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# 1 Introduction

Since the beginning of the 1990s the Baltic states Estonia and Latvia have been sovereign countries. After they declared independence from the Soviet Union they soon introduced their own currencies, the Kroon and the Lats. After suffering from high inflation rates in the beginning of their newly gained independence, they managed to restore the outside world's faith and opened up their former closed economies with a series of liberalization measures.

Under the 1990s they sold out much of their state owned business and properties and managed to attract large amounts of foreign investments. Except from some smaller financial crises, they managed during the 1990s and the first couple of years of the 2000s to have among the highest growth rates in Europe. Their growth rates most years ranged around 6-10%. Capital kept flowing into the countries especially from their largest trading partners from Scandinavia. Several Swedish banks such as Nordea, SEB and Swedbank have built up branches in the Baltic countries and invested large amounts there.

When the ongoing worldwide financial crisis spread to the Baltic countries there have been abrupt stops in the fantastic growth figures they have shown in recent years. Investors are fleeing the countries. Estonia and Latvia have in very short time gone from being some of the more closed countries in the world to embracing a market style of economy with very little state involvement. Today they are having large difficulties with their economies. Many of the investments done in the countries now seems to be very unsafe covered by bad collateral and the future of the former 'Baltic Tigers' looks a lot less promising than it did just two years ago.

## 2 Purpose

The purpose of this essay is to investigate the Baltic miracle from a Swedish perspective, explain the incredible growth of the countries Estonia and Latvia and why this way of growth is not possible in the long run. The thesis will also show the Swedish, Latvian and Estonian interdependence and how closely the markets have integrated since the fall of the Soviet Union.

## 3 Background

In August 1991 a coup failed in Moscow. This along with other events lead to the demise of the Soviet Union. Estonia and Latvia, having been members of the union for over 50 years, were among the first countries to declare independence and move away from Soviet (Hirschhausen, 1998).

The second January of 1992 Russia introduced monetarization (attaching monetary values to goods and services) and the whole Soviet system of production and distribution independent from monetary arrangements soon collapsed. This threw whole former Soviet into a depression. The countries least hit from this was the Baltic states of Estonia, Latvia and Lithuania. One reason for this was that they were very quick to move closer to the western world. The Baltic countries along with Poland arose from the depression and in the end of the 1990s they experienced a very large economic growth. As a drawback unemployment rates rose to a more normal EU standard compared to the very low Soviet numbers they previously experienced. To go from a communist setting to a post-socialism market econ-

omy requires quite extensive reforms and we will further on explore some of the policies Estonia and Latvia undertook from 1991 until date (Hirschhausen, 1998).

In the Soviet communist system industries were not designed to be efficient in the production of a single good or service, rather they were supposed to be multifunctional. When moving from the communist system to a monetarized system where the markets are competitive these kind of multifunctional industries tend to be very inefficient. If one could find an entrepreneur willing to take over an inefficient industry there was also the problem of establishing who actually owned the industry (Hirschhausen, 1998).

In the Post-Soviet Estonia and Latvia the main economic challenges can be summarized by three goals that they had to accomplish during their transition:

- Focusing on stabilizing the economy, coming out of the post Soviet depression and avoiding long term mass unemployment.
- To be able to make more efficient use of resources.
- Make way for a stable long term economic growth by building a solid foundation for economic institutions.

A transition to a market economy is not possible to complete in a good way overnight, it requires private ownership laws, liberal regulations and good financial institutions. Prior to the collapse of Soviet union there was basically no real banks in Estonia or Latvia and their politicians and economists were rather inexperienced in market economy matters (Zlock-Christy, 2000).

### **3.1 The Estonian and Latvian Reforms**

In the late 1980s the economic reforms had already started in a small scale within Soviet Union, the first commercial bank in the union was opened in Estonia in 1989. In the beginning of 1992 Russia started to let the prices float free and the Baltic countries, still members of the Ruble area, experienced an inflation rate of 30% over the first month that year. Over the first 6 months of the average inflation of the Ruble area was 10% (Zlock-Christy, 2000).

The instability of the Ruble paired with a wish to show their sovereignty the Baltic countries started to look for other monetary options. Estonia was first out and choose a fixed exchange rate, soon Latvia followed in a similar manner. Making use of a fixed exchange rate can be seen as an attempt to keep external stability, but can also pose a threat to internal price stability. Another reason to use a fixed exchange rate can be to remove some of the exchange rate uncertainty small countries open to trade sometimes experience. To fix the exchange rate of a small currency can also help to improve the liquidity of the currency (Zlock-Christy, 2000).

A problem with the fixed exchange rate is that the currency can become overvalued, which will lead to less competitiveness in the export sector. This can be countered by devaluing the currency. When countries makes transitions and moves to a more deregulated market, as in the Baltic case, this can lead to large increases in capital flows. These capital inflows can increase the wages at rapid speed, increasing the domestic demand and inflate the value of domestic assets. When deregulation is completed and the capital inflows slow down or stop without domestic prices and wages are adjusted downwards, adjustment of the exchange rate is needed or it might cause an economic slump. This can lead to problems in

the banking sectors if the inflated asset prices get very volatile or start to fall in value (Zlock-Christy, 2000).

### **3.1.1 Estonia**

Estonia was the first of the Baltic countries introducing a currency of its own, the Kroon. In 1992 their parliament passed three laws, the currency law, the law of backing the Kroon and the foreign exchange law. These laws define the Estonian fixed exchange rate, with a currency board. They did not adopt the very strictest version of a currency board, and the Bank of Estonia was given some guidelines on how much capital inflow that was allowed to increase the monetary base. The laws also set minimum reserve requirements for Estonian commercial banks and stated that the foreign currency reserve always had to cover the money in circulation and the money kept in deposits at the commercial banks. In 1992 Estonia faced a bank crisis involving frauds. As a response the bank of Estonia forced three of the largest commercial banks into bankruptcy to show that they were very serious about their budget constraints. (Zlock-Christy, 2000 – Åslund, 2002).

The Estonian Kroon was fixed to the German mark by a rate of 8 Kroon per Mark, by these measures Estonia managed to lower the inflation rate substantially. In 1999 the Euro replaced the Mark as peg currency. During 1993 and 1994 Estonian foreign reserves increased substantially, partly due to increased foreign investments and partly due to the privatization process where state owned companies were sold out (Zlock-Christy, 2000).

By law the Estonian central bank has no rights to devalue the Kroon without approval from the parliament. There are no restrictions on the current account transfer and the balance of payments. This means that the central bank has very limited power to do discretionary monetary policy or to control the money supply. Thus the Estonian macroeconomic policy has been rather passive aiming primarily to ensure a liberal market determined business climate, rather than intervening with policy measures to ensure market stability (Hannula, Radosevic and Tunzelman, 2006).

While being a member of the Soviet Union, Estonia's outside Soviet export accounted for 2-3% of their total GDP and all trading agreements were handed by Soviet officials. When Estonia broke free, they undertook an extensive liberalisation programme. All trade barriers and barriers for capital movements were removed and they quickly became one of the most liberalized states in the world. With a very liberal FDI legislation adopted in 1991, all this paved way for large amounts of FDI. By the end of the 1990s the country had turned into a growth tiger, with growth rates of 10%. Most of the growth was export based and quickly they became very integrated in the Nordic and Baltic economic area. In 1991 western countries only accounted for 5% of Estonia's exports, in 1999 this had jumped up to over 60%. Today Sweden and Finland are by far Estonia's most important trading partners, and these two countries have directed enormous amounts of FDI into Estonia. Together Finland and Sweden constitutes over 30% of Estonia's exports and 25% of their total imports (Feldmann & Sally, 2001 - CIA, The World Factbook).

The Estonian state was one of the first to implement a flat tax rate, something that later on has been followed by several other states such as Latvia, Romania and Georgia. In 2004 Estonia became a member of the European Union and NATO. During the period 2000 till 2007 the Estonian state has experienced GDP growth ranging around 7-10% and the Estonian economy have been the subject of large amounts of FDI primarily from the Scandinavian countries. As of 2007 Estonia was ranked 12<sup>th</sup> in the world on the 'index of eco-

conomic freedom' presented by The Heritage Foundation and The Wall Street Journal (Laar, 2007).

### **3.1.2 Latvia**

Of the three Baltic countries Latvia was the one with the hardest ties with the Soviet Union. They showed no signs of a sovereign country when they left Soviet. As an effect of this their transition has in some sectors been slightly slower, at a more moderate pace than some of the other ex-soviet countries (Hirschhausen, 1998).

The first year of independence 1991 was marked by a beginning of liberalization reforms such as; monetarization, currency exchange and reformation of tax and customs system. But it was not until 1993 a national currency was introduced in Latvia when the Lats was put in circulation. In 1995 their newly formed central bank, Bank of Latvia approved regulations on their monetary policy. Examples of successful regulations are: maintenance of exchange rates, reserve requirements and loans for commercial banks and the control of the money supply. They did not implement as firm liberal measures as Estonia, but still in 1995 Latvia experienced a financial crisis since they did not manage to control their budget. This financial crisis lead to the withdrawal of several licences to commercial banks, very similar to what happened in Estonia (Hirschhausen, 1998).

With the increased stability and liberalization in the country, the foreign investments and the foreign reserves increased very quickly in the 1990s and the Bank of Latvia has managed to keep their exchange rate very stable towards foreign currencies. During the 1990s the number of commercial banks grew very quickly and after the financial crisis the bank of Latvia extended the banking regulations and started to monitor the banking sector on a monthly basis. Still today the banking sector regulations are perhaps lagging behind. During the 2000s Latvia has been one of Europe's states with the highest growth rates and inflation has been kept at moderate levels. Latvia is located in a convenient geographic location and has had a quite poor domestic market; therefore the country has been dependent on export and have during the last years been subject to large amounts of FDI. In 1999 Latvia joined the World Trade Organization and in 2004 they joined the European Union together with Estonia. During the first years of independence they also privatized a lot of state owned property, but they did it at a slower rate than the Estonians. Today Latvia is a member of the European exchange rate mechanism, with the Lats pegged to the Euro. In 2012 they have planned to become full members of the European Monetary Union. Sweden and Finland together makes up for 10% of Latvia's export and 10% of their imports making them very important trading partners (Burda & Wyplosz, 2005 - Hirschhausen, 1998 – CIA, The World Factbook).

