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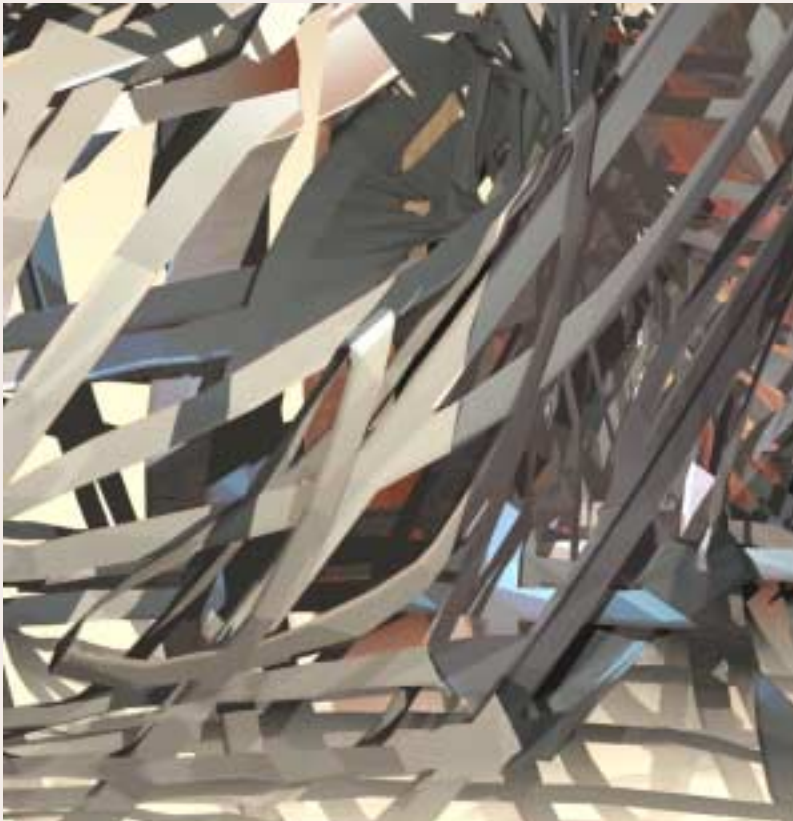
PRICE DYNAMICS IN LATVIA

EXPERIENCE AND FUTURE PROSPECTS



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ABSTRACT

The Latvian experience shows that the central bank's successful monetary policy, together with the government's prudent policies, helps to reduce inflation. Due to Latvia's small size and high degree of openness of its economy, the exchange rate plays a significant role in determining inflation in the country. The Bank of Latvia's interim objective – the stability of the exchange rate – has been the key to achieving and maintaining price stability. In light of the fact that many factors that determine inflation in Latvia are beyond the central bank's control, the pursuit of a strategy based on inflation targeting appears to be difficult.

Key words: *monetary policy, inflation, Phillips curve*

JEL classification codes: *C13, E31*

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INTRODUCTION

Inflation or an overall increase in prices has a long history. The phenomenon has existed ever since money was introduced as a means of payment. For a long time neither economists nor policy makers could identify causes for inflation. In the 1960s, inflation and economic activity were supposed to have a direct and firm relationship; hence, it was believed that the central bank could reduce unemployment and promote economic growth by targeting inflation. In the last three decades, this assumption has proved to be fallacious, as all attempts of the industrialized countries to stimulate long-term economic growth by using expansionary monetary policy have failed and resulted in higher inflation. Recent evidence shows that the central banks of nearly all industrialized countries have reached a consensus that in the long run it is price stability that promotes economic growth (Mishkin 1997).

Given the successful experience of the industrialized countries in reducing inflation, the central banks in nearly all Central and Eastern European countries have chosen the achievement and maintenance of price stability as their primary policy objective. In the early 1990s, all these countries witnessed a dramatic increase in inflation, which had a devastating effect on the population's purchasing power; and therefore, the importance of long-term price stability in these countries can hardly be questioned. In Latvia, the principal goal of the central bank, as set forth in Article 3 of the Law "On the Bank of Latvia", is to control the amount of money in circulation by implementing monetary policy with the aim of maintaining price stability in the country.

