt crisis. The damage to balance sheets after the devaluation was a major source of the contraction of the economies in East Asia, as it was in Mexico in 1995 (Radelet and Sachs, 1998). As we saw in section 3.2 inflation has been an immediate effect in most currency crises. A rise in expected inflation after the currency crisis aggravates the financial crisis because it leads to a sharp rise in interest rates (as we will see in section 3.5), leading to huge increases in interest payments and making debt harder to repay.

In this section the (external) debt situation of the sample countries will be investigated. Some questions that will be answered are: did the currency devaluation – and possibly financial crisis – affect the debt? Was this positive or negative? What were some of the factors for this and how did the debt composition change?

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<sup>7</sup> Total external debt is debt owed to nonresidents which is repayable in foreign currency, goods, or services. "Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. Data are in current U.S. dollars" (World Bank, 2012).

<sup>8</sup> A balance sheet is a measurable summary of a company's financial condition at a specific point in time, including assets, liabilities and net worth. The first part of a balance sheet shows all the productive assets a company owns, and the second part shows all the financing methods, such as liabilities and shareholders' equity.

## Argentina

Since 1999, Argentina had a full-fledged recession and was unable to repay the debt. The state had no currency reserves, as those were used to retain the peso from devaluing. However, the Argentine government carried out severe measurements and challenges trying to refinance its debt, creditors denounced the default. In the beginning of 2002 it defaulted on part of its external debt. The Argentine government set up numerous policies and fiscal reconstruction to improve its debt situation and budget deficit. A number of these were mainly privatisations and structural reforms in the banking sector (IMF, 2003). As a result of the defaults, IMF debt financing, reforms and the economic recovery of 2003, the percentage of external debt in relation to the GNI plummeted from 2003 onwards. The economic recovery and especially the trade surplus, were mainly due to the gained competitiveness as explained in section 3.3. Therefore, to some extent, the falling debt ratio can be seen as a result of the devaluation of the peso in 2002.

## Brazil

In Brazil most government debt was either linked to the exchange rate or to the prime interest rate. Since the devaluation of 1999, the proportion remained substantial (Amann, 2003). Because of the speculative attacks on the real and the rise of the interest rates, public debt as a proportion of GDP rose from 49.4% in 1999 to 63.9% in 2002. The percentage of external debt on the other hand didn't rise that much, and the total amount even decreased slowly in that period.

Unlike the economies of Korea and Thailand a year previously, the big devaluation did not lead to the development of a financial crisis. There are two explanations for this. First of all, the degree of financial depth was much smaller than that of most of the Asian countries. As is visible in graph 3.4.2, the percentage of external debt in relation to GNI just before the Brazilian devaluation was much lower compared to the percentages of each country before the devaluation of their currencies. Secondly, after the implementation of the Real Plan, the BCB launched a series of tax incentives and other credit facilities, resulting in concentration in the banking industry strengthening the financial system (Amann, 2003). Another reason could be, as given by Amann (2003), that "the devaluation itself had been foreseen for a long time by many institutions, so that when it finally arrived there were very few casualties".

## Thailand and Korea

As mentioned above, one of the main reasons for the crises in Thailand and Korea were the overvalued currency and – most important – the huge external debt. For example, just before the crisis investors estimated that Korea's short-term foreign debt was \$110 billion, which was three times Korea's official foreign exchange reserves (Wade, 1998). In December 1997, Moody's downgraded the sovereign debt of both Korea and Thailand to 'junk bonds'. As a result of creditor panic, bank runs, and the sovereign downgrades, Korea and Thailand were obligated to default on debt partially. "In the case of Korea, these defaults were initially handled by an emergency standstill of debt repayments; subsequently short-term debt was rolled over into longer term instruments backed by Korean government guarantees. This rollover applies to around one-third of the Korean external debt falling due in 1998" (Radelet and Sachs, 1998). Although these governmental bonds carried higher interest rates, it did help soothe the panic. When the data from the graphs are analysed, for both countries – Korea and Thailand – the total amount and the percentage of external debt of GNI dropped considerably after the devaluation in 1997. One of the reasons for this was the immediate high trade surplus after the devaluation that helped reduce the foreign debt. This is a good sign as external debt is considered to have

harmful effects on an economy. Also, a lowering of this number increases the external debt sustainability<sup>9</sup> and therefore its future economic perspectives.

