Inflation in Latvia: how real is it?

Trond-Arne Borgersen
Roswitha M. King

Høgskolen i Østfold
Arbeidsrapport 2009:2

Online-versjon (pdf)

Utgivelsessted: Halden

Høgskolen i Østfold har en godkjenningsordning for publikasjoner som skal gis ut i Høgskolens Rapport- og Arbeidsrapportserier.

Høgskolen i Østfold. Arbeidsrapport 2009:2

ISBN: 978-82-7825-274-1
ISSN: 1503-6677

Inflation in Latvia[1]: How real is it?

Trond-Arne Borgersen
Østfold University College
Faculty of Economics, Social Sciences and Languages
Remmen
N- 1757 Halden
e-mail: trond.a.borgersen@hiof.no

Roswitha M. King
Østfold University College
Faculty of Economics, Social Sciences and Languages
Remmen
N- 1757 Halden
e-mail: roswitha.m.king@hiof.no

First draft; 24/8-08
This draft; 31/12-08

Abstract: This paper applies and extends the Scandinavian Model of Inflation for analysing determinants of inflation in Latvia. In recent years high inflation has been a persistent problem for advocates of Latvian participation in the euro collaboration. However, by allowing for transitional effects and separating the impact of nominal and real factors to inflation, where real factors are related to the structural shifts at the heart of transition economies, the recent inflation history becomes more understandable. The equilibrium effects accompanying real factors are shown to be the key component of overall inflation over the last 12 years, keeping non-structural inflation below the Maastricht criteria for most of the period. The real contribution to inflation provides Latvia with better prospects for future growth and higher standards of living, and should hence be less worrisome than the nominal contribution. Still, when it comes to compliance with the Maastricht criteria, no distinction is made between the two, complicating convergence for transition economies.

JEL classifications: P2, O14

Keywords: Latvia, economic transition, inflation, Scandinavian Model of Inflation, manufacturing and service industries.

[1] *We are grateful to Konstantīns Beņkovskis and Česlavs Gržibovskis for helpful comments on an earlier draft of this paper.*

1. Introduction

In two waves on May 1, 2004 and January 1, 2007 the European Union expanded to include twelve new member states. All new member states have the obligation to also seek membership[2] in the Economic and Monetary Union (EMU) after fulfilling the Maastricht criteria.[3]

Regarding the Maastricht criteria, some of the transition countries have so far not been successful in reducing inflation to the required level. This is particularly true for the Baltic countries, which, until the arrival of the current global downturn, recorded double digit economic growth rates. The Baltic countries illustrate in particularly stark form a dilemma shared at various levels of intensity by others among the group of recently acceded (mostly east European) EU member states: The primary long-term economic goal is to catch up to the per capita income level and standard of living of Western Europe. This requires high growth. And indeed, growth rates have been high in the Baltic countries – but accompanied by high inflation. The high inflation has in turn prevented these high growth, and eager-to-join countries, from entering the euro zone – a membership of which is widely regarded as necessary, or at least highly desirable, for stable long-term economic growth.

In this paper we focus on Latvia, which, in recent years, has distinguished itself by having the highest rate of growth of all EU member states as well as the highest rate of inflation. For 2007 Latvia recorded an inflation rate[4] exceeding 10%, leaving behind high inflation countries such as Turkey (under 9%) and Hungary (just short of 8%).

Being a transition economy, Latvia will have to incur the effects of the transition process. We argue that a substantial part of inflation in Latvia is related to the real effects accompanying this transition – being both unavoidable and desirable. Moreover, as we explain in section 2, the privatization policy that Latvia applied during the early 90s has rendered it particularly exposed to this type of inflation.

The main conceptual argument of the paper is that a proper framework for analysing inflation in transition economies is one that explicitly takes the real effects accompanying transition into account. The main theoretical contribution is a mathematical interpretation of the real effects on inflation accompanying transition. In our main empirical contribution we show that once we account for the real effects on inflation the remaining nominal part is surprisingly modest, and well within the bounds of the Maastricht inflation criterion. The real part of inflation, however, by itself, exceeds the allowed limit. Being a necessary part of structural

---

[2] *Three of the 2004 EU entrants, Slovenia, Cyprus, and Malta have already joined the euro zone. So the euro-15 consist of Belgium, Germany, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Malta, The Netherlands, Austria, Portugal, Slovenia, and Finland. The last enlargements of the EU in 2004 and 2007 expanded the number of member countries from 15 to 27 countries, and from 2008 15 of those countries are members of the EMU.*

[3] *The Maastricht criteria are designed to ensure that a Member State has achieved a high degree of economic convergence before joining the euro area. In particular the criteria set conditions for price stability, public finances, exchange rate stability and long term interest rates. Especially they include inflation rate of no more than 1.5 percentage points above the average rate of the three member states with the lowest inflation, a national budget deficit not more than 3% of GDP, public debt not exceeding 60% of GDP.*

[4] *Average annual rate of change in Harmonized Indices of Consumer Prices (HICP)*

adjustment during transition to a mature market economy the real contribution to inflation will persist into the foreseeable future – dimming Latvia's prospects for speedy euro adoption.

The Bank of Latvia pegged the national currency, the lats, to the euro on January 1, 2005. On May 2, 2005 Latvia joined the ERM II. At that time the target date for adopting the euro was set to 2008, which would have placed the convergence criteria compliance assessment somewhere in the middle of 2007. This schedule had to be postponed. As can be seen from table 1, below, Latvia has since 2006 satisfied the Maastricht criteria on public finance by a comfortable margin. Likewise, both the criteria on long term interest rates and the criteria on exchange rate stability have been fulfilled. It is the inflation criterion that has been a barrier to Latvia's adoption of the euro during this period – much to the country's chagrin.

Table 1: Fulfilment of convergence criteria- Latvia

	Criterion in 2006	**Latvia's performance in 2006**	**Criterion in 2007**	**Latvia's performance in 2007**	**Criterion in June 2008**	**Latvia's performance in June 2008**
Budget balance (% of GDP)	-3.0	-0.2	-3.0	-0.04	-3.0	-0.04*
Government debt (% of GDP)	60.0	10.7	60.0	9.7	60.0	9.7*
Average annual inflation rate of last 12 months (%)	2.9	6.6	2.8	10.1	3.7	14.5
Long-term interest rate on government securities (%)	6.24	4.13	6.43	5.28	6.49	5.44
Exchange rate regime	Fixed exchange rate against the euro and participation in ERM II for at least two years	Fixed exchange rate against the euro and participation in ERM II since May 2005	Fixed exchange rate against the euro and participation in ERM II for at least two years	Fixed exchange rate against the euro and participation in ERM II since May 2005	Fixed exchange rate against the euro and participation in ERM II for at least two years	Fixed exchange rate against the euro and participation in ERM II since May 2005

* In 2007.

Table 1 is taken from „Recent Economic Developments and Banking in Latvia", Ilmars Rimsevics, Governor, Bank of Latvia, Notes, July 2008. Original Data Sources: data of the Treasury, the Central Statistical Bureau of Latvia and Eurostat.

Table (1) shows how high inflation has been a continuous problem for Latvia, and in fact, the inflation issue has been escalating during the period of observation. Between December 2005 and June 2008, the highest permissible inflation rate under the Maastricht price stability criterion was 3.7 percent. However, Latvia's average annual inflation rate was 6.6 percent in 2006, rising to 10.1 percent in 2007 and reaching an average of 14.5 percent during the 12 month period from June 2007 to June 2008.[5]

At such rates of inflation it is not surprising that policies supporting economic growth have, since 2007, been partially replaced by deflationary policies.[6] The global financial downturn, and in particular the accompanying asset devaluations, have, in the meantime, rendered such policies redundant, and have led to a drastic decline in growth.[7]

So, will the economic downturn, via reduced inflation, open the euro zone door for Latvia?