## **4 International Macroeconomic Development**

This section outlines the most important macroeconomic developments needed to understand and explain the growth and problems of Estonia and Latvia

### **4.1 A Brief History of International Monetary Systems**

During the last 150 years there have been some major international monetary systems that have each dominated their eras; they will serve to increase the readers understanding of exchange rates and the international monetary markets. The two major systems are the fixed

exchange rate and the floating exchange rate, but as we will see there are several different setups and combinations that can be used under these systems (Salvatore, 2001).

#### **4.1.1 The Gold Standard, 1880 - 1914**

The gold standard can be considered to be the first modern international monetary system in function. Under this setting each country fixed a gold content to its currency and was always ready to buy or sell gold at a fixed price, something called mint parity. The exchange rate was determined within the gold points by gold shipments, which means that the tendency of a currency to move outside the gold point was stopped by gold moving outside the country. These outflows represented the deficit in a country's balance of payments. With the outbreak of the First World War, the gold standard came to an end. After the war had ended there were major exchange rate fluctuations and some countries such as the United Kingdom and the U.S tried to go back to gold standard. This was a period of great instability and when France decided to convert all of its pounds into gold the gold standard once again collapsed. Before the Second World War followed a period where beggar thy neighbour policies were very common as nations tried to export their unemployment (Salvatore, 2001).

#### **4.1.2 The Bretton Woods System, 1947 - 1971**

At the end of the Second World War 42 of the world's most advanced countries met to set up regulations on what international monetary system to use after the war ended. This resulted in the Bretton Woods system. The system was a gold exchange system where all nations fixed their currencies against the U.S dollar and the U.S fixed the dollar price against gold with a price of 35\$ per ounce. No country was allowed to let their currency float more than 1% off their target exchange rate against the U.S dollar, this should be done by drawing dollar from their reserves to buy their own currency at the target price (or vice versa). Nations were to finance their balance of payments deficits by using their reserves or by borrowing from the newly formed IMF (The International Monetary Fund) (Salvatore, 2001).

After a transition period member nations were forced to make their currencies fully convertible against other nations currencies and loans from the IMF were only allowed to finance short term deficits. Countries were in the long run supposed to keep a balance of payment equilibrium, but this was not very easy for all countries. During the post-war period United Kingdom ran balance of payment deficits during most years and Germany on the other hand ran surpluses. This led to currency speculation and forced two devaluations of the pound and one revaluation of the mark. Close after the war the U.S ran balance of payment surpluses, but this soon changed to chronic deficits. The U.S solved most of its deficit problems by paying in newly printed dollars, most countries accepted this because the dollar was after all, fully convertible into gold (Salvatore, 2001).

The U.S kept running deficits and over the following years their gold reserves got smaller and smaller. As the dollar was the international currency, the U.S felt that they could not devalue the dollar and tried several policies with very limited effects. When finally the gold reserves became too small and they kept running deficits the U.S government had to suspend the convertibility of dollars to gold. This ended the Bretton Woods system. The U.S had during the Bretton Woods system a large advantage since they were the only country in the system that could get any seigniorage. For this privilege they paid a very high price since they could not devalue the dollar without bringing the Bretton Woods system to an end (Salvatore, 2001).

### **4.1.3 1973 – Present**

After some havoc following the breakup of the Bretton Woods system, the world has been functioning mostly by floating exchange rates. There have been some minor currency unions and recently the European monetary union is a larger scale attempt of a fixed exchange rates system. Under a flexible system it is each country's responsibility to intervene in the market to smooth out short run fluctuations while not tampering with the long run outcome. In the early days of the floating exchange rates, there were some attempts to make up rules to prevent abuse of the system but there have not been any serious abuse attempts and the rules have not been taken into use. Under the present managed float operating in many nations, there are still needs for foreign reserves to help smoothen out short run fluctuations by doing market interventions. Some of the biggest problems the world is facing on the international money market and exchange rates today are the excess volatility of the exchange rates and the persistence of disequilibria in the exchange rates. Another big problem is the large balance of trade deficits some countries, such as the U.S, are running and the surpluses run by countries such as China (Salvatore, 2001).

## **4.2 Central Bank, Currency Board and the Policy Trilemma**

There are two major types of institutions that can have the monetary authority within a country: A central bank or a currency board. The most common setting is the central bank which usually has discretionary control over the monetary policies and monopoly on supplying the notes and coins in a country. The currency board is perhaps not as well known, but has been used from time to time by states trying to stabilize their economies. Under a currency board the money supplied in the economy is decided by the market and is usually fully backed by foreign reserves. This section will outline the most common features of the two systems (Hanke, Jonung & Schular, 1993):

### **Central bank setting:**

- Can supply floating or fixed exchange rates, apart from supplying coins and notes also supplies deposits
- Lets the amount of foreign reserves fluctuate, and has limited convertibility
- Low level of transparency and acts as a lender of last resort
- Regulates commercial banks and has control over the monetary policy
- Acts under political pressure and has lower credibility
- Possibility to create inflation and can finance spending for the government.
- Can earn seigniorage both from inflation and interest
- Slow monetary reforms that require certain settings and forces it to keep a large staff

### **Currency board setting:**

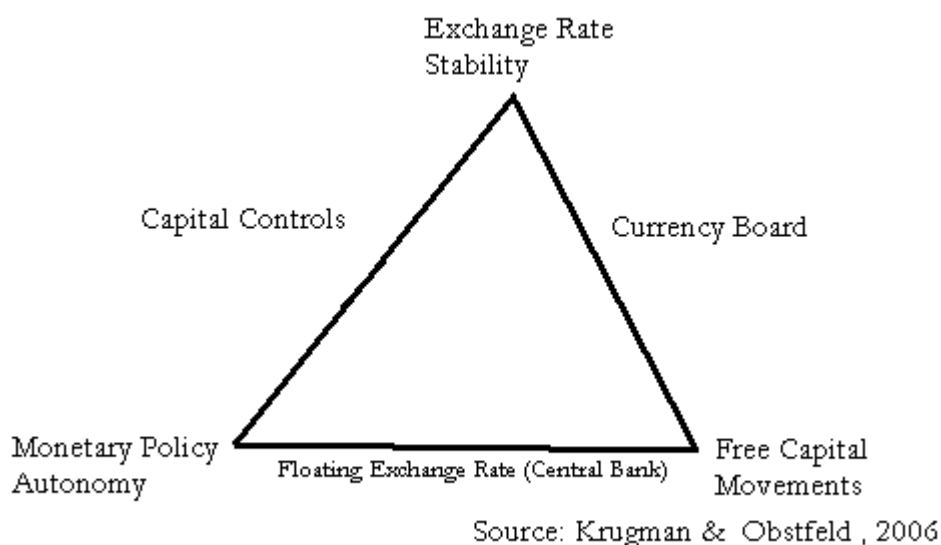
- Fixed exchange rates with domestic currency 100% covered by foreign reserves
- Only supplies coins and notes, and has full convertibility
- All monetary policies are bound by rules and it does not act as a lender
- Full transparency and does not regulate banks
- Cannot be forced to act on political pressure and has high credibility
- No possible inflation creation or financed spending



- Quick monetary reforms and has to keep only a minimum level of staff

These are the common features of the two setups, understanding these differences are essential to see why a currency board has the possibility to buy credibility for a country while a central bank has more tools to use to affect the economy (Hanke, Jonung & Schular, 1993).

Most open economies strive for three different goals: exchange rate stability, free capital movements and monetary policy independence. The policy trilemma illustrates that only two of these three are achievable at the same time. As can be seen in figure 4.1 only one side can normally be chosen: floating exchange rates, capital controls or a currency board and each setting has its potential gains and drawbacks. The gains are consistent with the two goals that it lies in between in the trilemma triangle (Krugman & Obstfeld, 2006).



**Figure 4.1 The Policy Trilemma for Open Economies**

While the policy trilemma shows three extreme situations with a central bank, currency board or strict capital control. In the real world it is quite uncommon to see one of these settings used in a strict way. A country can use a combination of different settings and try to get the mix of policies they believe is best suited for their own situation. One example of this is that the Estonian currency board is not set up in the most extreme way (mentioned in section 3.1.1), it does also include some of the settings of a central bank to try to achieve some monetary policy autonomy. Of course moving these settings from a strict currency board closer to a central bank setting will lower the credibility and decrease the exchange rate stability (Krugman & Obstfeld, 2006 – Åslund, 2002).

## 5 Macroeconomic Modelling

Here the macroeconomic models most important to understand the development in the Baltic and Nordic region are presented:



## 5.1 National Accounting and Equilibrium

We know by definition that the total domestic demand for output, income (Y) is made up from consumption (C), investment (I), government spending (G) and net exports (NX). This will take the following form:

$$Y \equiv C + I + G + NX \quad (1)$$

The national income accounting identity is an accounting standard, simply put: the procedure to calculate for total output or GDP in a country (or region). But this definition can also be used to show the national income equilibrium. By definition, no inputs or outputs can come out of nowhere and there must always be a balance in the identity. With help of mathematical manipulation we can look at this accounting identity and gain several helpful insights about the links between savings, income, investment, government spending and net exports and why they have to be in an equilibrium situation. There can be no black holes in an economy; it is by law of physics impossible to make something out of nothing. The value of production equals income equals expenditure (plus net exports) (Bade & Parkin, 2004).