### **Mexico**

As explained in section 3.1, the Mexican government issued Tesobonos, a type of debt instrument denominated in pesos but indexed to dollars. In that year the percentage of external debt grew vastly. When the Mexican peso devalued, the real value of the debt exploded and in combination with high interest rates, made it impossible for the government to repay it. The U.S. government stepped in rapidly: firstly by buying pesos in the open market, and then by granting assistance in the form of \$52 billion in loan guarantees (Krueger and Tornell, 1999). By 1996, the economy was growing and made it possible for Mexico to repay all US Treasury loans in 1997, ahead of schedule. Since then, the total amount of external debt has been relatively stable, but the percentage towards the GNI has decreased substantially: from 60% in 1994 to 20% ten years later.

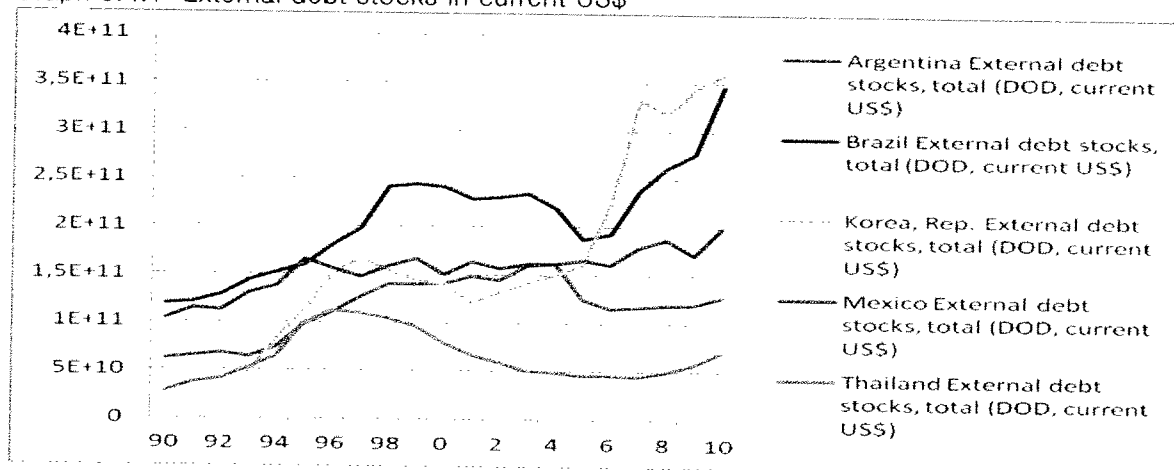
### **Resemblances**

All countries, except Brazil, the devaluation either caused or was caused by a financial crisis. They subsequently received loans and other financial help from the IMF or foreign governments. This helped the countries recover, as for all countries the external debt ratio towards the GNI fell after the devaluation. For most, this was in particular due to the improved trade balance, as seen in section 3.3, and structural reforms and policies. The general improvement of a country's economic situation, usually speaking always improves the debt situation.

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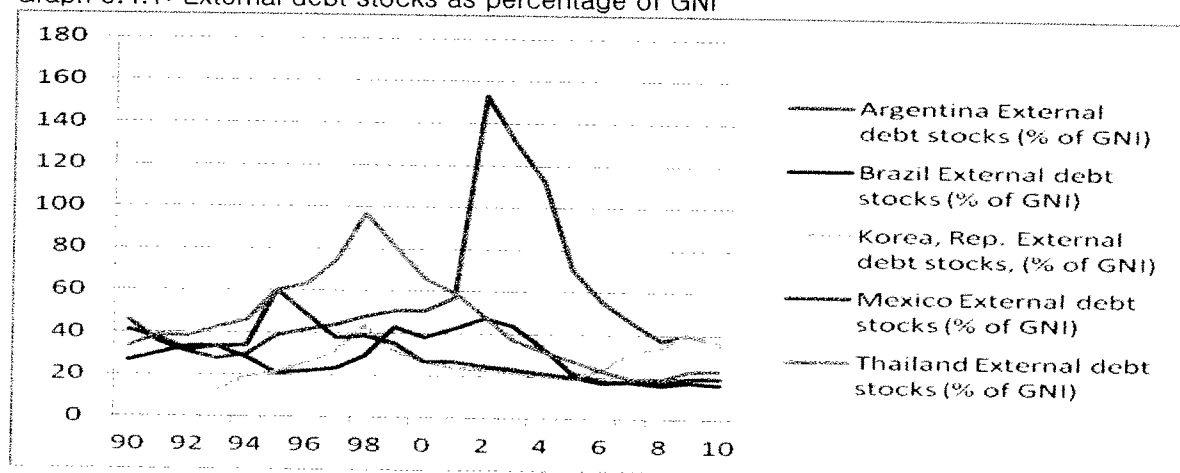
<sup>9</sup> "Sustainable debt is the level of debt which allows a debtor country to meet its current and future debt service obligations in full, without assistance of further debt relief or rescheduling, avoiding accumulation of arrears, while allowing an acceptable level of economic growth" (World Bank, 2011).