The European Central Bank (ECB) has clearly stated that its principal objective is price stability. Any future member state is expected to meet a set of requirements, the so-called Maastricht criteria, which lay down that before the Economic and Monetary Union (EMU) accession the inflation rate in the candidate country must sufficiently and permanently converge on the levels observed in EMU member states. This, however, does not imply that price stability will lose its importance for Latvia after joining the EMU. Once exchange rate fluctuations disappear, inflationary policies will imply a loss of competitiveness and damage to a country's long-term growth prospects (Duisenberg 2000).

In transition economies, inflation in its traditional form is a relatively new phenomenon, and, in many cases, its causes are different from those in the industrialized countries. Moreover, the causes of inflation often cannot be detected with sufficient precision because of short statistical data series. Thus, central banks in these countries face the difficult task of controlling inflation that is often caused by factors beyond the central bank's direct control.

Nevertheless, the central bank needs to analyse inflation in order to successfully implement monetary policy. This publication deals with inflation dynamics in Latvia, seeking to discover the main factors driving inflation in the short and long run. Section I describes the Latvian experience in reducing inflation; Section II looks at short-term inflation determinants; Section III analyses the impact of administrative prices on inflation; Section IV discusses long-term inflation determinants; and Section V gives conclusions and implications of inflation analysis for the Bank of Latvia's monetary policy.

I. PRICE DYNAMICS IN LATVIA (1991–2000)

Price liberalization was initiated in Latvia in 1991. At that time, the central bank of Latvia had already been re-established as an independent central bank with the exclusive right to issue the national currency. The USSR ruble, however, remained legal tender in Latvia. Consequently, monetary policy was still determined by Soviet institutions. In this period, Latvia witnessed strong growth in the money supply, which was caused mainly by excessive lending to the government and public enterprises (Vanags and Garry 1995). Monetary growth, along with the demise of the controlled price system, directly translated into skyrocketing inflation, with the annual growth rate in the consumer price index (CPI) at 951.2% in 1992.

In order to stop the excessive monetary growth and stabilize the economy, the Bank of Latvia introduced the Latvian ruble in May 1992. The pursuit of an entirely independent monetary policy became feasible only in the summer of 1992, when the fixed exchange rate between the Latvian ruble and the Russian ruble was abandoned. As the main task of the Latvian ruble was to earn credibility for the lats, the Latvian currency, and the reliability of the currency at that time was strongly associated with its exchange rate against the US dollar, the Bank of Latvia's first and foremost task was to stop the depreciation of the Latvian ruble vis-à-vis the US dollar. In the following years, the stability of the Latvian currency in the context of high inflation in other parts of the former USSR was the reason for capital inflows from the former Soviet republics to Latvia. As a result of this, the Latvian ruble (later, the lats) appreciated. To avoid the weakening of Latvian exporters' external competitiveness, the Bank of Latvia opted for fixing the exchange rate of the lats to the SDR basket of currencies in February 1994. Since then, the fixed exchange rate regime has been kept unchanged.

This means that Latvia began an exchange-rate-based stabilization programme in 1993. Apart from the fixed-exchange-rate regime, institutional steps were taken to ensure the sustainability of the programme: the Bank of Latvia's independence in making and implementing decisions was reinforced by law, and the government was committed to fiscal policies supporting exchange rate stability.

The monetary policy followed by the Bank of Latvia, coupled with the government's fiscal and wage policies, has led to a considerable reduction in inflation. Year-on-year consumer price growth decreased to 2.6% in 2000 (see Table 1), one of the best performances among the countries of Central and Eastern Europe.

Inflation in Latvia has been caused by different factors in different periods. In the early stage of the reform process, inflation in Latvia was generally related to credit growth and price liberalization; and therefore, until the end of 1992, a close relationship existed between growth in the money supply and inflation (Vanags 1998). As of 1993, inflation is determined by other factors, such as the country's economic cycle, escalating competition in a number of sectors of the economy, tax legislation adopted by the

Table 1

CONSUMER PRICE CHANGES IN LATVIA (1991–2000)
(%)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Over the previous year	172.2	951.2	109.2	35.9	25.0	17.6	8.4	4.7	2.4	2.6
Over December of the previous year	262.4	958.7	34.9	26.3	23.1	13.1	7.0	2.8	3.2	1.8

Source: Central Statistical Bureau of Latvia.