We know by definition that the disposable income (YD) is equal to output/income minus the money spent on taxes (TA) plus the net transfers (TR) received by the private sector:

$$YD \equiv Y + TR - TA \quad (2)$$

If we rearrange (2) and insert it into (1) it will look like:

$$YD - TR + TA \equiv C + I + G + NX \quad (3)$$

Disposable income (YD) can only be spent on consumption (C) or be saved (S):

$$YD \equiv C + S \quad (4)$$

Saving (which by definition is invested) can therefore be written as a function of disposable income (YD) and consumption (C), and substituting in private consumption (10) will yield the saving equation:

$$S \equiv I \equiv YD - C = YD - \hat{C} - c(Y + TR - TA) \quad (5)$$

The saving equation (5) will be made up from disposable income (YD) minus autonomous consumption ( $\hat{C}$ ) and variable consumption depending on taxes (TA), Transfers (TR) and income (Y). Simply put, the amount left for saving is everything not spent on consumption. Inserting (4) into (3) will come out as:

$$C + S - TR + TA = C + I + G + NX \quad (6)$$

With some rearranging (6) will yield a fundamental equilibrium equation:

$$I = S - (G + TR - TA) - NX \quad (7)$$

Equation (7) is very important because it shows us that investment (I) must equal saving (S) minus the budget deficit ( $G + TR - TA$ ) minus the net exports (NX). All money being saved in an economy is considered to be invested. If a country has too much investment compared to the levels of saving (Too high level of consumption and too little saving), this

implies that there also will be a budget deficit or a negative in the net exports. A negative net export means that a country is borrowing from the rest of the world to finance their investments due to lack of savings. This is something that has perhaps taken place in both Estonia and Latvia since they have aimed at getting attention from foreign investors more actively than trying to keep their budget stable (Dornbusch, Fischer & Startz, 2008).

A country in an open world market works a lot like a person on the credit market in a closed economy. Assume that the country in question experiences a supply shock such as a bad harvest. This will make people in the country wanting to borrow from the outside world. As long as the country is small and the crisis is not worldwide this borrowing can take place on the world credit market without a notable change in the world's interest rate. If we instead assume that the supply shock is worldwide, then the possibility to borrow at the interest rate, that was set before the shock, would not be possible. Instead the real interest rate on the world credit market would rise so that the world aggregate borrowing would equal the desired lending (Barro, 1990).

If instead a country experiences an increase in the demand for goods, this can also be financed by borrowing abroad. A small country that for some reason has this increased demand will find that their domestic expenditure is higher than their GNP, in this case they will have to borrow from abroad to finance their investments and by doing this they will run a current account deficit. Small countries with favourable investment opportunities can borrow from abroad during an investment boom without having to raise their production or to slow down their consumption or cut back on government spending; this is something that can pose a risk when the investment boom slows down and world interest rates increase. According to the national income accounting identity, borrowing from abroad represents too little domestic saving compared to the amount of domestic investment (consider equation 7) (Barro, 1990).

An example of this is Mexico where they found oil during the 1970s, and saw the possibility of large future incomes. These expectations increased the aggregate demand for goods in Mexico. To finance their increased demand and the costs for exploiting the oil reserves, they borrowed heavily and Mexico's external debt increased from 9% of GDP in 1971 to 26% in 1981. Of course this kind of behaviour can pose problems, when the oil prices dropped in the first half of 1980s the future expected earning of Mexico decreased and caused trouble both for Mexico and its creditors (Barro, 1990).

According to Barro, (1990) the discussions about current account deficits have often been accompanied with discussions about the exchange rate. A common argument was that for the U.S to stop their deficits the dollar would have to depreciate against other major currencies to decrease the imports and increase exports. A problem with this is that people making this kind of statements think too much in terms of dollars instead of goods. Consider that the amount of exports or imports did not change, then exporters would receive the same amount of dollars for their exports while importers would have to pay more for their imports which would result in an even larger current account deficit. Barro also points out that there is no clear empirical pattern between the U.S exchange rate and their current account.

## **5.2 The IS-LM Model**

The Mundell-Flemming is a model based on the Keynesian idea that aggregate supply holds a passive role of fixing the price level while the aggregate demand level decides the amount

of economic activity. The M-F approach puts its focus on the different conditions deciding the current balance on one side and the new capital inflow on the other side.

The Mundell-Flemming model is based on the IS-LM model which below is explained and then expanded to the full M-F model. Not only does the IS-LM model serve as a foundation for the M-F model, it is also needed to understand the macroeconomic relationship between the Baltic countries and their close neighbours.

The IS-LM model is based on the IS and LM curve. The IS curve describes the combinations of income and interest rate where the goods market is in equilibrium and the LM curve describes at what levels of income and interest rate the money market is in equilibrium.

The IS curve is derived from the national accounting identity equation (1). First the investment function has to be defined. Investment ( $I$ ) equals the autonomous level of investment ( $\hat{I}$ ) minus the interest rate ( $i$ ) multiplied by a coefficient ( $b$ ) that indicates how sensitive the level of investment is to the interest rate.

$$I = \hat{I} - bi \quad (8)$$

The level of investment is depending on the interest rate because; the higher interest rate, the more expensive will it be to borrow to finance one's investments. When the goods market is in equilibrium aggregate demand will be the same as output:

$$AD = Y \quad (9)$$

Private consumption can be defined as autonomous consumption ( $\hat{C}$ ) plus consumption ( $c$ ) depending on taxes ( $TA$ ), transfers ( $TR$ ) and income ( $Y$ ):

$$C = \hat{C} + c(Y + TR - TA) \quad (10)$$

Substituting (8), (9) and (10) into (1) will yield:

$$Y = AD = [\hat{C} + cTR + c(1 - TA)Y + (\hat{I} - bi) + G + NX] \quad (11)$$

If we see transfers, government spending, net export and transfers as autonomous we can define:

$$\hat{A} \equiv \hat{C} + cTR + \hat{I} + G + NX \quad (12)$$

Substitute (12) into (11) and rearrange the equation will give us:

$$AD = \hat{A} + c(1 - TA)Y - bi \quad (13)$$

From equation (13), that is the IS curve, we can see that an increase in interest rate reduces the aggregate demand for a certain level of income because a higher interest rate reduces investment spending. Consider that  $\hat{A}$  is a part of aggregate demand that is totally unaffected by both income and interest rate. The IS curve is negatively sloped because a higher level of interest rate lowers the investment spending and by doing this reduces the aggregate demand and by this the equilibrium level of income. The slope of the curve is dependent on  $b$ , how sensitive the investments are to interest rates (Copeland, 2006 - Dornbusch, Fischer & Startz, 2008).

The LM curve is, as mentioned, at what levels of income and interest rate the money market is in equilibrium. The demand for money depends on the income and the interest rate,

this is because individuals will need to hold money to pay for their purchases (that are dependent on income). The cost for holding money is made up by the interest they are losing for holding money rather than other assets, the higher the interest rate the higher is the cost for holding money. The real demand for holding money ( $L$ ) can be described as:

$$L = kY - hi \quad (k, y > 0) \quad (14)$$

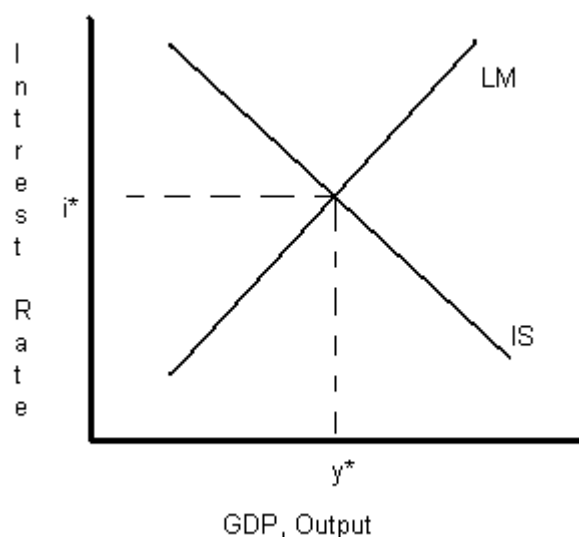
$k$  and  $h$  are parameters describing the sensitivity for holding money to the level of income and interest rate respectively. In equilibrium the demand for holding money ( $L$ ) will be equal to the real money supply which is the quantity of money ( $M$ ) divided by price level ( $P$ ):

$$L = \frac{M}{P} \quad (15)$$

Substituting (15) into (14) and solving for the interest rate ( $i$ ) will give us the LM curve:

$$i = \frac{1}{h} \left( kY - \frac{M}{P} \right) \quad (16)$$

Equation (16) is the LM curve, which represents the money market equilibrium showing combinations of interest rates and income levels where the demand for real balances is equal to its supply. The curve is positively sloped; an increase in the interest rates lowers the demand for real balances. The sensitivity constants  $k$  and  $h$  determines the slope of the curve and are related to income and interest rates respectively. Putting the IS-LM schedules together will present us a situation where both the goods market and the money market are in equilibrium (Copeland, 2006 - Dornbusch, Fischer & Startz, 2008).



**Figure 5.1 The IS-LM Schedule**

The IS-LM curves are put together in figure 5.1, where the conditions for equilibrium in both the goods and money market are satisfied at  $i^*$  and  $y^*$ . The LM curve can be shifted right by an expansionary monetary policy, lowering the interest rate and increasing the output. It can also be shifted the other way by a contractionary monetary policy, where the ef-

fects on interest rate and output are the opposite. These measures are controlled by the central bank. The IS curve can be shifted to the right by an expansionary fiscal policy and to the left by a contractionary fiscal policy, which can be done by changed government spending (Copeland, 2006 - Dornbusch, Fischer & Startz, 2008).

### 5.3 International Parity Relations

To understand the relationship between exchange rate, interest rate and inflation we need to introduce the parity relations framework. Usually countries utilize different currencies, and under these currencies they have independence in setting their own interest rate and monetary policy. This implies that interest rates and inflation will differ between different countries which also imply that exchange rates between currencies will not stay the same over time (Solnik & McLeavy, 2003).

#### 5.3.1 Interest Rate Parity

If we assume open economies with substantially free capital movements, and that people want the highest return possible from their investments the Interest Rate Parity will look like:

$$(1 + r) = (1 + r^*) + \Delta s^f \quad (17)$$

Where

$r$  = home interest rate

$r^*$  = foreign interest rate

$\Delta s^f$  = actual change between spot and future exchange rate.

The Interest Rate Parity must be covered by arbitrage; this is because people wants the highest return for their money and would simply move their capital to the country that would yield them the highest return (Copeland, 2005).

#### 5.3.2 Relative Purchasing Power Parity

The Relative Purchasing Power Parity simply explains that the difference in exchange rates between two countries must be equal to the difference in inflation between the two countries, *ceteris paribus*:

$$\Delta S = \frac{(1+I^*)}{(1+I)} \quad (18)$$

Where

$\Delta S$  = change in exchange rate

$I$  = home inflation rate

$I^*$  = foreign inflation rate

Put simply, when the inflation rate between two countries are different, the purchasing power of one country will compared to the other country change over time. To balance

this on the world market the exchange rate between the two countries must change in accordance with the difference in inflation (Solnik & McLeavy, 2003).