Graph 3.4.1: External debt stocks in current US\$



Based on: World Bank and Asian Development Bank

Graph 3.4.1: External debt stocks as percentage of GNI



Based on: World Bank and Asian Development Bank

### 3.5 Investments

In this section investments will be focussed on. In even the simplest Keynesian model, higher investment leads to a larger rise in income and output in the short run. Higher investments not only adds directly to aggregate demand but, caused by increasing incomes, also adds indirectly to consumption demand (Begg, Dornbusch & Fischer, 2005).

The particular focus in this section will be on foreign direct investments (FDI). "FDI is a component of a country's balance of payments and is the sum of equity capital, reinvestment of earnings, other long-term and short-term capital" (World Bank, 2011). These acquire a lasting management interest in an company functioning in an economy other than that of the investor. FDI is thought to be more useful to a country than purely investments in the equity of its companies. This is because equity investments are generally considered 'hot money' which can flow out at the first site of increased risk, causing market instability, whereas FDI is durable and generally useful whether the economy is in a good or bad state.

In a study by Borensztein, Lee and Gregorio (1998), there was tested what effect FDI has on economic growth. There has been found that FDI is more productive than domestic investment. Particularly in the case of developing countries, but also for developed countries, it is likely that the higher efficiency of FDI would result from a combination of advanced management skills and more modern technology. The effect of FDI on economic growth is also dependent on the level of human capital available in the host economy. FDI makes it able for new technologies to be adopted in an economy, and therefore, FDI may also have a positive effect on human capital accumulation, as training is required to prepare the labour force to work with new technologies. Due to the several 'growth-development' benefits FDI seems to carry, different countries and regions have enforced active policies to attract FDI (Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2004). Evidence has also been found that countries with better financial systems can exploit FDI more efficiently, as FDI promotes growth especially through financial markets (Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2004).

FDI is therefore an influential factor for economic growth and future prosperity. As Greece does have a developed financial system, an increase in FDI would certainly be advantageous for its economy.

In theory real interest rates have an effect on investment spending, but in practice it has shown that changes in expectations of future profits and assurance of repayment are a more important source of alteration (Begg, Fisher & Dornbush, 2005). Because of devaluation, foreign institutions and investors, generally speaking, begin to worry about the repayment ability of borrowers. Therefore they withdraw capital in a rush, which results in more market instability. Governments often raise the interest rate to prevent capital outflow (Aguilar, 2005). Although, as mentioned above, this usually does not affect the investments significantly, it does increase the debt burden.

Nominal interest rates are made up the real interest rate and the inflation rate (Begg, Fisher & Dornbush, 2005). But since the debt burden only gets bigger when there is a positive real interest rate (only then does a country have to give up real resources to repay the debt in the long run), the focus has to be put on the real interest rate. Therefore data of the real interest rate of long-term loans will be analysed in this section.

But what effect does devaluation have on FDI? This has been researched by Athukorala (2003) whom found that currency devaluation could have a positive impact on FDI in at least three different ways. First, since devaluation of the exchange rate of a country's currency makes the foreign firms' purchasing power bigger within that country, investment can increase. Second,

costs of investment may also be significantly reduced as asset prices might have fallen due to a fall in domestic demand provoked by the crisis. Third, as part of policies trying to reduce crises in the affected countries, new FDI laws usually open up an economy, making FDI easier and therefore increasing it. Unfortunately, large currency devaluation can also have a negative side. As it is often connected to a financial crisis, there is generally speaking a domestic demand contraction and lowered immediate growth prospects, which can have negative effects on domestic market-oriented foreign investment.

In this section the empirical effect of devaluation on FDI and interest rates is analysed.