Saeima of the Republic of Latvia, as well as administrative decisions favouring price increases. In the longer run, price changes are caused by differing productivity growth across the economy.

Given the different origin of price changes before and after the introduction of the stabilization programme, two periods should be distinguished for the purpose of the present analysis: until 1993 and from 1993 until 2000. The analysis of inflation in the former period is beyond the scope of this publication, as it has been researched by Latvian economists and international institutions. This publication investigates the factors causing inflation in the period starting from 1993.

II. FACTORS AFFECTING INFLATION IN THE SHORT RUN

In assessing factors determining inflation in the short run, we apply the standard expectations-augmented Phillips curve, including supply-side factors, such as import prices and unit labour costs

$$\pi_t = \sum \alpha_j \pi_{t-j} + \sum \beta_j YGAP_{t-j} + \sum \delta_j Pim_{t-j} + \sum \gamma_j ULC_{t-j} + \varepsilon_t \qquad [1],$$

where π is the annual growth rate of core inflation (excluding energy prices, administrative prices and indirect taxes), YGAP denotes the output gap (defined as the difference between the seasonally adjusted actual output and the long-term output trend), Pim measures the annual change of import prices, and ULC stands for the annual change of unit labour costs.

To obtain the output gap and to get rid of the deterministic time trend, we use the Hodrick–Prescott filter. Unfortunately, import price statistics in Latvia are available only starting from 1998, and this variable cannot be used in the analysis. Annual changes in import prices (Pim), therefore, are substituted for the nominal effective exchange rate (NEER), implicitly assuming that exchange rate fluctuations determine changes in the overall import price level. The increasing exchange rate of the lats implies its appreciation in nominal terms. For labour costs, the measure of unit labour costs in the industrial sector is used most often. Several authors, however, have argued that

the share of labour income in national income provides a better proxy than unit labour costs for the real marginal cost of output, as it captures the effect of economy-wide labour costs (Chan-Lau and Tokarick 1999). In the following analysis, we therefore proceed with labour's share (Lshare) in national income instead of unit labour costs in the industrial sector.

The results of estimating the Phillips curve for Latvia [1] are shown in Table 2. Relationships between the variables become more robust and begin to fit in with the economic theory as of 1996. Apparently, the effects of economic reforms that were initiated in Latvia in the early 1990s have been so vast that they cannot be meaningfully analysed, using statistical methods. The results obtained should be interpreted with caution, as the short time series may impair their reliability.

Table 2

ESTIMATE OF THE PHILLIPS CURVE
Sample period: 1996 Q1–2000 Q1
Dependent variable: π

Variable	Coefficient	T-statistic
Constant	–0.051	–0.295
$YGAP_{t-2}$	0.037	2.996
$NEER_{t-4}$	–0.126	–3.815
π_{t-4}	0.364	2.911
$Lshare_{t-3}$	0.089	3.684
R^2		0.748
Adjusted R^2		0.664
F-statistic		8.924
DW-statistic		1.677

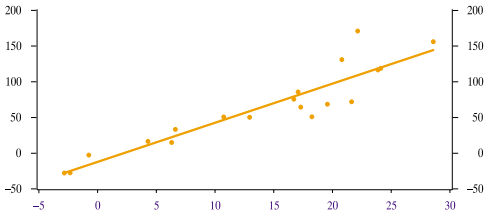
Therefore, factors affecting inflation in Latvia in the short run can be identified only in part. The results shown in Table 2 indicate that inflation in Latvia in the short term is influenced by the traditional factors, the same as in the industrialized countries. The model implies that inflation in Latvia has a cyclical component. (This is confirmed by a statistically significant relation between core inflation and output: the output gap affects inflation with a two quarters' lag.) From the structural side, labour unit costs appear to influence inflation with a three quarters' lag. The effect of the exchange rate is the most important factor affecting inflation in the short run. There are several reasons for this. First, the share of imports in the Latvian economy is considerable, about 45% of GDP. Second, consumption goods account for approximately 28% of imports; and therefore, import prices have a significant impact on the overall price level. Third, the import component constitutes about 50% of the production costs of the industrial and agricultural sectors and private consumption (source: the Central Statistical Bureau of Latvia data for 2000). Thus, given Latvia's openness and small size, external factors (exchange rates, import prices) have a larger effect on inflation than domestic factors (labour unit costs and economic cycle).