We argue in this paper, in contrast to Vanags and Hansen (2008), that such hopes most likely will go unfulfilled. Latvia will have to endure the fallout from the economic downturn without the side-benefit of seeing inflation fall below the threshold required for entry into the euro zone. The reason is that structural inflation is a significant component of Latvia's overall inflation. Even if other inflation drivers[8] should weaken, structural inflation will persist at a level high enough to be a barrier for Latvia's adoption of the euro for the years ahead.[9]

Post-communist economies, like Latvia, have undergone profound restructuring during the past 15 years, and are still continuing to do so. These countries will in general be exposed to structural inflation, i.e. inflation originating in differing performance of their various sectors. That is, differing productivity growth between sectors, induce changes in relative prices, which again stimulates the shifting of resources between sectors and structural shifts as such. It is the price growth accompanying the changes in relative prices which is at the heart of the transition process, and which is referred to as structural inflation. In transition economies this part of inflation is unavoidable, and in fact, being at the core of the transition process, it is desirable. The substantial structural shifts that have taken place in combination with inflation pressures from a variety of sources observed in the post-communist societies of Eastern Europe suggest analyzing inflation in different settings. While the Phillips curve models emphasize the link to the labor market and monetarist models characterize inflation as a monetary phenomenon - both theories essentially pointing to inflation as a target for short-run

---

[5] *The National Economy of Latvia: A Macroeconomic Review 2008(2), Ministry of Economics of the Republic of Latvia, June 2008, and "Recent Economic Developments and Banking in Latvia", Ilmars Rimseviks, Governor, Bank of Latvia, Notes July 2008, http://www.bank.lv/eng/main/all/sapinfo/presrunas/receco/, accessed 19.08.2008.*

[6] *On March 6, 2007 the Cabinet of Ministers announced its support for Latvia's inflation reduction plan, which includes measures regarding fiscal policy, credit extension by commercial banks, and other measures deemed effective particularly for the real estate market and labor market.*

[7] *In fact during the third quarter of 2008 GDP contracted 4.3 % over the third quarter of 2007. However, Inflation in Latvia , while in modest decline, is still the highest among all EU member states.(Ministry of Economy of the Republic of Latvia)*

[8] *Such as increases in administered prices, commodity- and food prices, increases in indirect taxes, indexation schemes to compensate for inflation etc., as well as inflation expectations.*

[9] *It should be noted that as a consequence of the global economic downturn the Maastricht inflation criterion will also be lowered, being computed at 1.5 percent above the average of the three lowest national inflation rates among the EU member states.*

stabilization policy – models of structural inflation link the long-run inflation tendency to structural factors. For instance, uneven productivity growth between sectors, and shifts in the relative importance of an economy's sectors impact inflation. In this paper we focus on one of the principal variants incorporating the structural inflation hypothesis that has become known as the Scandinavian Model of Inflation. This model captures structural causes and consequences of inflation in a way that is related to, but also extends beyond the Balassa-Samuelson effect,[10] which has received considerable attention in the literature.

The Scandinavian Model of Inflation incorporates the Balassa-Samuelson effect into a comprehensive long run framework for transition. Wages are equalized between sectors allowing transition to simultaneously impact both the tradable and the non-tradable sector. Aggregate wage growth comes about due to an asymmetry between sectors regarding how wages are formed. The formation of wages is related to the productivity differential between sectors, and hence the Balassa-Samuelson effect. The relationship between wages and the productivity differential is to maintain fixed income shares for both capital and labour, where the former is important during transition due to capital mobility, and the latter for constraining (brain-drain) migration.

Substituting Latvian data into the Scandinavian Model of Inflation we find that while over the period 1997-2007 average annual inflation equals 4,9 percent, average annual structural inflation has been 4,7 percent, leaving aside a non-structural inflation rate well below the Maastricht criteria.[11] The structural factors highlighted will not disappear due to cyclical developments or short-term stabilization policy measures. This calls into question whether Latvia will be in a position to satisfy the Maastricht inflation criterion in the near future – for reasons that are independent of other inflation drivers.[12]

The rest of the paper is organised as follows. The second part describes the structural shifts that have accompanied transition in Latvia. The third part sets out the theoretical foundations of the Scandinavian Model of Inflation, focusing on the real contributions to inflation and how it develops over time. The fourth part describes inflation, structural shifts and productivity developments in Latvia over the last 12 years, and estimates structural and non-structural inflation, as well as the impact on structural inflation of the various real factors. In the last part structural inflation in general, and how it comes about in Latvia, is discussed.

---

[10] The Balassa-Samuelson effect (or hypothesis) can be considered one of the components of the Scandinavian Model of Inflation. Helmut Frisch (1983) in his book Theories of Inflation, p.163, refers to the model of Bela Balassa (1964) as "a bridge between Baumol's model of disequilibrium growth and the Scandinavian model of inflation…". For references regarding Balassa-Samuelson effect in central and eastern Europe see, for example Égert, Balázs, Imed Drine Kirsten Lommatzsch and Christophe Rault (2002) and Égert, Balázs and Jirí Podpiera (2008).

[11] It should be noted that during the period of interest Latvia experienced severe swings in economic growth and inflation, so that the listed average values are accompanied by large variance. For example, from 1998 to 2003, in the aftermath of the Russian Ruble crisis, persistent structural inflation counteracted what would otherwise have been a period of deflation. On the other hand, from 2007 the steep increases in world prices for food and energy put strong upward pressure on the overall rate of inflation.

[12] Such as position on the business cycle, increases in administered prices, commodity- and food prices, increases in indirect taxes, indexation schemes to compensate for inflation etc., as well as inflation uncertainty and inflation expectations. Regarding inflation expectations in Latvia, see Beņkovskis, Konstantīns and Daina Paula (2007). Regarding effects of inflation uncertainty in Latvia, see Ajevskis, Viktors (2008).

2. Structural Shifts, Transition and Privatization Policy in Latvia

When a country transitions from a developing into a developed economy, or from a centrally planned to a market economy, tensions build up between demand and supply and structural shifts occur. Resources are usually moving out from slow growing and into fast growing sectors of production. The process is driven by productivity differences and changing of relative prices as discussed above. In transition, often attributed to the shifting of resources between sectors among the former east-European countries, high growth rates can coexist with unbalanced distributions of valued added between sectors.[13]

Latvia and its two Baltic neighbors, Estonia and Lithuania, have progressed faster in structural reforms, relative to other central and east European countries.[14] This is particularly so with regard to reducing the role of the state in the economy, reforming the pension system, building a business-friendly environment for entrepreneurs, opening their markets for international trade and capital flows, and providing a supportive public infrastructure. Labor markets in the Baltic countries are more flexible than those in the euro area. The fast pace of structural reform has rendered Latvia particularly exposed to structural inflation.

The large-scale structural shifts[15] in Latvia's economy, as well as in the economies of the other eastern European countries, began at the time of disintegration of the Soviet Union. The shifts are composed of several layers. As a member of the Soviet Union the (then) province of Latvia was highly specialized in delivering mass-produced industrial goods,[16] with guaranteed sales volumes, and at guaranteed prices to all parts of the former Soviet Union. As this demand base in the east disappeared, Latvian businesses quickly had to learn what consumers were interested in buying – without the assistance of the central plan. This was a severe structural re-adjustment in terms of what to produce, for whom to produce, and at what price to sell. A principal shift away from industrial goods to consumer goods and services took place, stemming from the bias toward industrial goods production and relative neglect of consumer goods production during Soviet times.[17] However, in terms of geography, it was still Latvia's eastern and south-eastern neighbors which represented the main export markets. In 1998 the Russian ruble crisis hit eastern-Europe, and Latvia's export markets in the east disappeared practically overnight, forcing a rapid re-orientation of the country's trade pattern toward west-European markets. This trade re-orientation is likely to have happened anyway, but it was precipitated by the Russian ruble crisis.

These abrupt changes in product demand, patterns of trade, and changes in relative prices were the drivers of economic restructuring, as they required substantial changes in the

---

[13] *For still outstanding structural shifts linked to value-added in Latvia's export product mix, see Vitola and Davidsons (2008)*

[14] *For an elaboration of this observation see Ronald MacDonald and Luca Ricci, "The Real Exchange Rate and the Balassa Samuelson Effect: The Role of the Distribution Sector", IMF Working Paper 2008.*

[15] *There are numerous sources describing the transition process from planned economy to market economy. See for example Herr et al (1994), Elster et al (1998), Gros & Steinherr (2004), Lavigne 2007, Roland (2000), Swain & Swain (2003), Turnock (1997), World Bank, Mitra and Selowsky (2002), Halpern &Wyplosz (1997), Sachs (1996).*

[16] *For example, Latvia produced and supplied locomotives for the entire Soviet Union.*

[17] *On consumption and production relations in the Soviet Union see Feher (1983), chapter 11. For structural change and its implications for the labor market see Blanchard (1998).*

allocation of resources across sectors of production. The restructuring was marked by increasing unemployment, in part due to labor market mismatches between skills demanded by the new economic structures and skills offered that were acquired under a very different set of production structures.