### **Argentina**

A feared consequence of the default and devaluation in 2002 was the reduction of FDI, but fortunately this did not happen. As graph 3.5.1 shows, even in the worse time of the crisis, that is 2002, FDI, though dramatically lower, never disappeared. Once the Argentine economy started picking up and investors confidence grew – as visible in the falling real exchange rate – the investments picks up too.

### **Brazil**

In the years prior to the devaluation, Brazil saw an immense grow in FDI. Part of that success was due to changes in the legislation affecting these flows. The Brazilian government started a privatization programme, which abolished previous existing restrictions on the relative size of foreign capital allowed in privatization (Bonelli, 1999). Graph 3.5.2 shows that when the devaluation started in 1999, Brazil had very high real interest rates. The reason for this was that the BCB had to increase interest rates abruptly and substantially to stop the capital outflows from the country, due to all the insecurity at that moment. Unfortunately, the FDI net inflows plummeted until 2002. After the inflation targeting plan, mentioned before, was formally introduced, in mid 1999, the real base interest rate fell with 28% by the end of 2000. After that the real interest rate has been decreasing slower, but still steadily.

### **Mexico**

Because the Mexican devaluation in 1994 was very unexpected and sudden, investors rapidly withdrew their capital from Mexico (Ito, 2007). As is visible in the graph, the direct investment inflows fell that year. Fortunately, as described in section 3.4, Mexico recovered quickly, giving investors more confidence. This is visible in the graph as the FDI grew and the real interest rates dropped. Because of the fall in interest rates, the economic recovery was stimulated.

### **Korea and Thailand**

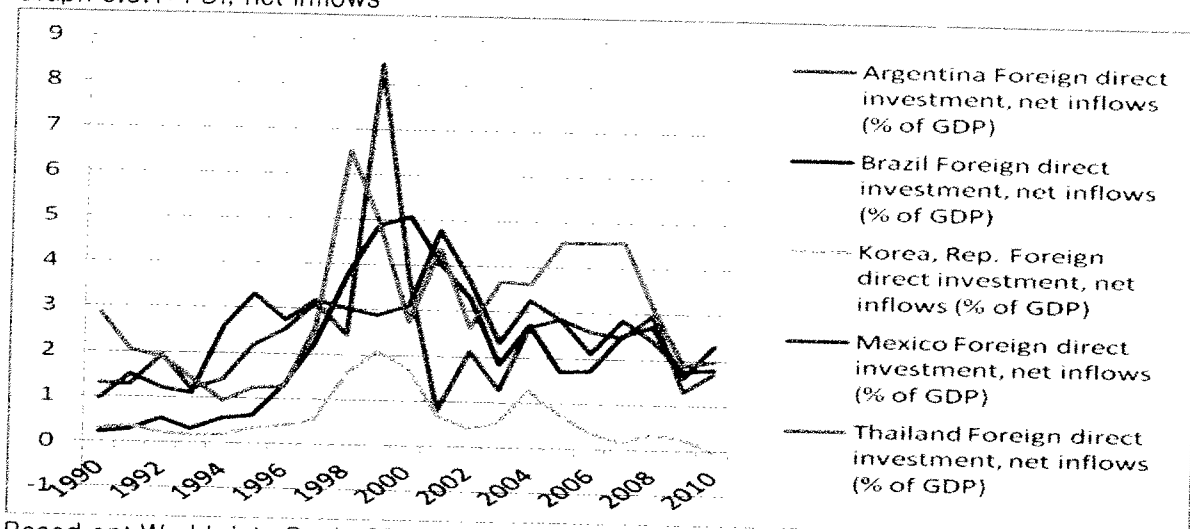
In the few years before the Asian crisis of 1997, in both Korea and Thailand the FDI inflows were very high. Net inflows to Korea contracted between 1996 and 1997 for two quarters, but began to recover much quicker (from about the first quarter of 1998) than in the other countries (Athukorala, 2003). From then on these flows started to increase significantly as there was big response by investors on the new FDI liberalization initiatives and take-overs that took place. In Thailand the FDI net inflows picked up significantly after the devaluation, but from 1999 it contracted again due to deterioration in the overall investment climate (Athukorala, 2003). This is also visible in the interest rate that picked up that year.

What is surprising is that the FDI increased in the lead-up to the crisis and contracted in the aftermath of the crisis for both countries.