In light of the importance of import prices, it may be worthwhile to consider the most volatile prices, those of oil products, and their importance in determining inflation in Latvia. World oil prices correlate closely with import prices on mineral products, affecting fuel prices in the Latvian market, which are dependent on imports of oil products. In Latvia, fuel prices are also influenced by changes in tax legislation and the pricing strategies adopted by fuel traders. Nevertheless, the correlation between world oil prices and fuel consumer prices in Latvia is quite high (see Chart 1).

Chart 1

CORRELATION BETWEEN WORLD OIL PRICES AND FUEL PRICES IN LATVIA
(January 1999–July 2000; year-on-year basis; percent)

$R^2 = 0.8478$



Source: Central Statistical Bureau of Latvia, Datastream.

This correlation implies that world oil prices have an impact on consumer prices in Latvia. Although fuel prices currently constitute only 2.6% of the total basket of consumer prices, in 1999 a marked rise in fuel prices (28.3%) led to an 0.7 percentage points increase in the CPI. In 2000, the negative effect of a rise in the import prices of mineral products was offset by the positive effect of a decrease in the excise tax rate, and this lessened the impact of oil prices on consumer prices in Latvia. The significance of oil products for the Latvian economy allows us to conclude that their prices exert an indirect influence on the overall price level by increasing production costs.

At this stage, the indirect effect of oil product prices for the Latvian economy cannot be measured precisely because of short data series, but considering the experience of the industrialized countries, it is possible to make a number of conclusions. The nature of the indirect effect caused by prices on oil products will largely depend on the behaviour of the wage level in Latvia. If the price of oil products increases, leading to higher wages in the Latvian economy, the inflation rate can be affected. This is unlikely to happen in the near future. Moreover, the indirect effect is likely to differ across the sectors of the economy. In the tradable sector, the impact of a rise in the oil product price is likely to be smaller because of the need to preserve producers' external competitiveness. In the non-tradable sector, a similar price increase is likely to result in a higher level of consumer prices.

III. EFFECTS OF ADMINISTRATIVE PRICES

At the beginning of transition, when prices were liberalized in almost all sectors of the economy, prices were still controlled by the government in those "sensitive" areas

where sharp price increases could virtually destroy the welfare of the majority of the population. Initially, it was envisaged that price increases in these sectors would move in conjunction with increases in purchasing power within the country, but, for political reasons, prices have increased less than income. Also, the relatively low standard of living may account for the fact that even 10 years after the beginning of economic reforms prices in these sectors are far below levels observed in the industrialized countries and often do not cover production costs in full. Currently, tariffs on electricity and gas, public transport fares, and rent for housing owned by the state or municipalities are subject to administrative decisions. In view of Latvia's preparation for accession to the European Union (EU), it is expected that prices in these sectors will gradually converge on EU levels. Prices will increase because of the rising standard of living across the population and efforts to harmonize Latvian legislation (also concerning taxes) with EU legislation.

Changes in the structure of private consumption are reflected in the share of administratively regulated prices in the total basket of goods and services. This share tends to increase over time: it rose from 22.1% in 1997 to 25.3% in 2000. The increase in administrative prices accounted for 44.3% of total inflation in 1997, 46.4% in 1998, and 34.7% in 1999. Given the quite significant proportion of administrative prices in the total basket of consumer prices, their influence on the overall inflation rate can be expected to persist in the near future for a number of reasons.

First, as mentioned above, there is a tendency for prices in this sector to converge on EU levels. Second, price increases are an important precondition for the development of public enterprises that enjoy monopolies in the Latvian market. For example, a requirement that such an enterprise raise its tariffs may be one of conditions for assigning a loan. Third, as administratively regulated prices are part of the CPI, their changes influence inflation expectations and future inflation. Even if the rate of increase in administratively regulated prices slows down, inflation inertia may prevent total inflation from falling if expectations of future administrative price changes are rigid. It should be noted, however, that Latvia has not experienced inflation inertia.