Latvia's method of privatizing state enterprises introduced a further difficulty into the restructuring process, as explained below. In addition, Latvia entered west-European markets at a time when these markets were already relatively saturated. The severe disruptions in Latvia's economy led to shifts in the relative importance of economic sectors, price fluctuations and differences in productivity between sectors of production. This, in turn, invited a second round of restructuring, as price signals and productivity signals motivated further re-allocation of resources. So, all in all, within a time-span of some 20 years, East European economies profoundly re-invented themselves. It is this rapid and severe structural change, which we believe invites analysis of inflation in transition economies in general, and in Latvia more specifically, with the Scandinavian Model of Inflation. The model relies on variations in productivity growth across economic sectors as its principal structural inflation driver, and motivates analysis of the consequences of structural shifts in an economy, with regard to its inflation performance.

When it comes to real factors impacting on inflation, Latvia is unusual in its composition of its sectors of production. Given the general income level, the country's service sector is unusually large relative to its manufacturing sector, measured as the share of the sectors contribution to GDP. This, unfortunately, is more a reflection of the weakness of Latvia's manufacturing sector, rather than a sign of having arrived at a mature post-industrial economy status.[18] In the language of the Scandinavian Model of Inflation: Latvia's non-tradable sector is unusually large relative to its tradable sector. This has serious implications for inflation, as we will show in section 3, below.

But why does Latvia display this unusual sectoral composition? An answer is provided by economic policy history – in particular, privatization policy during the 90s.[19] Latvia subscribed predominantly to voucher privatization. Vouchers that could be exchanged for shares in Latvian companies were distributed to the population according to a formula that depended, among other things, on years of residence in Latvia. This led to a wide dispersion of ownership: many owners, each with very small shares of companies, and, typically and most importantly, without any interest or affinity for the companies' line of business. To make a long story short: manufacturing companies' real assets, such as machinery and equipment, were sold off for cash by shareholders to a variety of buyers, including buyers in foreign countries. To this date, Latvia has not recovered from the erosion of real assets in its manufacturing base of the early to mid 90s, and therefore the artificial sector composition remains, which has strong implications for inflation.

This same fate is not shared by Latvia's Baltic neighbors. The reason, again, is policy. Estonia, for example, proceeded differently in privatizing state companies. A cornerstone of

[18] *A fact that has been obscured by Latvia's recent (but now deflated) intense real estate bubble.*

[19] *For details on Latvia's privatization history, see Iwaskiw (1995). For lessons learned from east Europe's voucher privatization, see Ellerman (2001). For general comparative analysis of alternative privatization policies, see Hare (1994) and Schmid-Schőnheim (1994), for a comparison between the Baltic States, see OECD 2000.*

Estonia's privatization policy[20] was to sell companies to 'real owners'. In practice, this meant selling majority stakes to investors with demonstrated interest and ability in effective management and product development of the companies they were bidding for, as well as commitment to durable investment and employment creation, no matter whether investor's were foreign or Estonian.

Even so, while structural reforms in the above interpretation eventually will slow down, other types of structural shifts appear to be just beginning, such as the shift in the export product mix from low value added to high value added products.[21] This suggests that the structural inflation driver will remain dominant in the foreseeable future.

3. The Scandinavian Model of Inflation

Let us consider a small open economy, split into a tradable and a non-tradable sector along the lines of Lindbeck (1979).[22] In both sectors of production, labour and capital are used as inputs. The two sectors differ when it comes to pricing, as purchasing power parity is assumed to govern pricing of tradable goods. In the non-tradable sector there is mark-up pricing, as prices are set in relation to unit labour costs. Labour is homogenous, and wages are equal in both sectors of production. In addition, factor income shares are fixed, in basic constraining the model validity to the long run. Expressing all variables as rates of change, the structural approach to inflation in a small open economy thus reads

1) $\dot{P} = \alpha \dot{p}_T + (1-\alpha)\dot{p}_{NT}$

2) $\dot{p}_T = \dot{p}_w + \dot{e}$

3) $\dot{w}_T = \dot{p}_T + \dot{q}_T$

4) $\dot{p}_{NT} = \dot{w}_{NT} - \dot{q}_{NT}$

5) $\dot{w}_T = \dot{w}_{NT}$

6) $\dot{q}_T > \dot{q}_{NT}$

Equation 1) gives the domestic price index (P) as a weighted average of prices in the tradable (p_T) and the non-tradable sector (p_{NT}), where (α) represent the tradable sector's share of aggregate output.

The purchasing power parity condition in equation 2) determines prices on tradable goods, which are conditional on world market prices (p_w) and the exchange rate (e).

Equation 3) determines wages in the tradable sector (w_T), according to the fixed factor income share assumption. Wage growth is, thus, in addition to the growth in tradable goods prices, determined by the sector's productivity growth $(\dot{q}_T)$. That is, wages in the tradable sector adjust according to the limits for maintaining purchasing power parity.

[20] *For details on Estonia's privatization policy, see Nellis (1996).*

[21] *For an analysis of Latvia's anticipated and desired shifts in the export product mix, see Vitola and Davidsons (2008)*

[22] *For a more thorough description of the model, see e.g. Aukrust (1977), or Edgren et al (1973).*

Prices on non-tradables are given by equation 4), and are determined by the difference between productivity growth (q_{NT}) and wage growth (w_{NT}) in the non-tradable sector.

Finally, equation 5) follows from the assumption of homogenous labour, equalizing wage growth between sectors and/or solidaric wage policy by unions, and equation 6) assumes that the sector that is exposed to international competition is characterized by higher productivity growth.

By applying the equations 2-5), the domestic price index in equation 1) can be expressed as

6) $$\dot{P} = \dot{p}_W + \dot{e} + (1-\alpha)[\dot{q}_T - \dot{q}_{NT}] = \dot{p}_W + \dot{e} + \dot{P}_{STR}$$

where $(\dot{P}_{STR})$ denotes structural inflation.

Domestic inflation is thus determined by three factors: world market prices, the exchange rate, and the productivity differential between the tradable and the non-tradable sector. While the first two components are nominal contributions to inflation, the latter is real.

The wage rate that helps to bring about such a rate of inflation is simply,

(7) $$\dot{w} = \dot{p}_T + \dot{e} + \dot{q}_T$$

and is determined by both domestic and international factors.

Based on this model of inflation Lindbeck makes the following inferences:

a) In a small open economy long run inflation is determined by imported inflation $(\dot{p}_W + \dot{e})$, and the term $((1-\alpha)[\dot{q}_T - \dot{q}_{NT}])$, which is in the terminology of Lindbeck, structural inflation $(\dot{P}_{STR})$. The structural component shows how a country's inflationary trend is related to productivity growth in different sectors of production.

b) In a small open economy, both international inflation (world market prices) and the rate of devaluation are completely passed on to domestic inflation. This is the case, even though the price index comprises both non-tradable and tradable goods, each scaled down by their share of aggregate production. The reason for the complete pass-through is that wages are determined in the tradable sector and carried over into the non-tradable sector.

c) The impact of productivity growth on inflation differs between sectors; whereas higher productivity growth in the tradable sector increases inflation, higher productivity growth in the non-tradable sector reduces inflation. The different impact on inflation is explained by how wages are formed in the model: while higher productivity growth in the tradable sector, by stimulating wages, increases prices in the non-tradable sector, productivity growth in the non-tradable sector reduces prices in the non-tradable sector via lowering of unit labour cost, keeping the sector's income shares fixed.

d) Even in the case of fixed exchange rate regimes, inflation might differ between countries. In fact, countries facing large differences in productivity growth between

sectors will enhance the difference in rates of inflation relative to countries where productivity differentials are smaller, complicating fixed exchange rate regimes between these two types of countries.