On the other hand, when looked at the total capital flows a massive contraction is found in these countries (Athukorala, 2003). This must have been caused by the other two components

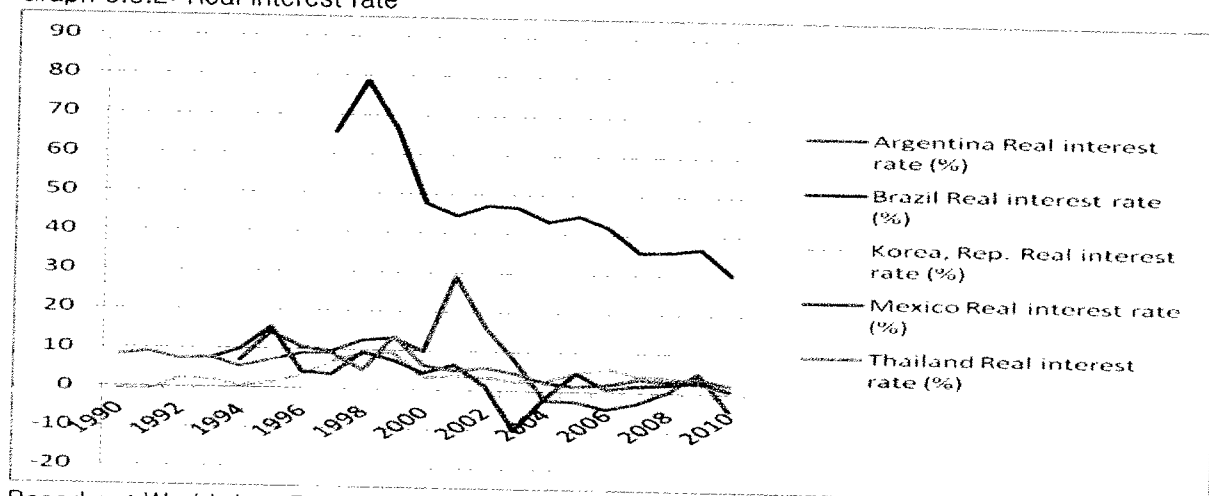
of foreign capital: portfolio flows and bank credit. After the crisis they did recover but never to the same point as in the pre-crisis years. A reason for this could be that before the crisis there was a sense of overinvestment: "countries were investing too quickly so that marginal return to capital became rather low" (Ito, 2007). If interpreted in this way, the post-crisis years represent a more normal, sustainable growth path for these countries.

Graph 3.5.1: FDI, net inflows<sup>10</sup>



Based on: World data Bank, 2011

Graph 3.5.2: Real interest rate<sup>11</sup>



Based on: World data Bank, 2011

<sup>10</sup> Net inflows are the new investment inflows less disinvestment in the reporting economy from foreign investors (World Bank, 2011). This data is shown as a percentage of the GDP.

<sup>11</sup> Real interest rate is the long-term lending interest rate adjusted for inflation as measured by the GDP deflator (World Bank, 2012).

### Resemblances<sup>12</sup>

FDI appears less inclined to sudden swings in an economy than other forms of capital inflow (Kim and Hwang, 2000). Overall it seems that FDI has been affected positively by the devaluation. FDI has been one of the influential factors that contributed to Korean recovery from the financial crisis, especially the quality of it (Kim and Hwang, 2000). The main reason for the total investment outflows and the rising interest rates, in all cases, was financial panic, but should this be ascribed to the devaluation? When pegged rates become overvalued, the pegged system forces countries to exhaust their foreign exchange reserves. This was visible in all of the countries in this section and in section 3.1. When that eventually happens, the countries are also forced to a sudden change of the exchange rate policy, by devaluing the currency. The combination of run-out reserves plus the sudden change in exchange rate policy leaves the country very vulnerable to panic. With a floating exchange rate system or a more representative pegged exchange rate – which does not cause overvaluation – countries can maintain their foreign reserves and thereby maintain a certain defence against financial panic. When foreign investors are insured that the central bank keeps enough reserves to repay short-term debts, the possibility of an arising creditor panic is eliminated. For these reasons the conclusion can be drawn that devaluation itself does not affect the FDI or other investments directly, but the panic resulted from the prior events and policies do. This panic, and therefore the investment environment can primarily be concluded from the real interest rate. In all cases real interest rates have increased in the time shortly prior to the crisis and during it, but once the recovery started and confidence grew real interest rates descended. As can be concluded, this wasn't because of a reversal of the devaluation, as for Argentina, for example, the exchange rate stabilised at the devalued rate, but the interest rate still fell.