The magnitude of potential changes can be estimated by analysing the present price levels in Latvia and the EU (see Chart 2). To reach the level comparable to that currently observed in Germany, the excise tax on oil products in Latvia needs to be raised by 67%, and the electricity price for households has to be doubled. Assuming that the electricity price in Latvia reaches 80% of the level in Germany over the next twenty years, the electricity price should increase by 3.5% in Latvia each year and the price in Germany should not change. This increase alone would directly cause an 0.1 percentage point rise in total inflation. Moreover, assuming that prices in all other sectors where prices are set by administrative decisions follow the changes in the electricity price, inflation would rise by 1.0 percentage point.

Chart 2

ELECTRICITY PRICE AND EXCISE TAX ON OIL PRODUCTS IN SELECTED COUNTRIES
(as at January 1, 2000; Germany = 100)

Source: Electricity Association (www.electricity.org.uk); "Standstill Britain." The Economist, *September 16, 2000, pp. 43–44.*

The above analysis is limited to direct or first-round effects only. The estimation of indirect effects is left for future research. However, given the importance of electricity prices and other prices that are set administratively or by monopolies, their changes could significantly affect inflation through indirect effects (an increase in production costs). Price liberalization and de-monopolization may significantly dampen the inflationary effects of administrative price increases. (This could be confirmed by the experience of the United Kingdom, where the liberalization of monopoly prices has been more rapid than in Germany, and hence, the electricity price is lower.)

IV. FACTORS AFFECTING INFLATION IN THE LONG RUN

In the longer run, with the effects of administrative price increases becoming less important, inflation is mainly driven by structural factors related to different productivity growth rates in the tradable and non-tradable sectors (Richards and Tersman 1996). This assumption is a straightforward implication of the Balassa–Samuelson hypothesis, which states that the purchasing power parity holds only for internationally traded goods, determining the wages for those employed in the production of these goods. The average wages in the tradable and non-tradable sectors must be equal within an economy. Thus in countries with high productivity growth in the tradable sector, wages rise in both the tradable and non-tradable sectors and the service sector, where productivity growth is slower. Additional inflationary pressures are caused by rising wages in the non-tradable sector. Considering the experience of countries where economic growth rate is rapid (ECB 1999) and the income differential between Latvia and the EU, this effect is likely to occur also in Latvia.

In order to examine how well the Balassa–Samuelson hypothesis can be used to explain price developments in Latvia, we will test two hypothesis: first, the prices of tradables converge on the EU level, and second, the relative price of non-tradables depends on the differential between the growth rates of productivity in the tradable and non-tradable sectors.

Price Dynamics in the Tradable Sector

First, the influence of export prices on the prices of manufactured goods within the country has to be estimated. Given the high degree of openness of the Latvian economy, the prices of internationally traded goods in Latvia are primarily determined by the prices that producers are able to get for their exports. Indeed, as seen from Chart 3, producer prices move closely in line with export prices. Regression analysis (see Table 3) confirms this assumption. It follows that, once the factors behind the dynamics of export prices in Latvia are detected, it should be possible to find factors determining the dynamics of the prices of manufactured goods (tradables) in the domestic market.

Chart 3

PRODUCER AND EXPORT PRICES IN LATVIA
(expressed in logarithms)

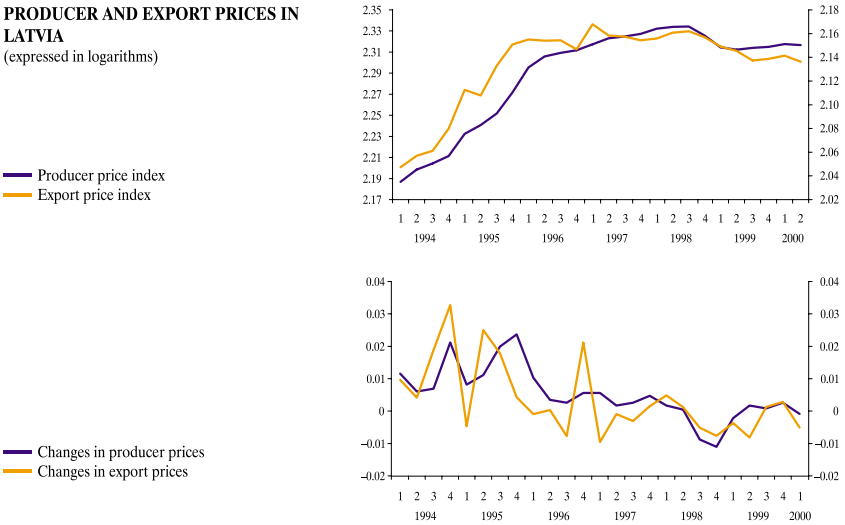


Table 3

RELATIONSHIP BETWEEN PRODUCER PRICES AND EXPORT PRICES IN LATVIA
Sample period: 1995 Q2–2000 Q2
Dependent variable: Δln PPI