The determinants of inflation will differ between exchange rate regimes,[23] and in the case of a fixed exchange rate system, that is $(\dot{e} = 0)$, domestic inflation is determined by world market prices and the difference between productivity growth in the tradable and non-tradable sector,

8) $$\dot{P} = \dot{p}_T + (1-\alpha)[\dot{q}_T - \dot{q}_{NT}]$$

At the same time, wage growth is determined by growth in world market prices and productivity growth in the tradable sector

9) $$\dot{w} = \dot{p}_W + \dot{q}_T$$

Thus, both domestic and international factors impact on both inflation and wages when exchange rates are fixed.[24]

3.1 Comparative statics on structural inflation

As the real contribution to inflation is at the core of the transition process, which is dynamic by nature, it is reasonable to expect variations in structural inflation over time. For analysing how structural inflation develops over time, let us first consider the comparative statics of its various components. Equation 10) recaptures the structural part of inflation, according to the Scandinavian Model of Inflation

10) $$\dot{P}_{STR} = ((1-\alpha)[\dot{q}_T - \dot{q}_{NT}])$$

Structural inflation can thus be said to comprise two effects, that is the *productivity effect* and the *size effect* respectively. While the former is related to the productivity growth differential between the tradable and the non-tradable sector $(\dot{q}_T - \dot{q}_{NT})$, the latter is related to the size of the non-tradable sector $(1-\alpha)$.

The comparative statics on the productivity effect shows that

11) $$\frac{\delta \dot{P}_{STR}}{\delta(\dot{q}_T - \dot{q}_{NT})} = [1-\alpha] > 0.$$

An increased difference in productivity growth between sectors, in favour of the tradable sector, pushes up structural inflation. Also note that the productivity effect depends on the size of the non-tradable sector. That is, the bigger the non-tradable sector, the stronger is the impact on structural inflation accompanying an increase in this productivity differential. The

[23] *See e.g. The Central Bank of Norway (2002) for analysing the determinants of inflation under various exchange rate regimes.*

[24] *The Scandinavian Model of Inflation is a long-term supply side model. Demand conditions are only implicitly in the background – assumed to ensure that the goods produced and supplied will be met with the appropriate demand.*

reason is due to the different impact on wages accompanying productivity growth in the tradable and the non-tradable sector respectively.

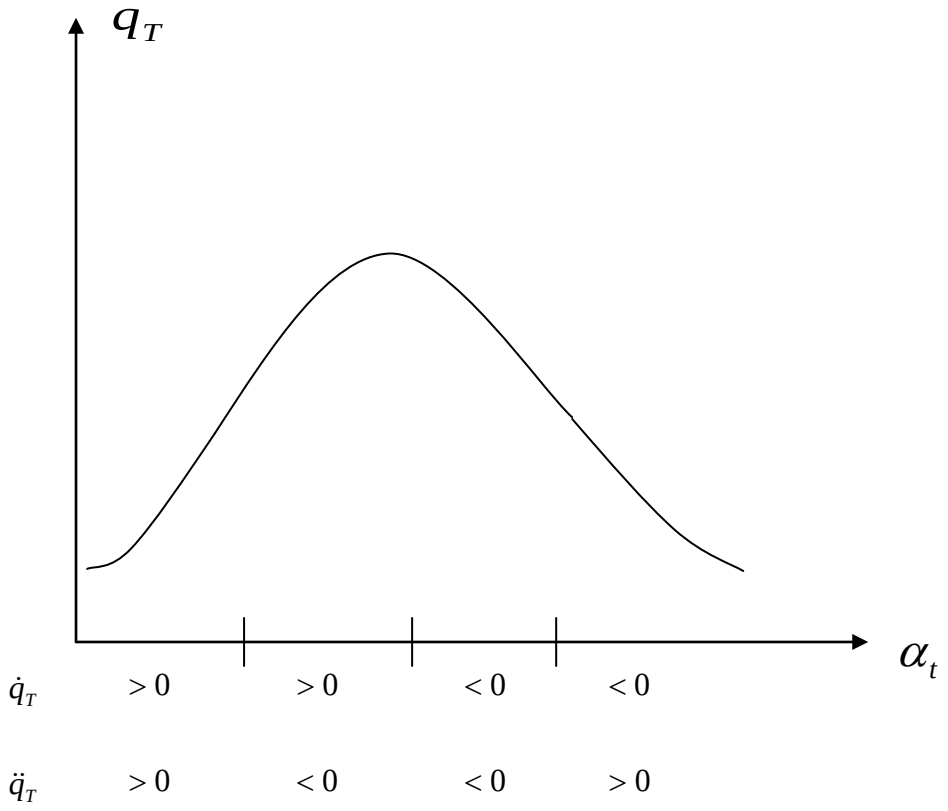
Likewise, the comparative statics on the size effect can be read as

12a) $$\frac{\delta \dot{P}_{STR}}{\delta \alpha} = -\left[\dot{q}_T - \dot{q}_{NT}\right]$$ 12b) $$\frac{\delta \dot{P}_{STR}}{\delta (1-\alpha)} = \left[\dot{q}_T - \dot{q}_{NT}\right]$$

That is, as the tradable (non-tradable) sector increases (decreases) the size effect impacts inflation negatively, as long as productivity growth in the tradable sector exceeds productivity growth in the non-tradable sector. Alternatively, as the economy matures the income level rises and the non-tradable sector expands, the impact on inflation accompanying the size effect is positive, as long as productivity growth in the tradable sector exceeds that of the non-tradable sector. Again, the reason is due to how wages are formed.

The comparative statics show two things. First of all, the productivity effect and the size effect are interrelated. Therefore, total impact on structural inflation accompanying a simultaneous change in the productivity effect and in the size effect is of interest, and this inter-linkage is analysed in section 3.2.

Figure 1: The relationship between the size of the tradable sector and its productivity measures.



Second, the difference in productivity growth between sectors determining the size effect depends on the production technology of the two sectors, and is in general an empirical question. According to equation (12) it is only the difference in productivity growth between sectors that matters. Thus, without loss in generality, we can make the simplifying assumption

that productivity is constant in the non-tradable sector, which implies that $(\dot{q}_{NT})$ equals zero. In this way the question of how the size effect impacts structural inflation can be reduced to analysing the production technology of the tradable sector. If returns to scale in the tradable sector are increasing (decreasing), the size effect will impact inflation positively (negatively) as the non-tradable sector expands. The implications of production technology are illustrated in figure 1, relating the size of the tradable sector to productivity (q_T), productivity growth $(\dot{q}_T)$, and the acceleration of productivity growth $(\ddot{q}_T)$ in the tradable sector.

3.2 The impact of transition on structural inflation

The comparative statics show how the productivity effect and the size effect are interlinked, where the former often is considered a prerequisite for structural shifts between sectors, and the latter is more of a consequence. In order to analyse the total impact on structural inflation from a combination of the productivity effect and the size effect, one has to make assumptions regarding the relation between the two. The combined effect can provide us with conditions for whether transition always will have a positive impact on structural inflation.

In this paper we extend the Scandinavian Model of Inflation by endogenizing the relative size of the tradable sector (α). We define the relative size of the tradable sector as a function of the productivity growth differential between the tradable and the non-tradable sector. Assuming, for simplicity, that productivity in the non-tradable sector is constant (and consequently $\dot{q}_{NT} = 0$), structural shifts are described by equation 13).[25]

13) $$\alpha = \alpha(\dot{q}_T) \quad \text{where} \quad \alpha'(\dot{q}_T) > 0$$

In our framework transition is defined as moving toward the optimal distribution of value added between economic sectors. For post-communist societies this typically implies a shift from a large to a small (α), i.e. from a large relative size of the tradable sector to a smaller one (or, alternatively, from a small relative size of the non-tradable sector to a larger one). The underlying intuition is that increased productivity in a sector translates into increased profits and rents, which act as a signal and attractor for the re-allocation of resources into this sector through changes in relative prices.

Even so equation 13) also implies that there is an optimal distribution of value added between sectors, depending on the productivity growth differential, or in our simplified setting, the productivity growth rate of the tradable sector. According to our specification of transition, it both contains the possibility for transition and, what we in the following refer to as "reverted transition", that is a relative expansion of value added in the tradable sector. As transition is negatively related to productivity growth in the tradable sector, it is dependent on whether productivity growth increases or decreases. In our framework transition takes place when $(\dot{q}_T < 0)$ as the tradable sector now decreases and the non-tradable sector increases. "Reverted transition" on the other hand, occurs when $(\dot{q}_T > 0)$ and the tradable sector expands. Countries which have been exposed to unusually large shocks with structural impacts, like Latvia, might be described in such a way.

[25] We assume that $\alpha = \alpha(\dot{q}_T)$ is continuous and differentiable.