### 5.3.3 The International Fisher Relation

The Fisher Relation claims that interest rates are the same between different countries, difference in nominal interest rates between countries are only because of the differences in inflationary expectations. The International Fisher Relation looks like:

$$\frac{1+r^*}{1+r} = \frac{1+I^{*e}}{1+I^e} \quad (19)$$

Where

$r$  = home interest rate

$r^*$  = foreign interest rate

$I^{*e}$  = expected foreign inflation rate

$I^e$  = expected home inflation rate

This means that the actual real interest rate should be the same between countries, the only difference between them comes from the different inflationary expectations that makes the nominal interest rate differ between countries (Solnik & McLeavy, 2003).

### 5.3.4 Uncovered Interest Rate Parity

Combining PPP (18) with the International Fisher Relation (19) yields the Uncovered Interest Rate Parity, the difference from simple Interest Rate Parity is that while the first theory must hold by arbitrage the Uncovered Interest Rate Parity is an economic theory:

$$(1+r) = (1+r^*) + \Delta s^e \quad (20)$$

Where

$r$  = home interest rate

$r^*$  = foreign interest rate

$\Delta s^e$  = expected change in exchange rate

This means that the domestic interest rate equals to the foreign interest rate plus the difference between the spot and expected future exchange rate (expected change in exchange rate). (Copeland, 2005).

Exchange Rate Movement ↔ Interest rate — Related By → Interest Rate Parity
Exchange Rate Movement ↔ Inflation rate — Related By → Relative Purchasing Power Parity
Expected Inflation rate ↔ Interest Rate — Related By → International Fisher Relation
Expected Exchange Rate movement ↔ Interest Rate — Related By → Uncovered Interest Rate Parity

**Table 5.1 The Relation Between the Parities**

Table 5.1 illustrates the different parity relations, and how the different factors are connecting all these relationships. Even if some of these relationships are theoretical in their nature and does not always hold in a real world setting, they clearly give some pointer to how inflation, interest and the exchange rate are linked together. In the real world they will of course not always hold for many different reasons that do not exist in this risk free full foresight world. While dealing with investments in different countries there will often be different risk premiums paid to investors when it's considered that a certain investment they take adds extra risk to their portfolio (Solnik & McLeavy, 2003).

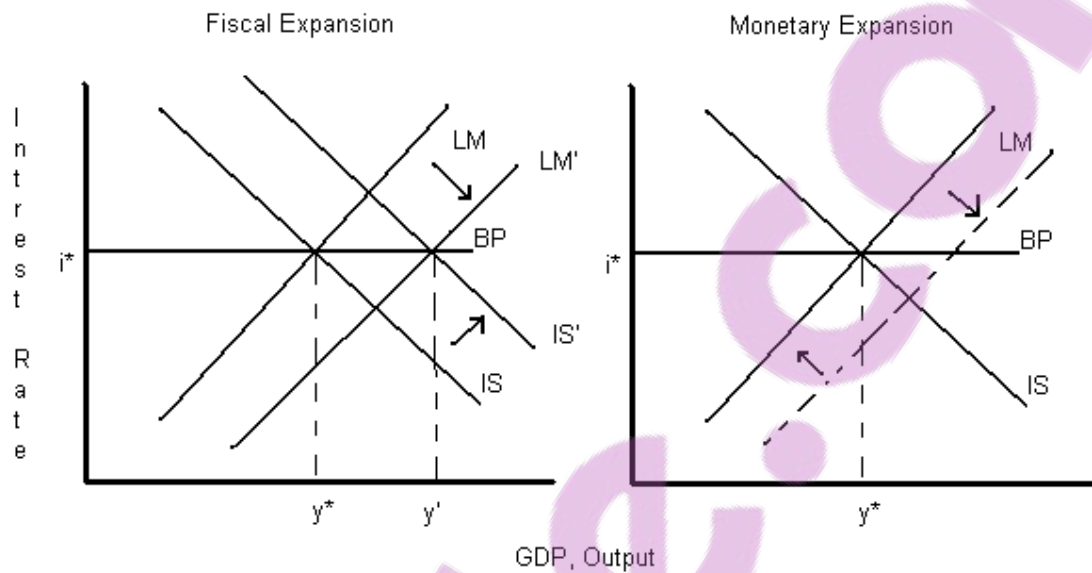
## 5.4 The Mundell-Flemming Model Under Fixed Exchange Rates

The Mundell-Flemming model extends the basic IS-LM model to an open economy under perfect capital mobility. In this model we also add the balance of payments line, as a straight line. The line is straight since under free capital mobility, this can be explained by the interest rate parity that all assets should yield the same return everywhere. The balance of payments is the record showing all the transactions between the residents of a country and the rest of the world. The two main sub-accounts in the balance of payments are the current account and the capital account. The head rule for the balance of payments is that any transaction that gives rise to a payment by a country's residents becomes a deficit in that countries balance of payments. The current account records all trade in goods, services and transfers payments including net investment by foreigners. The capital account records the purchases and sales of assets, such as bonds, land and stocks. By accounting standards the sum of the current account and the capital account must equal zero. This means that if a country runs a current account deficit consuming from the rest of the world, this must be done by selling assets or borrowing from abroad, running a capital account surplus. Any current account deficit has to be financed by an offsetting capital inflow. The fact that the current account plus the capital account must equal zero will give the conclusion that a country without any assets to sell or with no willing lenders will have to achieve current account balance even if this process might be very harsh on the country. The current account is simply put basically the same as the exports minus the imports, net exports (NX) (Dornbusch, Fischer & Startz, 2008).

Under the setting of perfect capital mobility the slightest disturbance leading to an interest rate increase will cause infinite capital movements into the country, because investors want to take advantage of the difference in interest rate compared to the interest rate of the world market. As a result of this huge capital inflow where foreigners will try to buy domestic assets the exchange rate tends to appreciate. Here the central bank has to intervene to keep the exchange rate fixed; this will cause the initial change in the interest rate to go back to its original equilibrium situation. This means that under a fixed exchange rate the central bank has no possibility of using monetary policy. While monetary policy is not useful under fixed exchange rate, the fiscal policy is on the other hand more efficient. As an

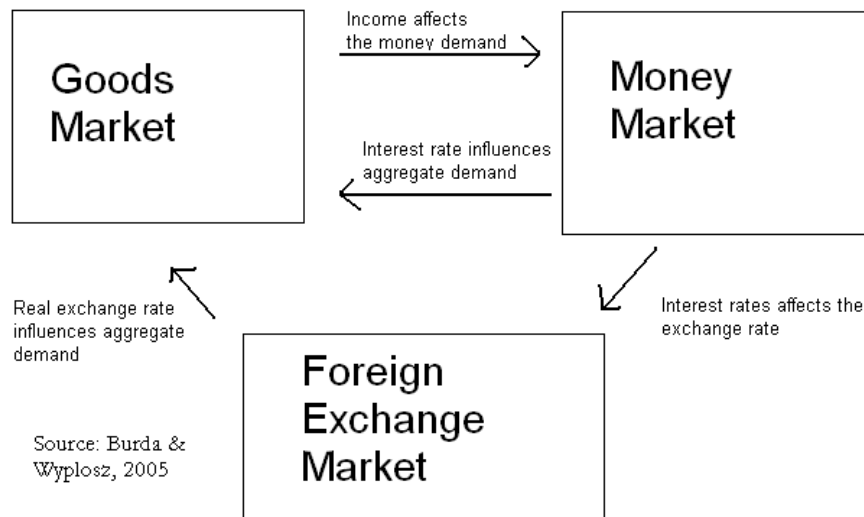


example: a fiscal expansion tends to move the IS curve to the right, increasing the output and interest rate. The new increase will set off a capital inflow and the central bank has to increase the money supply causing the LM curve to shift to the right to restore initial level of the interest rate but at a new higher output. While the assumption of perfect capital mobility is not fully true, it is not always too far from reality for some small open economies (Burda & Wyplosz, 2005 - Dornbusch, Fischer & Startz, 2008).



**Figure 5.2 The Mundell-Flemming IS-LM-BP Schedule**

Understanding the linkage of the goods market, the money market and the foreign exchange market is crucial to grasp this model since they are all interconnected. The different circumstances in a country's good and money markets affect one another along with the foreign exchange rate market. Interest rates and exchange rates affect the domestic aggregate demand, the disposable income influences the demand for money and for a given amount of money supplied, the interest rates. General equilibrium in the Mundell-Flemming IS-LM-BP model will take place when equilibriums in the three markets are consistent with one another (Burda & Wyplosz, 2005).



**Figure 5.3 The Link Between the Markets**

## 5.5 A Simple Interpretation of Trade

Consider a world with only two countries, the two countries are open to trade and have equilibrium equations similar to (1). The net export (NX) of both home and foreign are made up of exports (X) minus imports (M)

$$NX = X - M \quad (21)$$

Then home and foreign will take the following forms, home looks like:

$$Y = C + I + G + X - M \quad (22)$$

Foreign will look like

$$Y^* = C^* + I^* + G^* + X^* - M^* \quad (23)$$

Since there are only two countries in the world, the exports from home (X) will equal the import in foreign ( $M^*$ ) and so forth:

$$X = M^* \quad (24)$$

$$M = X^* \quad (25)$$

Substituting (24) and (25) into (22) yields:

$$Y = C + I + G + M^* - X^* \quad (26)$$

Equation (26) implies that the net export of home must equal the net export of foreign. Of course this is only a two country model, but this simple model implies that all the exports and imports in the world must add up to zero. Since imports in one country are exports of another country, an increase in income of one country will stimulate exports and therefore also the income in the other country. A country running a current account deficit against the rest of the world must, as mentioned previously, be running a financial account surplus.

This implies that in the short run it is possible for a country to stimulate their income by imports from another country, but in the long run there must be some current account balance and financing long term growth by imports is not possible (Appleyard & Field, 1998).