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<sup>12</sup> This paragraph is mainly based on Radelet and Sachs (1998), unless stated otherwise.

### 3.6 Summary of findings

Before the crises, all currencies are overvalued caused by their pegs to the U.S. dollar. In the meantime the governments have difficulties maintaining the peg and this overvaluation mostly resulted in a growing current account deficit, debt and interest rates.

The inflationary effects of devaluation were varied. For some they were immense, but in a period of time descended evenly. As for others, especially the Asian countries, the inflation rate didn't increase that much relatively and even settled at a lower rate than before the crisis.

Although it is difficult to predict what response policies targeting inflation will have on an economy, perhaps a more specific research on each implemented policy in those times should be done to aid or strengthen TMS and its effect.

In the theoretical framework a J-curve effect was portrayed, but in the empirical analysis no such effect has been found. For all countries an immediate improvement of the trade balance occurred. Unfortunately this was not due to a faster growth in exports, but due to a vast decrease in imports. For most countries, except Mexico, a trade deficit was turned into a trade surplus in the long run. This is a very positive result, as the devaluation has had a long run effect.

Because most countries that devalue their currency are in some sort of financial crisis, the debt burden is usually rather high at that moment. As most countries profited from a trade surplus and economic recovery after the devaluation, the external debt as percentage of GNI dropped considerably.

Another factor influencing the debt burden is the interest rate. Interest rates, generally speaking, reflect the investment environment. As stated above, most of the devaluations happened during a financial crisis. During such a crisis there is a lot of market instability and insecurity, causing the hike in interest rates. Therefore this accumulation should not be ascribed to the devaluations.

FDI is an important factor that enhances productivity, efficiency, human capital accumulation and modernisation of technology and therefore stimulates economic growth and future prosperity. In the empirical analysis, evidence has been found that when a country devaluates its currency, the short term impact on FDI is positive, but in the longer term the patterns are very varied: some fell, but others have remained high ever since the devaluation, such as Mexico.

The mistake all countries made was waiting too long to devalue their currency, until reserves ran low, and so that by then there was no good way out (Frankel, 2003). This might also be the case for Greece, and therefore – if TMS results being a good solution – Greece should act fast.

## 4. The Greek crisis

### 4.1 The situation<sup>13</sup>

In the period 2001–2008, the Greek economy experienced a growth of real GDP at average annual rate of 3.8%. This was much higher than the average growth of the rest of the Eurozone, which was 1.7% (Eurostat, 2010). Growth of personal consumption due to many loans at low interest rates, and a large amount of public investment financed from public funds, and European Union funds were causes of the high real GDP growth. Unfortunately, in the same period, the Greek average current account deficit grew to 9% of its GDP, much higher than that of the rest of the Eurozone, which amounts at only 1%. The government's expenditure increased by 87% during this period, meanwhile the state revenues only increased by 31%. The reason for the high government spending has been because of inefficient state administration, a very expensive pension and welfare system, tax evasion and the lack of financial discipline. Especially the poor collection of tax revenues has been the cause of the increasing Greek budget deficit.

The structure of its industry and the decline of its international competitiveness, have also been causes of the Greek crisis. Due to low productivity and relatively high labour costs, the competitiveness of Greek products abroad has eroded, which ultimately has affected the exports and the account deficits. Although you would expect exports to increase a lot after joining the EMU in 2001 –due to easier access to other markets–, the Greek exports increased at a significantly much lower rate than that of other Eurozone members.