In our extended version of the Scandinavian Model of Inflation the inflation effects accompanying the structural shifts inherent in transition can be split between the productivity effect (PE) and the size effect (SE) analysed above. Again, by assuming constant productivity in the non-tradable sector, productivity growth is zero (i.e. $\dot{q}_{NT} = 0$), making $(\dot{q}_T)$ the only variable that matters when analyzing the combined effect on structural inflation.

The total derivative of equation 10) with respect to productivity growth in the tradable sector equals

14) $$\frac{d\dot{P}_{STR}}{d\dot{q}_T} = \left(\underbrace{(1-\alpha)\ddot{q}_T}_{PE} - \underbrace{(\dot{q}_T)\alpha'(\dot{q}_T)\ddot{q}_T}_{SE} \right)$$

By applying equation 14), and the relationship between productivity growth and the acceleration of the productivity growth illustrated in figure 1, the impact of increased productivity growth in the tradable sector[26] on structural inflation can be separated into four regimes, classified as follows:

1) A small tradable sector
When $\dot{q}_T > 0$ and $\ddot{q}_T > 0$ the impact of productivity growth in the tradable sector on structural inflation is ambiguous, and depends on the relationship between PE and SE. If PE > SE the impact on structural inflation is positive.

2) An intermediate sized tradable sector (pre-q_T-peak)
When $\dot{q}_T > 0$ and $\ddot{q}_T < 0$ the impact of increased productivity growth in the tradable sector on structural inflation is again ambiguous. If SE > PE the impact on structural inflation is positive.

3) An intermediate sized tradable sector (post-q_T-peak)
When $\dot{q}_T < 0$ and $\ddot{q}_T < 0$ the impact on structural inflation is unambiguous, as both SE and PE impact structural inflation negatively.

4) A large tradable sector
When $\dot{q}_T < 0$ and $\ddot{q}_T > 0$ the impact on structural inflation is again unambiguous, but now the impact on structural inflation is positive.

The regimes show that the impact on structural inflation following increased productivity growth in the tradable sector depends on the size of the tradable sector. Stated differently, the impact of transition on structural inflation varies over time. The reason why results differ between regimes is due to how wages are formed. As wages are determined in the tradable sector, and as fixed income shares determine wages in the non-tradable sector as a residual (or alternatively, owing to solidaric wage policy), the size effect impacts wages and inflation negatively (positively) as long as productivity growth is positive (negative). Likewise, the productivity effect depends positively on the acceleration of productivity growth in the

[26] W*e conduct our analysis in terms of 'reverse transition' (transition being defined in terms of a decrease in the relative size of α, as, by equation (13) and (14) ,we characterize what happens as a consequence of an increase in α. In light of Latvia's current disproportionately small tradable sector, as well as policy announcements aiming at increasing the relative weight of the sector, the perspective of 'reverse transition' is the appropriate one.*

tradable sector, which differs between the convex (regimes 1 and 4) and the concave part (regime 2 and 3) of the productivity curve.

For understanding the interaction between the two forces at work, let us for instance consider the combined effect when the tradable sector is small (regime 1). Now productivity in the tradable sector increases, and the growth rate is accelerating. Whereas the latter makes the productivity effect impact inflation positively, the former makes the impact of the size effect on structural inflation negative. That is, increased productivity growth in the tradable sector expands the productivity differential to the non-tradable sector, and the increased differential impacts structural inflation positively. At the same time increased productivity growth in the tradable sector will, however, also expand the size of the tradable sector relative to the non-tradable sector, reducing the impact of productivity growth differences on domestic inflation. All in all, in regime 1 the combined effect on structural inflation is ambiguous, since our theoretical argument does not inform about the relative magnitudes of the two effects.

The classifications show how the impact of transition on inflation is unambiguously positive when the tradable sector is large, and unambiguously negative during the intermediate sized (post-q_T-peak period). However, as the tradable sector shrinks, the inflation effects accompanying increased productivity growth in the tradable sector become ambiguous. Now a role for policy intervention emerges. When in transition, countries have to accept some inflation pressure stemming from the supply side. Still, keeping the inflation pressure at a minimum should be a policy goal. Hence, the model gives some policy guidelines based on our decomposition of the impact on structural inflation. The supply side policies should orient themselves on finding relations between the productivity effect and size effect that minimises the total impact on inflation accompanying transition.

4. Applying the Scandinavian Model of Inflation to Latvian Data

Using data from the Central Statistical Bureau of Latvia over the past 12 years (1996-2007), the relations between inflation, structural inflation and non-structural inflation, including the two components of structural inflation are derived numerically.

By applying the Scandinavian Model of Inflation to Latvian data, two comments are in order. First, the model assumes that wage growth is equalized between sectors. While this may appear to be a rather strong assumption, there is empirical evidence in support of it. Égert et al (2002) analyse a number of transition economies including Latvia. They find in most of the countries that (i) real wage growth in the tradable sector is connected to productivity growth, and (ii) that wage increases tend to equalize between the tradable and the non-tradable sectors. Hence, both provide support for the underlying model assumptions.

Second, when calculating the consumer price index Lindbeck specifies the relative shares of the tradable and non-tradable sector in terms of value added in different sectors of production. Hence sectoral shares are defined as relative contributions to GDP. This is in contrast to the conventional approach when calculating the Balassa-Samuelson effect, which, instead, defines sectoral shares in terms of their contributions to CPI. The distinction between using sectoral shares derived from GDP and CPI respectively, can be part of the reason for the dismal empirical merits of the Balassa-Samuelson effect, i.e. its disappointingly small impact on inflation and real exchange rates (Égert et al, 2005). Focusing on real exchange rates, however, the CPI approach of the Balassa-Samuelson analysis is understandable. On the other

hand, when analysing the impact of structural shifts on inflation, GDP measures are more suitable. First of all it highlights supply side effects. Second, we avoid the shortcomings of the CPI approach related to high share of food- and regulated prices, as well as the low share of non-tradables in the CPI commonly found in most transition economies (Égert et al, 2002). In Latvia, the latter argument is of particular importance given the large size of the non-tradable sector.

Table 2 shows 11-year time series for a variety of recorded and estimated inflation measures, as well as the Maastricht inflation criterion for reference. Our estimated annual average structural inflation rate is 4,7 percent, and the structural component of Latvia's overall inflation is thus by itself above the value allowed by the Maastricht convergence criterion. Even so, as mentioned above, between December 2005 and June 2008 (not shown in table 2), a time of accelerated inflation in Latvia, the highest permissible inflation rate under the Maastricht price stability criterion was merely 3,7 percent.

Table 2: Inflation – Latvia, and Maastricht Inflation Criterion in percent

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
a)Inflation (HICP)	8.1	4.3	2.1	2.6	2.5	2.0	2.9	6.2	6.9	6.6	10.1
b)Average Annual Inflation	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
c) Cumulative Inflation 1997-2007	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3	54.3
d) Cumulative Structural Inflation 1997-2007	51.9	51.9	51.9	51.9	51.9	51.9	51.9	51.9	51.9	51.9	51.9
e) Average Annual Structural Inflation	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
f) Average Non-Structural Inflation	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
g) *Maastricht criterion*			*2.1*	*2.7*	*3.1*	*2.9*	*2.7*	*2.2*	*2.4*	*2.9*	*2.8*

Source: a-c) Eurostat, date of extraction 26.Aug. 2008 and authors' calculations; d-f) authors' calculations based on Central Statistical Bureau of Latvia data, g)European Commission.
Note: a) annual average rate of change in Harmonized Index of Consumer Prices (HICPs).

Between 1997 and 2007 the inflation rate in Latvia varied between 2,0 percent and 10,1 percent year-on year. The severe variation in inflation is due to the fact that Latvia during this period had to face both the implications of the Russian Ruble crisis (1998-2003), and the beginning of a period (from 2007 and onwards) where both global food- and energy prices rose significantly. Thus substantial shifts have come about, inducing drastic policy interventions. In principle this invites analysis of sub-samples with regard to structural and non-structural inflation. However, we refrain from such an exercise because firstly the time series is short as it is, and second we want to adhere to the spirit of the Scandinavian Model of Inflation, which is characterized by a longer-term perspective.