### 5.5.1 Determinants of Exports and Imports

In this model exports and imports will be functions of domestic income ( $Y$ ), foreign income ( $Y^*$ ) and the real exchange rate ( $R$ ) between two countries:

$$M = f(Y, R) \quad (27)$$

Imports ( $M$ ) are here shown as a function of domestic income ( $Y$ ) and real exchange rate ( $R$ ), they are both positively correlated to imports. As domestic income or real exchange rate increases this will cause an increase in the imports.

$$X = f(Y^*, R) \quad (28)$$

Exports ( $X$ ) are given as a function of foreign income ( $Y^*$ ) and the real exchange rate ( $R$ ). If foreign income increases the exports in home will increase but if the real exchange rate increases the exports of home will decrease. This can be interpreted as when a country experiences an increase in income as they have done in the Baltics since the Soviet collapse this will lead to a more import orientated consumption pattern (Blanchard, 2009 - Dornbusch, Fischer & Startz, 2008).

## 5.6 Hypotheses

From theory two hypotheses are formed and then tested in the next section. The first hypothesis will concern the current accounts of Sweden, Latvia and Estonia:

$H_0$  = The Swedish current account is negatively correlated to both the Latvian and Estonian current accounts

$H_A$  = The Swedish current account is not negatively correlated to both the Latvian and Estonian current account.

If this hypothesis is validated it will give some indication that Latvia and Estonia finances some of their growth with imports from Sweden and have over time build up a large current account deficit.

The second hypothesis concerns the stock markets of Sweden, Latvia and Estonia:

$H_0$  = The Swedish stock market is positively correlated to the stock markets of Latvia and Estonia

$H_A$  = The Swedish stock market is not positively correlated to the stock markets of Latvia and Estonia

If this hypothesis cannot be rejected it will indicate that when the Swedish stock market goes up in value so does the Latvian and Estonian stock markets.

If both hypotheses are validated it will support the theory that Latvia and Estonia have financed parts of their growth by imports from Sweden. At the same time they have also enjoyed increases in the values of their stock markets as the Swedish markets grows. If Esto-

nia and Latvia have financed growth by taking on current account deficits they have done this by exporting financial assets. As long as the Swedish economy was in a boom this was possible, but as soon as the Swedish economy cooled down this would slow down the financial markets of Latvia and Estonia and stop the possibility of growing by lending from abroad. This implies that in the long run Latvia and Estonia are forced to reach current account balances and this can be a very painful process.

## 6 Swedish Export to Neighbouring Countries and the Current Account Dependencies

In Table 6.0 we see that almost 40% of the Swedish export goes to close neighbours and countries located by to the Baltic Sea. For Sweden this indicates that proximity is an important variable when it comes to where they export. We can also notice that export dropped by substantial amounts in the first two months of 2009 compared to the same time period last year. Even if Estonia and Latvia receive quite small amounts in terms of percent of Swedish exports, one has to consider that it is fairly large amounts compared to the sizes of the Estonian and Latvian economies.

Country/exports	Percent of total export (J,F - 09)	Value (J,F - 08)	Value (J,F - 09)
Estonia	0.6	1 705	909
Latvia	0.2	682	344
Denmark	7.8	15 181	12 272
Finland	6.7	13 048	10 518
Norway	10.2	19 014	16 065
Germany	10.1	21 761	16 020
Poland	2.4	4 878	3 825
Lithuania	0.3	907	460
Russia	1.3	3 865	2 117
<b>Total</b>	<b>39.6</b>	<b>81 041</b>	<b>62530</b>

**Table 6.0 Swedish Export to neighbours**

*Source: SCB.se, value in millions of Swedish kronor and data ranges from January to February the given year.*

## 6.1 The Nordic and Baltic Countries' Current Accounts

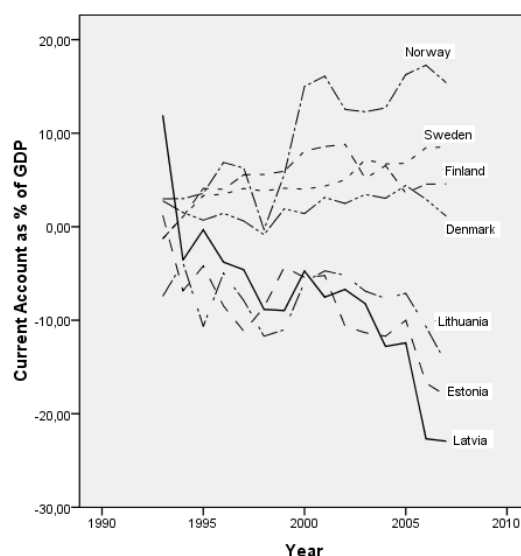
The current account balance can indicate if countries are net importers or net exporters. A positive current account means that a country is importing goods and services by selling financial assets such as stocks, land or bonds (that will offset the current account on the capital account). By investigating the development of the current account one can draw conclusions if a country is a net lender or a net borrower to the rest of the world. Equation (7) illustrates that a country's investment should equal its saving minus the budget deficit and the net exports. Consider also equation (26) which implies that there must be a balance between the different countries' imports and exports and that in the long run a country must be running a quite balanced current account.

In table 6.1, showing the current account balance of the Nordic and Baltic countries we can see that all Baltic countries are net borrowers while the Nordic countries are net lenders. This indicates that the Baltic countries have borrowed from the rest of the world while the Nordic countries have lent to the outside world. The data is collected annually and ranges from 1993 -> 2007.

Year / Country	Estonia	Latvia	Lithuania	Norway	Sweden	Denmark	Finland
1993	1.2	11.9	-7.4	3.0	-1.3	2.8	-1.3
1994	-6.8	-3.6	-3.9	3.0	1.1	1.5	1.1
1995	-4.2	-0.3	-10.7	3.6	3.3	0.7	4.1
1996	-8.5	-3.8	-5.0	6.9	3.5	1.4	4.0
1997	-11.2	-4.6	-7.9	6.3	4.1	0.6	5.6
1998	-8.6	-8.8	-11.7	-0.3	3.8	-0.9	5.6
1999	-4.3	-9.0	-11.0	5.6	4.1	1.9	5.9
2000	-5.4	-4.7	-5.9	15.0	4.0	1.4	8.1
2001	-5.2	-7.5	-4.7	16.1	4.3	3.1	8.6
2002	-10.6	-6.7	-5.2	12.6	5.0	2.5	8.8
2003	-11.3	-8.2	-6.9	12.3	7.2	3.4	5.1
2004	-11.7	-12.8	-7.7	12.7	6.7	3.1	6.5
2005	-10.0	-12.4	-7.1	16.3	6.8	4.4	3.6
2006	-16.7	-22.7	-10.7	17.3	8.5	2.9	4.6
2007	-18.1	-22.9	-14.6	15.4	8.5	1.1	4.6

**Table 6.1 The Current Account Balance of Baltic and Nordic Countries as Percent of GDP**

*Source: The IMF, World Economic Outlook Database*



**Figure 6.1 The Current Account Balance of Baltic and Nordic Countries as Percent of GDP**

*Source: The IMF, World Economic Outlook Database. Graph by author*

Table 6.2 shows the correlations between Nordic and Baltic current accounts as percent of GDP. As we can see there is a very high positive correlation coefficient estimate between the Estonian and Latvian current accounts and two negative correlation coefficient estimates between the Swedish and Latvian respectively Estonian current accounts. This can be interpreted as when Sweden's current account increases the current accounts of the two Baltic countries experience a current accounts decrease highly correlated to the Swedish increase. Noticeable is that the other Nordic states except Norway, is not significantly correlated with Estonia or Latvia. Lithuania is not significantly correlated with either the Nordic states or within the Baltic region. Within the Baltic region Estonia and Latvia are very highly correlated to one another.

		Estonia	Latvia	Sweden	Lithuania	Norway	Denmark	Finland
Estonia	Correlation Coefficient	1,000						
	P-value							
Latvia	Correlation Coefficient	,882**	1,000					
	P-value	,000						
Sweden	Correlation Coefficient	-,868**	-,913**	1,000				
	P-value	,000	,000					
Lithuania	Correlation Coefficient	,373	,476	-,399	1,000			
	P-value	,171	,073	,140				
Norway	Correlation Coefficient	-,541*	-,626*	,735**	,065	1,000		
	P-value	,037	,013	,002	,817			
Denmark	Correlation Coefficient	-,052	-,119	,283	,379	,642**	1,000	
	P-value	,854	,672	,307	,163	,010		
Finland	Correlation Coefficient	-,278	-,395	,484	,061	,476	-,025	1,000
	P-value	,315	,145	,068	,828	,073	,928	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 6.2 The Correlation between Swedish, Estonian and Latvian Current Accounts as Percent of GDP**

*Source: The IMF, World Economic Outlook Database. Calculations by author.*

## 6.2 Current Account Regressions

Below we show two simple regression where we have Estonia's and Latvia's current accounts as percent of GDP respectively against the Swedish current account as percent of GDP. The data used is the same as in previous section:

$$CA_{E/L,t} = \beta_1 + \beta_2 CA_{S,t} + \varepsilon$$

where

$CA_{E/L,t}$  = Current account as percent of GDP for Estonia or Latvia in year t

$CA_{S,t}$  = Current account as percent of GDP for Sweden in year t

$\beta_1$  = Intercept coefficient

$\beta_2$  = Slope coefficient

$\varepsilon$  = Error term

In both regressions a significant and negative relationship is expected. The residuals are expected to be evenly distributed around 0. The negative relationship means that as Sweden's current account surplus increases the Latvian and Estonian current account deficits increases. Regressions with both Finland and Sweden as independent variables have also been run, but since the Finland variable was insignificant in both cases these regressions are presented in the appendix. Further regressions, one with Estonia and one with Latvia as dependent variables, and all the Nordic countries as explanatory variables were run. In these regressions Sweden was the only significant variable and therefore these regressions were omitted from the thesis.