Variable	Coefficient	T-statistic
$\Delta \ln PPI_{t-1}$	0.525	5.074
$\Delta \ln P^{exp}$	0.296	3.021
$\Delta \ln P^{exp}_{t-4}$	0.197	2.387
Adjusted R^2		0.815
DW-statistic		1.67

When explaining export price dynamics, it should be noted that Latvia is a small country and, therefore, its exporters are price-takers. Hence, its export prices should be closely related to prices on similar products in its main trading partner countries. Given Latvia's very extensive trade ties with the EU (over 60% of Latvia's exports goes to this region),

we test the relationship between Latvia's export prices (expressed in euros) and consumer prices in the EU (excluding the prices of services and oil products).

Since the concept of purchasing power parity can be used to explain price movements only in the long run, we focus on the long-run behaviour of the series. In order to do that, we first test whether (logarithms of) export prices in Latvia and consumer prices in the EU are stationary or have a unit root by running a Dickey–Fuller type regression:

$$\Delta p_t = \alpha + (\lambda - 1)p_{t-1} + \sum \gamma_j \Delta p_{t-j} + \varepsilon_t \qquad [2],$$

where p stands for the price index (expressed in logarithms) and Δ stands for changes in the variable (the price index). Then we test the null hypothesis where $\lambda = 1$, i.e. the series are non-stationary (have a unit root). If we are not able to reject the null hypothesis for both data series, we examine whether they are cointegrated, using the residual based test:

$$p^{LV}{}_t = \alpha + \beta p^{EU}{}_t + \varepsilon_t \qquad [3],$$

$$\Delta\varepsilon_t = (\chi - 1)\varepsilon_{t-1} + \sum \gamma_j \Delta\varepsilon_{t-j} + \nu_t \qquad [4].$$

If the hypothesis $\chi = 1$ cannot be rejected, we must conclude that Latvia's export prices are cointegrated with consumer prices in the EU in the long run, i.e. the purchasing power parity (in its weakest form or the so-called relative purchasing power parity) explains price movements in the tradable sector in Latvia.

The results of the regression [2], presented in Table 4, confirm that neither Latvia's export prices nor the EU's consumer prices contain a unit root. The results for consumer prices in the EU show very convincing evidence in favour of the null hypothesis. The results for Latvia's export prices also confirm the null hypothesis, as we are not able to reject it with a 95-percent degree of confidence. Acknowledging that too many lagged terms in the equation [2] will always force us to accept the null hypothesis, especially if the data fluctuate a lot, we run the regression for Latvia's export prices without any lagged terms. Still, the results of the regression point to the existence of a unit root in the series with a 95-percent degree of confidence. It may therefore be concluded that

Table 4

TESTS FOR A UNIT ROOT IN LATVIA'S EXPORT PRICES AND CONSUMER PRICES IN THE EU
Sample period: 1994 Q2–2000 Q2

Dependent variable	Number of lags	t(ADF)	DW-statistic	R^2
$\Delta\ln CPI_{EU}$	1	–0.252	2.00	0.86
$\Delta\ln P^{exp}_{LV}$ (with constant)	0	–2.599	2.44	0.23
$\Delta\ln P^{exp}_{LV}$ (with constant)	1	–2.380	2.46	0.44

there are unit roots in both Latvia's export prices and the EU's import prices, and we may test whether they are cointegrated.

As seen in Chart 4, the trends of Latvia's export prices and consumer prices in the EU correlate closely (see Table 5). This evidences that Latvia's export prices and consumer prices in the EU are cointegrated in the long run.