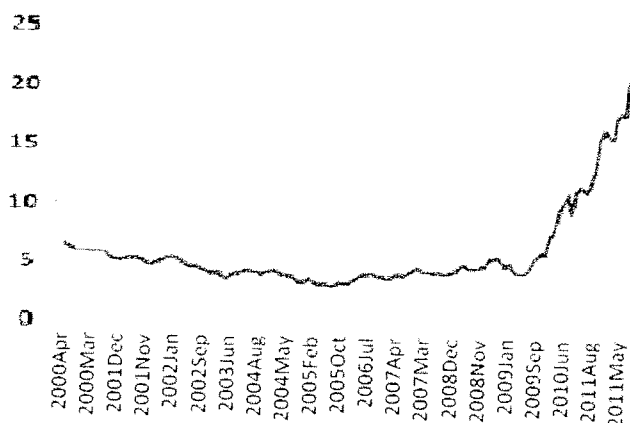
The growing government deficit was primarily financed by borrowings on the international capital markets, which increased the public debt substantially in this country. As Greece became increasingly reliant of external borrowing to cover the budget deficit and current balance, the country became very sensitive to the capital markets. By joining the Eurozone in 2001, Greece was able to take advantage of the easier access to capital markets and lower interest rates due to confidence in the single currency. Although there were significant advantages, it did lead to constant borrowing that accumulated the public debt. Foolishly no legal actions were taken to prevent this from happening, resulting in the current crisis.

In 2009 a newly elected government in Greece revised the state of public finances. Apparently the budget deficit of 2009 was 12.7% of GDP rather than 6.7% that was published originally, but after an investigation by Eurostat in 2010 it became clear that it was 15.4%. Once this information was made public, investors became nervous and worried about the solvability of Greece. Immediately agencies lowered the credit rating, resulting in higher interest rates as visible in graph 4.1.1.

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<sup>13</sup> This section is mainly based on Todorović and Bogdanović (2011), unless stated otherwise.

Graph 4.1.1: Long-term interest rate<sup>14</sup>



Based on: ECB, 2012

However the Greek government tried to restore investors' confidence, by means of rearranging the public finances, a reduction of excessive government spending and increase of taxes, they were unable to raise funds for paying its obligations that were due, and the country required aid from other EU countries and the IMF. The total amount of the assistance for a period between 2010 and 2012 has been about 110 billion euro's. A detailed plan has been set up to reduce the budget deficit during this period and the beginning of huge reorganization of the economy of Greece. To reduce the Greek current balance deficit, Greece will have to increase productivity, reduce wages and increase savings in this country.

The aid might be a short-term option, but they will not recover the economic imbalances Greece suffers from. Since Greece has joined the Eurozone, it no longer has the possibility of an independent monetary policy. There is no possibility for currency devaluation to increase competitiveness and therefore reduce the current account deficit, nor other fiscal opportunities.

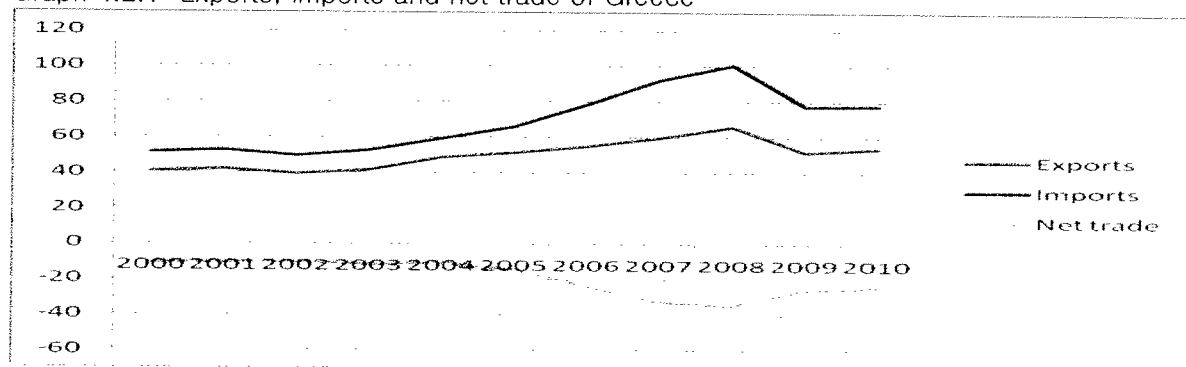
This is where the Matheo Solution could step in.

<sup>14</sup> The data shows long-term interest rates for assessing convergence among the EU Member States. The rates are secondary market yields of government bonds with a remaining maturity close to ten years (ECB, 2012).