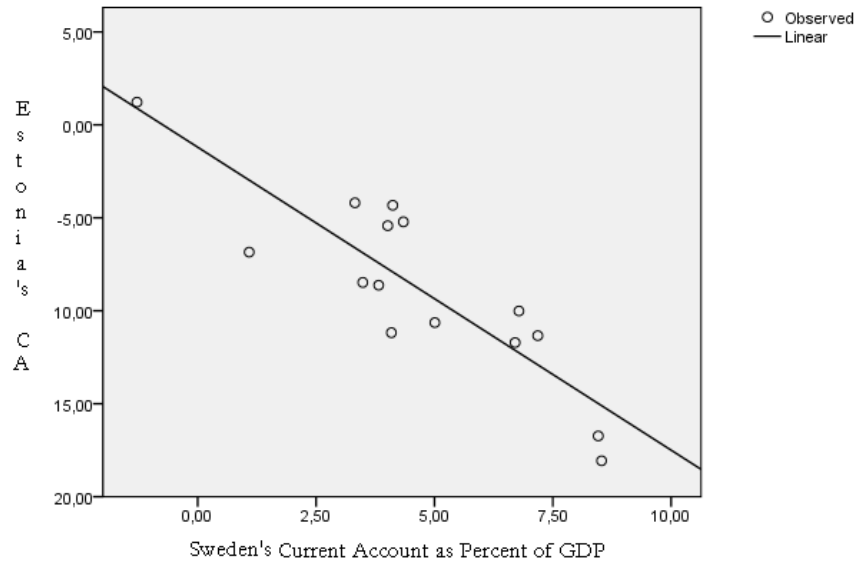
## 6.3 Estonia's Current Account – Regressed

In table 6.3 we see an estimated negative and significant slope coefficient connecting the Estonian and Swedish current accounts. The can be interpreted as when the Swedish current account increases the Estonian current account decreases, Sweden's surplus will be followed by a current account deficit on the Estonian side. The R-square of 0.75 and the high correlation coefficient estimate, together with figure 6.2 shows us that there is a strong fit of the model and a large percent of the variation is explained. The regression and the residuals have been graphically studied with ppplots and boxplots which indicate that the data is made up by white noise. The regression is tested with White's test and found to be homoscedastic.

Estonia Dependant on Sweden				
R Square		Coefficient Estimate	Standard Error	P-Value
	.754			
(Constant)		-1.200	1.368	.396
Sweden		-1.630	.258	0.000

**Table 6.3 Estonia's Current Account as Percent of GDP Regressed Against Sweden's Current Account**

*Source: The IMF, World Economic Outlook Database. Calculations by author.*



**Figure 6.2 Estonia’s Current Account Dependent on Sweden’s Current Account**

*Source: The IMF, World Economic Outlook Database. Graph by author.*

### 6.4 Latvia’s Current Account – Regressed

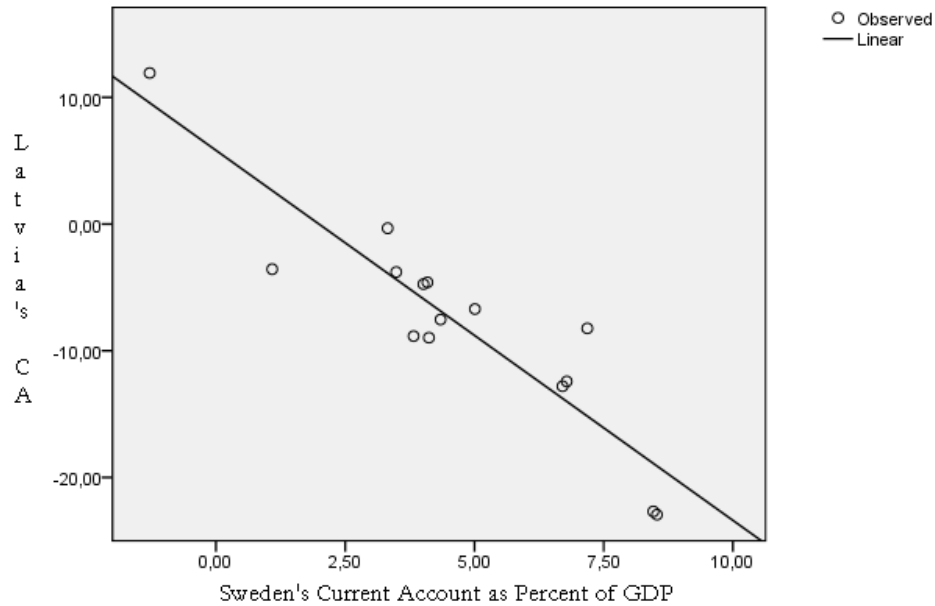
In table 6.4 we see a highly significant and negative slope coefficient estimate connecting the Swedish and Latvian current account movements, this indicates that when Sweden’s current account increases the Latvian current account decreases. The R-square of 0.834 and the very high correlation coefficient estimate along with figure 6.3 shows us a very close relationship where much of the variation is explained. The regression and the residuals have been graphically studied with ppplots and boxplots which indicate that the data is made up by white noise. The regression is tested with White’s test and found to be homoscedastic.

Latvia Dependant on Sweden				
R Square	.834	Coefficient Estimate	Standard Error	P-Value
(Constant)		5.820	1.916	.010
Sweden		-2.921	.362	0.000

**Table 6.4 Latvia’s Current Account as Percent of GDP Regressed Against Sweden’s Current Account**

*Source: The IMF, World Economic Outlook Database. Calculations by author.*





**Figure 6.3 Latvia's Current Account Dependent on Sweden's Current Account**

*Source: The IMF, World Economic Outlook Database. Graph by author.*

## 6.5 Testing the First Hypothesis

By studying table 6.2 we observe a strong negative correlation between the Swedish and the two Baltic countries of Estonia and Latvia; the relationship is also highly significant. Studying table 6.3 and table 6.4 concerning the current account regressions we have found negative slope coefficient estimates in both cases, both regressions are highly significant and a large part of the variation is explained.

All these observations indicate that we should not reject the first null-hypothesis; Sweden's current account seems to be negatively correlated with both the Estonian and Latvian current accounts.

## 7 Nordic and Baltic Stock Markets

According to Andersson (1998), it is easy to assume that the rapid globalisation process leads to a more similar development of the different national stock markets; this would be a simplified assumption. It is more probable that countries with high degree of trade with one another, a high current account correlation will also experience a high correlation in their respective (microeconomic) stock markets. With close proximity and/or high degree of trade it is more probable that two markets will increase the appetite for stocks and bonds from the trading partners markets. One should also consider the financial account, when some countries trade goods and services for bonds and other liabilities from the country.

To show the high integration of the Nordic and Baltic markets the author has in this section collected quarterly closing data from some of the world's major stock indexes. A correlation matrix of the Nordic and Baltic markets will be presented and two regressions concerning Estonia's and Latvia's dependence on the Swedish stock market will be pre-

sented. This section shows that the Nordic and Baltic Markets are highly integrated and to understand the ongoing financial havoc the relationship between these markets is of importance.

The data is collected quarterly and ranges from 20021231 to 20081231. The model used to interpret the data and run the regressions looks like:

$$\frac{\Delta K_i}{K_i} = \beta_1 + \beta_2 \frac{\Delta K_j}{K_j} + \varepsilon$$

Where:

$$\frac{\Delta K_i}{K_i} = \text{Change in dependent quarterly closing index} / \text{Change from}$$

$$\frac{\Delta K_j}{K_j} \text{ Change in independent closing index} / \text{Changed from}$$

$\beta_1$  = Intercept coefficient

$\beta_2$  = Slope coefficient

$\varepsilon$  = Error term

## 7.1 The Correlation between Different Nordic and Baltic Markets

One way to tell how much different markets in the world act, in relation to one another, can be done by correlating the indices of major stock markets in the world. A perfect correlation between two markets would be indicated by a correlation coefficient of 1. According to Andersson (1998), over the last 30 years or so the stock markets and the financial system have been subject to rapid globalization and the world has become more and more integrated.

	Sweden	Finland	Norway	Denmark	Estonia	Latvia	Lithuania
Sweden	1						
Finland	0.87	1					
Norway	0.81	0.81	1				
Denmark	0.83	0.79	0.82	1			
Estonia	0.79	0.71	0.72	0.83	1		
Latvia	0.7	0.67	0.63	0.83	0.77	1	
Lithuania	0.7	0.69	0.69	0.81	0.84	0.85	1

**Table 7.1 Correlations between the Nordic and Baltic Major Stock Index Growth**

*Source: Wall Street Journal Database, Nasdaqomxnordic.com & Nasdaqomxbaltic.com. Calculations by author. All correlation coefficient estimates significant at the 1% level. Tested for stationarity with the Augmented Dickey-Fuller test and the data for the series are stationary.*

As we see in Table 7.1 the estimated correlation coefficients between the Nordic stock indexes ranges around 0.9 to 0.8. In the Baltic block the estimated correlation coefficient

ranges around 0.75 to 0.85. The Baltic and the Nordic blocks are correlated with estimated coefficients ranging around 0.7 to 0.8, this implies that the Nordic and Baltic stock index movements are quite strongly correlated.

## 7.2 Looking Closer at Sweden’s relationship to Estonia and Latvia

Here we examine the stock market index relationship between Sweden and the Baltic nations Latvia and Estonia by running separate regressions. The regressions are modelled as described in section 7 and significant and positive slope coefficient estimates are expected in both cases. The residuals are expected to be evenly distributed around 0. Positive coefficient estimates for the slope variable means that the Swedish, Latvian and Estonian major stock indices will move in the same direction and be positively correlated to one another.

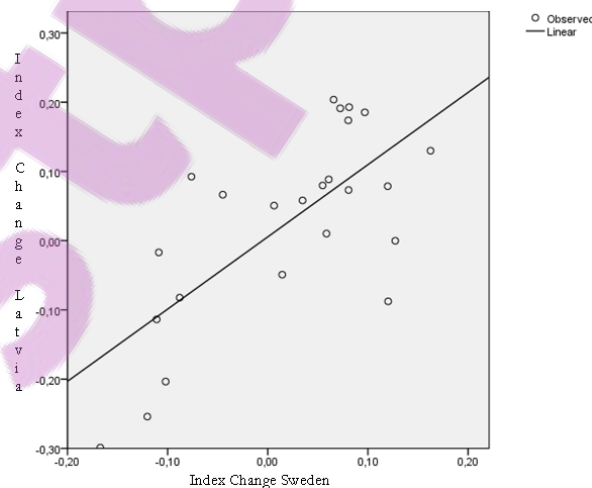
Latvia Dependant on Sweden				
R Square	0.496	Coefficient Estimate	Standard Error	P-Value
(Constant)		0.006	0.021	0.790
Sweden		1.043	0.224	0.000

**Table 7.2 Latvia’s Stock Index depending on Sweden’s Stock Index**

*Source: Wall Street Journal Database, Nasdaqomxnordic.com & Nasdaqomxbaltic.com. Calculations by author.*

Here we observe a quite strong relationship; the coefficient estimate for the slope parameter is close to one. This can be interpreted as the Swedish and Latvian quarterly stock index changes follow each other at a close 1 to 1 relationship. The correlation coefficient estimate of 0.7 indicated a quite closely correlated relationship between the markets. The regression and the residuals have been graphically studied with pplots and boxplots which indicate that the data is made up by white noise. The regression is tested with White’s test and found to be homoscedastic.