For the period as a whole, average annual inflation is 4,9 percent. In this period there are severe variations in structural inflation year-on-year, but again, given the long term perspective of the model, the average structural inflation rate is most relevant. For the period

between 1997 until 2007 our estimated average annual structural inflation equals 4,7 percent, leaving behind a more modest average non-structural inflation rate of only 0,2 percent.[27]

Table 2 suggests several things: First, structural inflation by itself exceeds the reference value imposed by the Maastricht inflation criterion. As structural inflation reflects a "normal" and unavoidable adjustment processes of becoming a mature, balanced economy, this invites the following commentary: Given the inflation criterion, which was originally designed by and for mature west European economies, either countries like Latvia will have to remain outside the monetary union for a significant number of years, or the criterion is inappropriate in the context of the desired monetary union enlargement. Second, when we abstract from the unavoidable structural inflation Latvia's inflation rate has been rather modest for a fast growing economy, and should not be alarming for policy-makers. Third, from 1998 to 2003, in the aftermath of the Russian Ruble crisis, persistent structural inflation counteracted what would otherwise have been a period of deflation.

Knowing the substantial level of structural inflation that has been present in Latvia over this period, the distribution between the size effect and productivity effect is of interest. In order to split the real contribution to inflation between the size effect and the productivity effect, the development of the share, $(1-\alpha)$, that is the size of the non-tradable sector in gross value added over time is calculated and presented in table 3. [28]

Table 3. Share of Latvia's non-tradable sector in gross value added at constant 2000 prices.

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
70.4	*69.8*	*69.9*	*71.7*	*71.8*	*71.8*	*71.4*	*71.6*	*71.9*	*72.5*	*73.3*	*74.3*

Source: Central Statistical Bureau of Latvia, data table 2-4 *Gross domestic product by kind of activity at constant prices of 2000*, and authors' calculations.

Table 3 shows two things: Latvia's proportion of the non-tradable sector is high, and it is increasing. Although the increase has not been monotonic over each single year, the trend is positive. The table shows that between 1999 and 2004, no substantial increase in the size of the non-tradable sector occurred. Taking the decline in the inflation rate in the aftermath of the Russian Ruble crisis into account this fits nicely. Prices were simply not developing in a manner favourable for structural shifts. Since 2002 the expansion of the non-tradable sector has been both monotonic and accelerating.

The size of the non-tradable sector has implications for the rate of inflation, as conveyed by expression 12b. A relative expansion of the non-tradable sector increases inflation, as long as

[27] *For computing the average structural inflation of 4.7% (row (e) in table 2) we take as a point of departure expression (10). For the period 1997-2007 we calculate average structural inflation as the annual average of the product of two factors: the cumulative productivity growth differential between sectors and the cumulative GDP share of the non-tradable sector. This approach is motivated by the long term perspective of the Scandinavian Model of Inflation, abstracting away from short-term fluctuations in the productivity differential. We substitute numerical values for (1−α) from Table 3, and for* $(q'_T - q'_{NT})$ *from Appendix table A1, and find cumulative structural inflation to equal 51.9%, in row (d) of table 2, from which we compute the average annual structural inflation of 4.7% in row (e) of Table 2.*

[28] *The division into tradable and non-tradable sectors is not a trivial matter (see for example McRae et al 1987), and a variety of groupings have been used by different authors for different countries. In this paper we define as non-tradables the service sector (categories G – O of the Central Statistical Bureau of Latvia), which includes wholesale, retail trade; repair of motor vehicles, motorcycles, personal, household goods (G), hotels and restaurants (H), transport, storage and communications (I), financial intermediation (J), real estate, renting and business activities (K), public administration and defence; compulsory social security (L), education (M), health and social work (N), other community, social and personal service activities (O).*

productivity growth in the tradable sector exceeds that of the non-tradable sector – other things held constant. It is in congruence with Latvian data: The share of non-tradables has grown (Table 3), inflation has increased since 2002 (table 2), and, on average, the productivity growth of tradables has exceeded that of non-tradables.[29] Our calculations show that from 1997 to 2007 cumulatively productivity growth of tradables outpaced that of non-tradables by 7 percent.[30] In terms of average annual performance of productivity growth, the tradables sector has been ahead of the non-tradables sector by 0,6 percent. In fact, the extremely large share of GDP arising from the non-tradable sector makes the productivity differential particularly important for the substantial structural inflation in Latvia. This is due to the fact that, as a consequence of the unusually large relative size of the non-tradable sector, the productivity differential will be passed on to inflation, to an extent far beyond economies at the same level of income.

Consider for instance a productivity differential of 7 percent, and a size of non-tradables of 74 percent of gross value added. If the productivity differential increases by one percent, the partial contribution to structural inflation is 0,74 percentage points. If, on the other hand, the size of the non-tradable sector is 40 percent of gross value added, the partial contribution to inflation is only 0,4 percentage points. Thus, the somewhat artificial structure of the Latvian economy makes it particularly exposed to this part of structural inflation.

Also the size effect impacts inflation positively in Latvia. The impact on inflation accompanying an expanding non-tradable sector is shown by equation 12b. An expanding non-tradable sector impacts structural inflation positively as long as the productivity differential is positive. In our sample, the productivity differential is estimated to be 7 percent in cumulative terms, and 0,6 percent in average annual terms. That is, by applying the average annual productivity growth difference of 0,6 percent, a one percent increase in the non-tradable sector will increase inflation by 0,006 percentage points. So we can see that the marginal contribution to inflation from shifts in relative sector size is clearly less than the effect of changes in the productivity differential.

Applying equations (11) and (12) to Latvian data we calculate the magnitudes of productivity effect and size effect respectively. The contributions of the two effects to structural inflation are summed up in table 4. Again, we focus on average measures, in keeping with the spirit of the Scandinavian Model of Inflation and its long-term perspective. By fixing variables to their average values, the sum of the productivity effect and the size effect does not add up to our calculated average structural inflation, leaving aside a residual part of 0,58 percent. Even so, table 4 gives an indication of the relative magnitude of the two effects, where the productivity effect accounts for the ballpark of structural inflation in Latvia.

Table 4: Contribution to structural inflation from the productivity effect and the size effect (averages over the years 1997-2007)

a) Average Structural Inflation	4.714

[29] *See table A1 in the appendix.*

[30] *Central Statistical Bureau of Latvia, data table 2-4 Gross domestic product by kind of activity at constant prices of 2000, table 5-9 Employed in the main job by kind of activity, and authors' calculations.*

b) Average Contribution of Productivity Effect to Average Structural Inflation	4.133
c) Average Contribution of Size Effect to Average Structural Inflation	0.0004
d) Residual Contribution*	0.5806

Authors' calculations: Averages are computed over the annual values from 1997 to 2007.

* Residual Contribution is {(a) – [(b)+(c)]} and comes from the relative arbitrariness of using the average size of the non-tradable sector in calculating (b), and likewise from the relative arbitrariness of using the average sectoral productivity growth difference in calculating (c).

Using our calculated average annual structural inflation of 4.7 percent (table 2) we arrive at the average contributions of productivity effect and size effect in the following way: By fixing the relative share of the non-tradable sector at its average value for the period, 71.8 percent, and combining it with year-on-year changes in the productivity growth differential, our calculations show that of the 4.7 percent of average structural inflation 4.1 percent is accounted for by the productivity effect. Likewise, by fixing the productivity differential to its average, 0.6 percent, over the period, and varying the size of the non-tradable sector, the size effect contributes 0.0004 percent to average structural inflation.

Thus, with regard to the regimes defined in section 3.2, Latvia, with its small tradable sector and its substantial non-tradable sector, must be classified within regime 1. This implies, given our calculations, that, although the productivity effect and the size effect are opposite in sign, their combined net impact is to increase structural inflation. Thus, the artificial economic structure of Latvia, with its substantial non-tradable sector exerts significant upward pressure on structural inflation.

5. Summary and discussion

By applying a framework that allows for both nominal and real contributions to inflation, this paper links the inflation performance of Latvia to the equilibrium effects at the heart of the country's economic transition. The real contribution to inflation is argued important for transition economies, stimulating the potential for future growth and improved standards of living. However, when it comes to compliance with the Maastricht criteria, inflation has been a long standing issue for Latvia, and the distinction between nominal and real factors is de facto irrelevant. From the EMU's point of view, high inflation is, due to the potential for undermining the stability of the euro, an argument for restraining the entry of new members. On the other hand, from the perspective of a transition economy, the real factors impacting on inflation are desirable – being at the core of the necessary shifting of resources between sectors. Representing equilibrium effects, it is, in fact, questionable whether the real factors should be relevant for compliance with the criteria for EMU entrance - or, stated alternatively, whether the criteria themselves are appropriate when considering monetary union enlargements by including transition economies.