## 4.2 Empirical analysis: comparison and conclusion

When looking at the causes of the devaluation, the situations those governments found themselves in were rather similar to the one Greece is facing at the moment. Before the crises all currencies were overvalued caused by their pegs to the U.S. dollar, as Greece's currency is now due to the euro. As explained above, Greece has several financial problems. Over the past couple of years the trade balance worsened as is visible in graph 4.2.1. All of the examined countries have shared this problem before the devaluation. As we saw in section 3.3 the trade balance of each country improved immediately after the devaluation. Firstly this was due to falling imports, but soon the exports exhilarated. Most countries have experienced a long-term trade surplus, which was due to the generally improved competitiveness in the international markets. The trade surplus brings more income in the country, and stimulates its economy. Therefore we are able to conclude that this will most likely also happen to Greece if it devaluates its currency as result of implementing TMS.

Graph 4.2.1: Exports, imports and net trade of Greece



Based on: Eurostat, 2011

Because of the improved economic situation experienced after all currency crashes, the examined countries were able to reduce their external debt gradually. This was mainly due to the improved competitiveness that boosted many companies.

As saw in graph 4.1.1, the Greek interest rates have been rising increasingly over the past two years. Just like in the other crises, investors were alarmed by the financial situation, but it has been noticed that after devaluation economic stability and future expectations improve, making the interest rates fall consequently. Lower interest rates make repaying governmental debt easier, which would be important in the case of Greece. Also, once the investment environment has improved, the capital inflow will increase. In the empirical analysis there has been seen that FDI firstly saw a steady increase when a currency devaluated. FDI enhances productivity, efficiency, human capital accumulation, and modernisation of technology. Especially productivity and efficiency have been a big problem in the structure of Greece's economy, and therefore an increased inflow of FDI would have very important effects, especially for the recovery process, as seen in Korea.

The found inflationary effects have been varied. A direct short-term effect has been determined: devaluation leads to increase in the CPI. On the other side the long-term effect has not. It seems that each governmental policy applied after the devaluation has had its own corresponding impact. This has not been investigated specifically in this research, but would be of importance to aid or strengthen TMS and its effects.

## 5. Conclusion

The single currency policy of the EMU, has led to serious financial problems. This is especially due to the widely non-convergent economies that participate. Because of the single currency policy, countries are now unable to restore economic imbalances relative to other economies and therefore particularly economically weaker countries have seen their international competitiveness erode.

Ten Dam (2010) came up with a solution which would make it possible for economically weaker countries to devalue their currency, and therefore seeing an expected economic improvement.

In theory it is expected that any competitive advantages that might have appeared in the short run, will vanish in the long run. This is largely due to a parallel increase of inflation, which was caused by higher import prices and higher nominal wages.

Empirical evidence is of utter importance when finding out what real effect a certain policy will have on an economy. In this case: what impact have other large-scale devaluations had in recent crises? The focus in this paper has been on deviations of inflation, the trade balance, debt, investments and interest rates. The findings have principally been very positive. Especially the trade surplus that has been created and sustained in the long run is a valuable effect when considering the Matheo Solution. This trade surplus has had many other positive consequent effects: it has led to a quick economic recovery, financial stability, ability to pay off debt and a drop in interest rates. The only possible problematic change devaluation has led to is an increase of inflation. Although these effects have been very varied, all countries have, at least in the short run, experienced a heightening of consumer prices. The long run effect was mainly affected by the different policies each country implemented. As these policies have not been analysed specifically, a final conclusion cannot be made on the long-term effect of inflation.

When analysing the causes of the Greek crisis, similarities are found in comparison to the other crises. The growing current account deficit, huge public debt, financial insecurity and inefficient industries, which have been the main problems causing the Greek crisis, would be amended positively if indeed the Matheo Solution would be implemented. These findings are comparable to what ten Dam expected, as seen in section 2.3.

Therefore the final conclusion which can be drawn from this paper is that implementation of the Matheo Solution would be highly effective for recovery from the current Greek economic situation. Although the specific conditions of the other economically weak countries in the Eurozone has not been analysed, till some extent, a positive effect can also be concluded supposing that the Matheo solution would be executed. The economic imbalances the Eurozone faces will be subdued and a sustainable prosperous future can be partially secured.

## 6. Appendix

BCB: Brazilian Central Bank

CPI: Consumer Price Index

FDI: Foreign Direct Investments

ECB: European Central Bank

ECU: Euro Currency Unit

ECU-ERM: Euro Currencies Units- Exchange Rate Mechanism

EMU : European Economic and Monetary Union

EMS: European Monetary System

ERM: Exchange Rate Mechanism

NCU: National Currency Unit

TMS: The Matheo Solution

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