This can also be illustrated with a figure with Latvian and Swedish index changes:



**Figure 7.1 Quarterly Stock Index Changes, Latvia and Sweden**

*Source: Wall Street Journal Database, Nasdaqomxnordic.com & Nasdaqomxbaltic.com. Graph by author.*

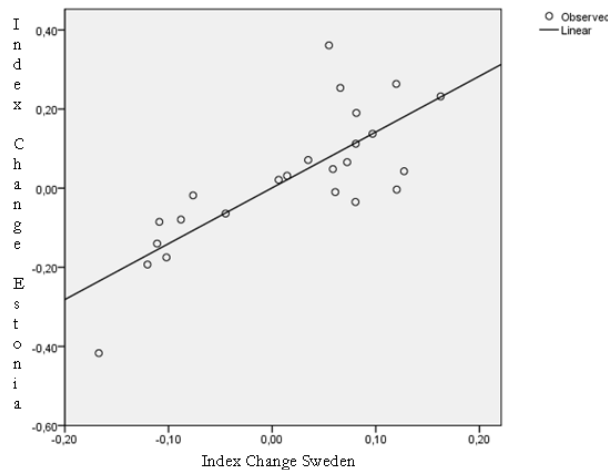
Estonia Dependant on Sweden				
R Square	0.619	Coefficient Estimate	Standard Error	P-Value
(Constant)		0.001	0.022	0.971
Sweden		1.412	0.236	0.000

**Table 7.3 Estonia’s Stock Index depending on Sweden’s Stock Index**

*Source: Wall Street Journal Database, Nasdaqomxnordic.com & Nasdaqomxbaltic.com. Calculations by author.*

We observe a relationship where the estimated coefficient for the slope parameter is 1.4. This means that when Sweden’s major stock index increases 1 unit the Estonian stock index will increase with 1.4 units. With a correlation coefficient estimate of 0.79 this means that the markets are highly correlated. The regression and the residuals have been graphically studied with ppplots and boxplots which indicate that the data is made up by white noise. The regression is tested with White’s test and found to be homoscedastic.

This will also be illustrated with a figure with Estonian Swedish index changes:



**Figure 7.2 Quarterly Stock Index Changes, Estonia and Sweden.**

*Source: Wall Street Journal Database, Nasdaqomxnordic.com & Nasdaqomxbaltic.com. Graph by author.*

### 7.3 Testing the Second Hypothesis

In table 7.1 we observe a quite strong positive correlation between the Swedish, Estonian and Latvian stock markets. In fact, all the Nordic and Baltic markets are highly correlated and all the correlations are significant at a high level.

To take a closer look at Sweden’s relationship to Estonia and Latvia we study table 7.2 and table 7.3 where we observe positive slope coefficient estimates for both the regressions. In both cases they are highly significant and a fairly large amount of the variation is explained in both the cases.

In all these observations there are no indications that we can reject the second null-hypothesis. Sweden’s stock market is positively correlated with both the Estonian and Lat-

vian stock market. Table 7.1 shows that the whole Nordic-Baltic region's stock market seems to be positively correlated.

## 8 Analysis

In this section the findings from section 6 and section 7 are analyzed. This is done by examining the results from the correlation matrices, regressions and figures concerning the current accounts and stock market indices.

We will start by looking at the current account of the Nordic and Baltic countries and then move on to take a closer look at the stock market indices and see what implications it has.

In figure 6.1 and table 6.1 we can see that all the Nordic states have current account surpluses while all the Baltic States have current account deficits.

Sweden and Norway are the two countries with the largest current account surpluses and in the correlation matrix in table 6.2 we see that both of them have negative significant correlation estimates to both Latvia and Estonia. The Swedish to Latvia and Estonia current account correlation estimates are very high, ranging around -0.9. The Norway to Latvia and Estonia current account correlation estimates are lower, ranging around -0.5 -> -0.6. This can still be interpreted as when the Swedish and Norwegian current account increases the Latvian and Estonian current account will decline.

Looking closer at the regressed relationship between the Swedish and Estonian current account in table 6.3 and figure 6.2 there is a highly significant negative slope coefficient estimate of -1.63 which means that when the Swedish current account increases 1 unit, the Estonian current account will decrease with 1.63 units. An R-square of 0.754 implies that a very large part of the variation is explained.

The Swedish and Latvian current account shows a similar relationship, but perhaps even stronger. Table 6.4 along with figure 6.3 tells us that there is a highly significant negative slope coefficient estimate of -2.921. This estimate implies that when the Swedish current account increases by 1 unit, the Latvian will decrease by 2.921 units. The R-square in the regression is even stronger with a value of 0.834 along with figure 6.3 showing a very strong relationship where much of the variation is explained.

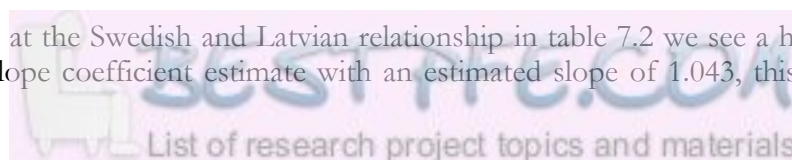
The large current account deficits of Estonia and Latvia mean that they have large negative exports, much of it coming from some of their Nordic neighbours.

In table 7.2 we see pretty high estimated correlation coefficients where the Nordic Markets have a correlation among themselves with an estimate of around 0.8, and there is a pattern for the Baltic States sharing a correlation estimate of approximately 0.8 as well.

The correlation between the Nordic and Baltic markets lies around 0.7, which has to be seen as a quite high correlation coefficients. The exception here is the Danish stock index that have estimated correlation coefficients to all of the Baltic States with values above 0.8. This can perhaps be explained by the large number of Danish banks, such as the largest Scandinavian bank (Danske Bank) has worked hard to get into the Baltic markets.

The high positive correlations can be seen as that the Nordic and Baltic stock markets move together, and most of the stock markets in these markets are owned by OMX.

Looking closer at the Swedish and Latvian relationship in table 7.2 we see a highly significant positive slope coefficient estimate with an estimated slope of 1.043, this means that



the Swedish and Latvian stock markets move in a close 1 to 1 relationship. The R-square of 0.496 has to be seen as a pretty high value; together with figure 7.1 it shows that there is a high goodness of fit.

The Swedish and Estonian relationship presented in regression table 7.3 shows a highly significant positive slope coefficient estimate with an estimated slope value of 1.412. This means that when the Swedish stock market index increase with 1 unit, the Estonian index will increase with 1.412 units. An R-square of 0.619 has to be considered a high value, together with figure 7.2 it shows a very high goodness of fit.

We could not reject any of the null-hypotheses. Clearly the Swedish current account is negatively correlated with the current accounts of Estonia and Latvia, at the same time the countries have positively correlated stock markets. The implications of this is discussed in section 10.

## **9 Suggestions for Further Research**

A problem with this thesis is that is written when the crisis is still very much in effect, there is not very much recent accessible data and no one knows if we have yet hit the bottom. If the crisis would end tomorrow, the Baltic States would maybe be able to do a not too painful recovery. But if the crisis continues or gets worse we might see a scenario where the currencies of Estonia and Latvia collapses and they both have to turn to IMF for more bailouts. A suggestion for further research is with hindsight to evaluate how the Baltic states of Estonia and Latvia managed to recover from the crisis and what they should do to accomplish stable growth figures. Another very interesting finding is the highly correlated stock markets in the world, a good topic for a study would be how this correlation affects the possibility to risk diversify.

## **10 Summary and Conclusions**

Latvia and Estonia have negative current accounts which implies positive financial accounts. This means that Latvia and Estonia has financed their consumption of goods and services by exporting financial assets. The high correlation in the current accounts implies that much of this exchange have taken place within the Nordic and Baltic region.

Since the liberalization of Estonia and Latvia they have gotten a taste for the good life. During a liberalization process when a small country opens up to the rest of the world, there are usually some very favourable investment opportunities. Estonia and Latvia have used these opportunities to finance their increased demand for goods by exporting financial assets to their Nordic neighbours. During the stable economic climate and boom periods the last couple of years, it has been possible for Estonia and Latvia to finance their increased cost of living by borrowing from abroad, but since the crisis hit them this is no longer possible.

The positively correlated stock markets together with the negatively correlated current accounts implies that Estonia and Latvia are dependent on Sweden (and perhaps the rest of the Nordic countries) to provide for their demand for goods and does this by exporting financial assets. At the same time they are dependent on the Nordic stock markets to rise to finance this demand. As long as it rises Latvia and Estonia have been able to boost very high growth which have given them higher income and increased their demand for goods

even further. As soon as the Nordic markets went into recession a crash in the Baltic countries appears to have been more or less inevitable due to this unhealthy relationship.

When Estonia and Latvia borrowed during the boom, they could do that on the world market without raising the interest rates there. When the economy slowed down, interest rates increased and loans have been much harder to get lately. As implied by theory if a country has no goods or services to sell and no willing lenders to turn to, they must try and reach current account balance. This is something that can be extremely painful to a country; there are several examples of this in history (for example in Latin America).

The increased interest rates have also put the fixed exchange rates under a great deal of pressure and there has been talk about devaluations in all Baltic countries, something that would make the investors think twice before spending their money there in the future. Devaluation in one of these countries would most likely lead to a mass of human tragedies because people in these countries have often borrowed in Euros but gets their salaries in the local currency. According to Barro, the solution is perhaps not a devaluation and doing this would also cost Estonia and Latvia much credibility on the world market and make their recovery even harder.