In Latvia, average annual inflation equals 4,9 percent over the period. At the same time, average annual structural inflation is estimated to 4.7 percent, leaving about an average non-structural inflation rate that always fulfils the Maastricht criteria.

The Scandinavian Model of Inflation singles out the determinants of inflation in Latvia over the last 12 years. Two factors emerge as sources of inflation: Nominal factors, represented by the growth in world market prices and the exchange rate, and real factors. The real

contributions can again be split in two: the difference in productivity growth between the tradable and the non-tradable sector (the productivity effect), and the relative size of the two sectors respectively (the size effect).

If the real contribution to inflation is divided between the productivity effect and the size effect, the reason for the pronounced structural inflation in Latvia becomes clearer. In Latvia, where the size of the non-tradable sector seems out of proportion taking the country's income level into account, the productivity effect accounts for 87 percent of average structural inflation. This is due to the fact that the size of the non-tradable sector acts as a scaling factor for the productivity effect – and in the case of Latvia, magnifying the impact of the productivity effect on structural inflation. If instead we had applied a CPI based measure of the size of the non-tradable sector, the productivity effect would be significantly smaller.

The structure of the Latvian economy can be related to the privatization policy of the 1990s, making it a key factor when explaining the country's persistent structural inflation. In fact, the distribution of value added between sectors places Latvia within regime 1, discussed in section 3.2, where the productivity effect exceeds the size effect, and transition, as it is defined, has positive impact on structural inflation. Thus, even in the event of a recession disinflation will be slow.

In Latvia, structural inflation might be pronounced due to its somewhat artificial economic structure, where the non-tradable sector is bigger and the tradable sector smaller, than in other economies at a similar level of income. However, in the public debate regarding inflation, both the size effect and the productivity effect are more or less ignored.

In this paper, the developments in Latvia over the last 12 years are analysed, arguing that transition, structural reforms and the accompanying real factors impacting on inflation have been at the very heart of the country's inflation process. Even so, upcoming structural reforms might continue to impact inflation positively in the years to come.

For instance, at a seminar in Brussels on February 1-2, 2008 organized by the Estonian Central Bank and the IMF, academics and policymakers discussed policies for the Baltic countries in light of the global imbalances and increasing difficulties on the credit markets. Among the policy recommendations was a change in investment strategy to divert investment and production away from the non-tradable sector and toward the tradable sector- a sentiment that has also been expressed by the Central Bank of Latvia and Latvia's Ministry of Economics. Besides being conducive to reducing Latvia's current account deficit, such a strategy would also impact on structural inflation.

Thus, comprehensive estimates on value added accompanying such reforms in the different sectors, and for Latvia as a whole, are necessary before implementation.

References

Ajevskis, Viktors (2008), 'Inflation and Inflation Uncertainty in Latvia', Latvijas Banka Working Paper No. 4/2007, The Bank of Latvia, http://www.bank.lv/eng/main/all/pubrun/workingpap/2007/.

Ancans Helmuts (2007), 'Maastricht Criteria Compliance Prospects in Latvia', Monetary Policy Department, The Bank of Latvia.
http://www.bank.lv/eng/main/all/pubrun/citaspub/maestrichprospects/.

Aukrust, Odd (1977). 'Inflation in the Open Economy: A Norwegian model, in Krause, L. and Salant, W. (eds.), Worldwide Inflation, The Brookings Institution, Washington DC.

Balassa, Bela (1964). 'The Purchasing Power Parity Doctrine: A Reappraisal', JPE (December) 72(6), pp. 584-96.

Beņkovskis, Konstantīns and Paula, Daina (2007), 'Inflation Expectations in Latvia: Consumer Survey Based Results', Latvijas Banka Working Paper No. 1/2007, The Bank of Latvia, Riga,
http://www.bank.lv/eng/main/all/pubrun/workingpap/2007/.

Blanchard, Olivier (1998). The Economics of Post-Communist Transition, Oxford: Clarendon Press.

Buliř, Aleš and Hurnik, Jaromir (2006), 'The Maastricht Inflation Criterion: How Unpleasant is Purgatory? IMF Working Paper No. WP/06/154, The IMF, Washington D.C., http://papers.ssrn.com/sol3/papers.cfm?abstract_id=920246.

Central Bank of Norway (2002), Monetary Policy Report. No. 3, 2002.
http://www.norges-bank.no/search/search____112.aspx?search=Norges+Bank+Monetary+Policy+Report+3%2f2002&page=1&category='Other'.

Central Statistical Bureau of Latvia, Riga, http://www.csb.lv.

Edgren, Gunnar, Faxen, Karl O. and Odhner, Carl. E. (1973). Wage Formation and the Economy, London: Allen and Unwin.

Égert, Balázs, Lommatzsch, Imed Drine Kirsten and Rault, Christophe (2002),'The Balassa-Samuelson Effect in Central and Eastern Europe: Myth or Reality?' William Davidson Institute Working Paper No. 483/2002, University of Michigan, William Davidson Institute, http://wdi.umich.edu/Publications/WorkingPapers/WP401to500.

Égert, Balázs (2005). 'Balassa-Samuelson Meets South Eastern Europe, the CIS and Turkey: A Close Encounter of the Third Kind?'.The European Journal of Comparative Economics, Vol. 2, No. 2, pp. 221- 243.

Égert, Balázs and Podpiera, Jirí (2008), 'Structural Inflation and Real Exchange Rate Appreciation in Visegrad-4 Countries: Balassa-Samuelson or Something Else?', CEPR Policy Insight No. 20/2008, CEPR, London, *www.cepr.org/pubs/PolicyInsights/PolicyInsight20.pdf.*

Ellerman, David (2001). 'Lessons from Eastern Europe's Voucher Privatization', Challenge, 44(4), pp.14-37.

Elster, Jon, Offe, Claus and Preuss, Ulrich K. (1998). Institutional Design in Post-Communist Societies: Rebuilding the Ship at Sea (Theories of Institutional Design), Cambridge: Cambridge University Press.

Feher, Ferenc, Heller, Agnes and Markus, György (1983). Dictatorship Over Needs: An Analysis of Soviet Societies, Blackwell Publishers.

Frisch, Helmut (1983). Theories of Inflation, Cambridge Surveys of Economic Literature, Cambridge University Press.

Gros, Daniel and Steinherr, Alfred (2004). Economic Transition in Central and Eastern Europe: Planting the Seeds, Cambridge: Cambridge University Press.
Halpern, L. and Wyplos, Ch. (1997). 'Equilibrium Exchange Rates in Transition Economies'. IMF Staff Papers, Vol. 44, No. 4, December 1997, pp. 430-461.

Hare, Paul G. (1994). 'Privatization in Comparative Perspective: An Overview of Key Issues', in Herr, Hansjoerg, Tober, Silke and Westphal, Andreas (eds.), Macroeconomic Problems of Transformation: Stabilization Policies and Economic Restructuring, Edward Elgar.

Herr, Hansjoerg, Tober, Silke and Westphal, Andreas (eds.), (1994). Macroeconomic Problems of Transformation: Stabilization Policies and Economic Restructuring, Edward Elgar.

Iwaskiw, Walter R. (ed.), (1995), 'Latvia: A Country Study', Washington: GPO for the US Library of Congress, http://countrystudies.us/latvia/.

Lavigne, Marie (2007). The Economics of Transition: From Socialist Economy to Market Economy, 2nd edition, Palgrave Macmillan.

Lindbeck, Assar (1979). ' Imported and Structural Inflation and Aggregate demand: The Scandinavian Model Reconstructed, in Assar Lindbeck (ed.), Inflation and Employment in Open Economies, Oxford University Press.

McRae, James J. and Desbois, Martine M. (eds.), (1987). Traded and Non-Traded Services: Problems of Theory, Measurement and Policy, Toronto, Ontario: Proceedings of a Service Sector Roundtable, June 2-4, 1987, The Institute for Research on Public Policy, Halifax, Nova Scotia.