Until date, the budgets of Estonia and Latvia have been quite passively managed by currency boards, which was important to gain credibility in the post Soviet era. Perhaps now is a good time for policy makers to move along the 'trilemma' to a situation where the Baltic states of Estonia and Latvia aim more actively at keeping a balanced budget. The days of speeding up their consumption and growth by lending from abroad are for Estonia and Latvia, most possibly over. The problem here can probably be traced to the current international monetary system where each country is fully responsible for its own currency and exchange rate. Influential countries such as US and China running large current account deficits and surpluses over a long time might have lured smaller countries to follow their example and by running unhealthy balance of payments figures have made them much more vulnerable to external shocks (a country taking on large amounts of debt during world wide booms will have a very hard time to get more loans during recessions when the world interest rates increases).

In Sweden, Latvia and Estonia there are agencies supervising the financial markets. The Estonian and Latvian banking sectors are rather young, and their supervisory agencies are even younger. Latvia started up their monitoring agency in 2001 and Estonian agency were modernized and put in to full effect in 2004. The Swedish agency have been in place for a much longer period of time, and has had previous experience in handling major banking crises (for example in the early 1990s). It is obvious that the Estonian and Latvian agencies have had difficulties with the very rapid European integration and monitoring of foreign banks that have established in their countries. Before this crisis there has obviously been a lot of excessive lending from these banks in Estonia and Latvia. It seems there has been a problem for the monitoring agencies of Estonia and Latvia to keep control over the activities of these foreign banks. To avoid this happening in the future it is essential to increase the level of European cooperation when it comes to regulations and monitoring of banks and financial markets (The Estonian Financial Supervision Authority, 2009 - The Swedish Financial Supervisory Authority, 2009 – The World Bank, 2009).

The most important conclusion we can draw from this study is the lack of fiscal responsibility the policy makers of Estonia and Latvia have had. Anyone with a basic understanding of economics could have foreseen the very harsh landing Estonia and Latvia now are experiencing. A reason to why this fiscal irresponsibility has occurred is political. It would

most likely be political suicide to tell the voters that we are nurturing a unhealthy model of growth and that we need to cut imports and public spending. The too small amount of saving compared to investment and of course some foreign banks which allowed people to take on loans too easily are partly responsible, but the main responsibility lies on the government who failed miserably at regulating the banking system.

The Baltic countries are not the only ones having missed or just ignored the warning signs. Many countries in the whole world are now in the same situation and over the next few years we will most likely see some very slow and painful recoveries as countries tries to reach a more balanced current account. The dream of an everlasting boom is over, at least for this time.



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## Appendix 1 Correlation Between World's Major Stock Markets Indexes, Quarterly Data 20021231 -> 20081231

	Swe	Fin	Nor	Den	Est	Lat	Lit	Wor	Fra	Ger	Ita	Net	Spa	Swi	UK	Aus	Hon	Jap	Sin	US	Can	
Sweden	1																					
Finland	<b>0,87</b>	1																				
Norway	<b>0,81</b>	<b>0,81</b>	1																			
Denmark	<b>0,83</b>	<b>0,79</b>	<b>0,82</b>	1																		
Estonia	<b>0,79</b>	0,71	0,72	<b>0,83</b>	1																	
Latvia	0,70	0,67	0,63	<b>0,83</b>	0,77	1																
Lithuania	0,70	0,69	0,69	<b>0,81</b>	<b>0,84</b>	<b>0,85</b>	1															
World	<b>0,81</b>	<b>0,83</b>	<b>0,86</b>	<b>0,81</b>	0,69	0,68	0,72	1														
France	<b>0,91</b>	<b>0,83</b>	<b>0,86</b>	0,78	0,73	0,54	0,61	<b>0,86</b>	1													
Germany	<b>0,81</b>	0,75	<b>0,80</b>	0,67	0,59	0,44	0,51	<b>0,86</b>	<b>0,94</b>	1												
Italy	<b>0,90</b>	<b>0,8</b>	<b>0,84</b>	<b>0,82</b>	<b>0,83</b>	0,67	0,71	<b>0,88</b>	<b>0,94</b>	<b>0,87</b>	1											
Netherlands	<b>0,87</b>	<b>0,84</b>	<b>0,83</b>	<b>0,85</b>	0,71	0,64	0,61	<b>0,88</b>	<b>0,93</b>	<b>0,88</b>	<b>0,89</b>	1										
Spain	<b>0,85</b>	<b>0,79</b>	0,76	0,69	0,71	0,53	0,66	<b>0,84</b>	<b>0,89</b>	<b>0,85</b>	<b>0,93</b>	<b>0,80</b>	1									
Switzerland	<b>0,91</b>	<b>0,80</b>	0,76	<b>0,81</b>	0,70	0,64	0,62	<b>0,80</b>	<b>0,94</b>	<b>0,89</b>	<b>0,90</b>	<b>0,91</b>	<b>0,83</b>	1								
UK	<b>0,85</b>	<b>0,81</b>	<b>0,9</b>	0,76	0,65	0,57	0,60	<b>0,89</b>	<b>0,93</b>	<b>0,92</b>	<b>0,91</b>	<b>0,91</b>	<b>0,86</b>	<b>0,86</b>	1							
Australia	<b>0,81</b>	<b>0,84</b>	<b>0,85</b>	<b>0,84</b>	0,76	0,73	0,72	<b>0,88</b>	<b>0,81</b>	0,73	<b>0,89</b>	<b>0,83</b>	0,78	0,77	<b>0,85</b>	1						
Hongkong	0,62	0,75	0,68	0,70	0,51	0,60	0,64	<b>0,86</b>	0,64	0,63	0,68	0,70	0,65	0,61	0,72	<b>0,83</b>	1					
Japan	<b>0,81</b>	0,70	0,78	0,78	0,68	0,78	0,63	0,76	0,78	0,72	<b>0,79</b>	<b>0,81</b>	0,64	<b>0,85</b>	0,76	<b>0,83</b>	0,91	<b>0,81</b>	0,74	1		
Singapore	<b>0,85</b>	<b>0,84</b>	<b>0,87</b>	<b>0,90</b>	0,77	0,72	0,75	<b>0,89</b>	0,8	0,75	<b>0,83</b>	<b>0,83</b>	0,75	0,76	<b>0,83</b>	<b>0,91</b>	<b>0,81</b>	0,74	1			
US	<b>0,79</b>	0,74	0,69	0,71	0,67	0,58	0,63	<b>0,91</b>	<b>0,84</b>	<b>0,85</b>	<b>0,85</b>	<b>0,80</b>	<b>0,83</b>	<b>0,80</b>	0,77	0,78	0,76	0,65	<b>0,79</b>	1		
Canada	0,77	0,78	<b>0,93</b>	<b>0,86</b>	0,75	0,74	0,74	<b>0,9</b>	0,78	0,72	<b>0,82</b>	<b>0,83</b>	0,72	0,72	<b>0,82</b>	<b>0,86</b>	0,72	<b>0,81</b>	<b>0,88</b>	0,74	1	

Source: Wall Street Journal Database, Nasdaqomxnordic.com, Nasdaqomxbaltic.com & Borsaitaliana.it – Calculations by author. All correlation estimates significant at the 1% level. Bold digits flag for a correlation above the average correlation of 0.78. Tested for stationarity with the Augmented Dickey-Fuller test and the data for the series is stationary.

## Appendix 2 Correlation between World's Major Stock Market Indexes, Monthly Data 1971->1994

	Fra	Ger	Ita	Net	Spa	Swe	Sch	UK	Aus	Hon	Jap	Sin	Can	USA	Wor
France	1														
Germany	0,53	1													
Italy	0,41	0,33	1												
Netherlands	0,53	0,6	0,36	1											
Spain	0,34	0,36	0,39	0,36	1										
Sweden	0,3	0,37	0,32	0,4	0,41	1									
Schweizerla	0,54	0,64	0,35	0,65	0,33	0,44	1								
UK	0,5	0,38	0,32	0,62	0,3	0,36	0,56	1							
Australia	0,38	0,33	0,27	0,43	0,3	0,34	0,42	0,45	1						
Hongkong	0,22	0,26	0,21	0,36	0,22	0,19	0,3	0,35	0,3	1					
Japan	0,3	0,3	0,31	0,34	0,32	0,27	0,34	0,29	0,23	0,21	1				
Singapore	0,26	0,27	0,23	0,4	0,21	0,32	0,43	0,52	0,41	0,48	0,33	1			
Canada	0,45	0,33	0,27	0,55	0,27	0,31	0,51	0,52	0,56	0,3	0,29	0,4	1		
USA	0,47	0,39	0,24	0,58	0,3	0,38	0,59	0,56	0,52	0,31	0,33	0,46	0,71	1	
World	0,55	0,47	0,38	0,58	0,41	0,41	0,59	0,61	0,56	0,37	0,63	0,5	0,69	0,82	1

Source: Solnik, 1996.

## Appendix 3 Estonia's and Latvia's Current Accounts Dependant on Finland and Sweden

$$CA_{E/L,t} = \beta_1 + \beta_2 CA_{S,t} + \beta_3 CA_{F,t} + \varepsilon$$

where

$CA_{E/L}$  = Current account as percent of GDP for Estonia or Latvia in year t

$CA_S$  = Current account as percent of GDP for Sweden in year t

$CA_F$  = Current account as percent of GDP for Finland in year t

$\beta_1$  = Intercept coefficient

$\beta_2$  &  $\beta_3$  = Slope coefficients

$\varepsilon$  = Error term.

### Estonia as dependent on Sweden and Finland

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,883 <sup>a</sup>	,780	,744	2,50995

a. Predictors: (Constant), Finland, Sweden

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2,135	1,556		-1,372	,195
	Sweden	-1,798	,290	-,958	-6,195	,000
	Finland	,344	,287	,185	1,198	,254

a. Dependent Variable: Estonia

## Latvia as dependent on Sweden and Finland

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,915 <sup>a</sup>	,837	,810	3,68781

a. Predictors: (Constant), Finland, Sweden

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,294	2,286		2,316	,039
	Sweden	-3,016	,426	-,943	-7,072	,000
	Finland	,193	,422	,061	,458	,655

a. Dependent Variable: Latvia

In both models the Finland variable is insignificant. Finland's current account surplus can be considered quite small and perhaps does not have the same influence on the Estonian and Latvian current accounts as the Swedish does.