Ministry of Economics, Republic of Latvia (2008). Economic Development of Latvia Report 2008. Riga. http://www.em.gov.lv/em/2nd/?cat=137.

Ministry of Economics, Republic of Latvia (2008). The National Economy of Latvia: A Macroeconomic Review 2008, No. (2), June 2008. http://www.em.gov.lv/em/2nd/?cat=138.

Mitra, Pradeep and Selowsky, Marcelo (eds.), (2002). Transition--The First Ten Years: Analysis and Lessons for Eastern Europe and the Former Soviet Union, World Bank Publications, January 2002, *siteresources.worldbank.org/INTTRANSITION/Newsletters/20561622/JanFeb2002.pdf,* http://www.google.no/search?sourceid=navclient&ie=UTF-8&rlz=1T4SUNA_enNO237NO248&q=World+Bank%2c+Pradeep+Mitra%2c+and+Marcelo+Selowsky+eds%2e+%282002%29+Transition%2d%2dThe+First+Ten+Years%3a+Analysis+and+Lessons+for+Eastern+Europe+and+the+Former+Soviet+Union%2c+World+Bank+Publications%2c+January+2002%2e

Nellis, John (1996). 'Finding Real Owners – Lessons from Estonia's Privatization Program', Viewpoint, Note No. 66, The World Bank, Private Sector Development Department – Europe and Central Asia, World Bank Report number 16925, http://www-wds.worldbank.org/servlet/main?menuPK=64187510&pagePK=64193027&piPK=64187937&theSitePK=523679&entityID=000009265_3980420172834

Noyer, Christian (2001), "Challenges Ahead: The Accession Process", Christian Noyer, Vice President of the European Central Bank, Foreign and Commonwealth Office, London, November 12, 2001, http://www.bis.org/review/r011120b.pdf.

OECD (2000). The Baltic States, A Regional Economic Assessment, OECD Economic Surveys 1999-2000, h*ttp://www.ingentaconnect.com/oecd/03766438/2000/00002000/00000005/1000411e* .

Rimsevics, Ilmars (2008), 'Recent Economic Developments and Banking in Latvia', Bank of Latvia, Notes, July 2008, Riga: The Bank of Latvia, www.bank.lv/eng/info/act/, http://www.bank.lv/eng/main/all/sapinfo/presrunas/receco/.

Roland, Gérard (2000). Transition and Economics: Politics, Markets, and Firms (Comparative Institutional Analysis), The MIT Press.

Rosenberg, Christoph B. (2008). 'The Baltic Party Need Not End in a Bust", IMF Survey Magazine: Countries & Regions, February 19, 2008, http://www.imf.org/external/pubs/ft/survey/so/2008/CAR021908A.htm.

Sachs, Jeffrey (1996). 'Economic Transition and the Exchange-Rate Regime', The American Economic Review, Vol. 86, No. 2, May 1996, pp. 147- 152.

Schmid-Schönheim, Thomas (1994). 'Determinants of Privatization Strategies: The Hungarian and German Experiences', in Herr, Hansjoerg, Tober, Silke and Westphal, Andreas (eds.), Macroeconomic Problems of Transformation: Stabilization Policies and Economic Restructuring, Edward Elgar.

Statement by IMF Mission to Latvia on 2007 Article IV Consultation Discussion. Press Release No 07/87, May 4, 2007, The International Monetary Fund, http://www.imf.org/external/np/sec/pr/2007/pr0787.htm.

Swain, Geoffrey and Swain, Nigel (2003). Eastern Europe Since 1945: Making of the Modern World, 3rd edition, Palgrave Macmillan.

Tamirisa, Natalia and Deniz, Igan (2007). 'Banking Risks Rise in Eastern Europe', IMF Survey Magazine: Countries & Regions, September 25, 2007, http://www.imf.org/external/pubs/ft/survey/so/2007/RES0925A.htm.

Turnock, David (1997). The Eastern European Economy in Context: Communism and the Transition (Eastern Europe Since 1945), Routledge.

Vanags, Alf and Hansen, Morten (2008), Stagflation in Latvia: How Long, How far, How Deep? SSE Riga/BICEPS Occasional Paper No. 4, http://www.biceps.org/en/OccasionalPapers.

Vitola, Kristine and Davidsons, Gundars (2008), 'Structural Transformation of Exports in a Product Space Model', Latvijas Banka working paper 4/2008, http://www.bank.lv/eng/main/all/pubrun/workingpap/2008/.

Appendix Table 1 **Latvia**	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
GDP Tradables Mill. Lats At constant prices of 2000	1106	1156.6	1126.6	1198.1	1298.1	1403.5	1493	1606.6	1743.4	1889	1997.4	
#Employed in tradable sector In thousands	468.9	450.1	411.7	383	396	405.8	410.6	412.8	394.9	419.7	428	
Productivity in Tradable Sector Mill. Lats at constant prices of 2000	2.3587	2.5697	2.7365	3.1282	3.2780	3.4586	3.6361	3.8920	4.4148	4.5008	4.6668	
Productivity Difference year-on-year Tradables million lats	−0.008	0.2109	0.1668	0.3917	0.1498	0.1806	0.1775	0.2558	0.5228	0.0861	0.1660	
% change year-on-year in productivity of Tradables sector (decimal notation of percent)	−0.003	0.0894	0.0649	0.1432	0.0479	0.0551	0.0513	0.0704	0.1343	0.0195	0.0368	
GDP Non-Tradables mill. Lats At constant prices of 2000	2551.1	2680.6	2850.4	3054.6	3309.8	3508	3764.9	4111.9	4592.3	5194.5	5761.5	
#Employed in Non-Tradable sector In thousands	519.2	534.5	554	553.3	560.5	578.6	591.1	601.3	637	662.5	685.3	
Productivity in Non-Tradable Sector Mill. Lats at constant prices of 2000	4.9135	5.0152	5.1451	5.5207	5.9051	6.0629	6.3693	6.8384	7.2093	7.8408	8.4073	
Productivity Difference year-on-year Non-Tradables million lats	0.4043	0.1016	0.1300	0.3756	0.3844	0.1578	0.3064	0.4690	0.3709	0.6315	0.5665	
% change year-on-year in productivity of Non-Tradables sector (decimal notation of percent)	0.0897	0.0207	0.0259	0.0730	0.0696	0.0267	0.0505	0.0736	0.0542	0.0876	0.0722	
Cumulative Productivity Growth Difference Tradables minus Non-Tradables 1996-2007 (decimal notation of percent)	0.06564											
Share of Non-Tradables in Gross Value Added (decimal notation of percent) $(1-\alpha)_t$	0.6976	0.6986	0.7167	0.7183	0.7183	0.7143	0.7160	0.7191	0.7248	0.7333	0.7426	
Average share of Non-Tradables in Gross Value Added 1997-2007	0.71813											

Appendix Table A2 **Latvia**		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
a) Productivity Growth Difference (Tradables minus Non-Tradables) in percent (decimal notation)		−0.093	0.0688	0.039	0.0702	−0.022	0.0284	0.0008	−0.003	0.0801	−0.068	−0.035
b)Year-on-year change in productivity growth difference (Tradables minus Non-Tradables) in percent (decimal notation)			0.1617	−0.029	0.0312	−0.092	0.0501	−0.027	−0.004	0.0834	−0.148	0.0327
c)Cumulative year-on-year change in productivity growth difference (Tradables minus Non-Tradables) in percent (decimal notation)	0.0577											
d)Contribution of Productivity Effect to Average annual Structural Inflation in percent (decimal notation)	0.0413											
e)Share of Non-Tradable sector in Gross Value Added		0.6975	0.6985	0.7167	0.7183	0.7183	0.7143	0.7160	0.7191	0.7248	0.7333	0.7426
f)Year-on-year change in the share of Non-Tradable sector			0.0010	0.0181	0.0016	−0.000	−0.004	0.0017	0.0030	0.0058	0.0085	0.0093
g)Percent change year-on-year in the share of the Non-Tradable sector in Gross Value Added			0.0014	0.0260	0.0022	−0.000	−0.006	0.0025	0.0042	0.0081	0.0117	0.0126
h)Cumulative percent change year-on-year in the share of the Non-Tradable sector in Gross Value Added 1998-2007	0.0631											
i)Contribution of Size Effect to Average annual Structural Inflation in percent (decimal notation)	0.0004											
Average annual Structural Inflation in percent (decimal notation)	0.0472											