Chart 4

LATVIA'S EXPORT PRICE INDEX AND CONSUMER PRICE INDEX IN THE EU
(expressed in logarithms)

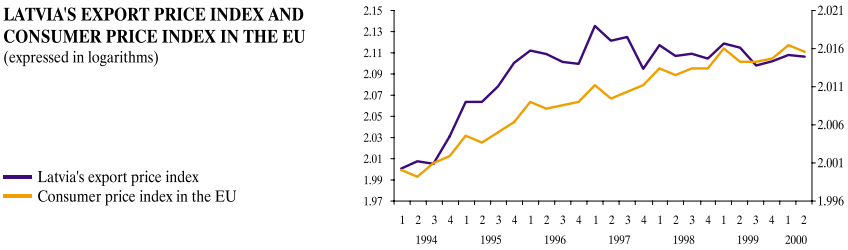


Table 5

LONG-TERM DYNAMICS OF LATVIA'S EXPORT PRICES
Sample period: 1994 Q1–2000 Q2
Dependent variable: ln P^{exp}

Variable	Coefficient	T-statistic
Constant	–22.974	–6.059
ln CPI_{EU}	6.076	7.357
Adjusted R^2		0.693
F-statistic		54.119

Dependent variable: $\Delta\varepsilon$

Variable	Coefficient	T-statistic
ε_{t-1}	–0.228	–1.866
Adjusted R^2		0.137
DW-statistic		1.77

To examine whether there is any short-term relationship between Latvia's export prices and consumer prices in the EU (the failure to find it would not invalidate the previous findings, as the purchasing power parity is a long-term concept), we apply the regression, which is based on the so-called error-correction mechanism principle:

$$\Delta p^{LV}{}_t = \alpha + \sum \gamma_j \Delta p^{LV}{}_{t-j} + \sum \eta_j \Delta p^{EU}{}_{t-j} + \gamma_t (p^{LV}{}_{t-1} - \beta p^{EU}{}_{t-1}) + \varepsilon_t \qquad [5],$$

where γ_j and η_j capture short-term effects, while γ_t reflects the speed at which Latvia's export prices adjust to the long-term equilibrium.

The results of the regression are given in Table 6. Since one of the coefficients, η, appears to be statistically significant, consumer price dynamics in the EU also have an

Table 6

SHORT-TERM DYNAMICS OF LATVIA'S EXPORT PRICES
Sample period: 1994 Q2–2000 Q2
Dependent variable: $\Delta \ln P^{exp}$

Variable	Coefficient	T-statistic
$\Delta \ln CPI^{EU}_{t-4}$	6.439	4.199
$[p^{LV}_{t-1} - \beta p^{EU}_{t-1}]$	–0.223	–1.926
Adjusted R^2		0.473
DW-statistic		2.20

influence on Latvia's export prices in the short run. It can be concluded that the EU's consumer prices affect Latvia's export prices both in the short run and the long run. This is no surprise, considering the role of Latvia's manufacturers as price-takers in the EU market.

The purchasing power parity in its strictest form requires that these prices be cointegrated with a cointegration slope of 1, and hence, price increases in Latvia and the EU should be equal in the long run. As seen from the results of the regression [3] in Table 5, this assumption must be rejected: the coefficient β, which characterizes the long-term relationship, shows statistically significant difference from 1. Also, Chart 4 shows that export prices in Latvia are on average rising faster than consumer prices in the EU. There are a number of explanations for this. First, in the early and mid 1990s, Latvian exporters used to sell their products in world markets at prices below the market price; however, the prices of Latvia's exports have gradually reached the market value. Second, the quality of Latvia's exports might have improved, and this is something not accounted for in the official statistics. Third, the domestic price of tradable goods has a non-tradable component that makes final prices differ across countries even for fully tradable goods (Richards and Tersman 1996).

The above discussion implies that in the future, the prices of tradables in Latvia will be influenced by three main factors. First, they will be determined by changes in consumer prices in the EU. Taking into account the long-term objective of the ECB—the maintenance of price stability, defined as a year-on-year increase in the HICP of below 2%—and the fact that consumer price changes in the EU are mainly caused by service and oil prices (which do not affect Latvia's export prices), we should not expect very dramatic increases in Latvia's export prices. Second, given Latvia's position in EU markets, prices on Latvian exports could be sensitive to the fluctuations of the lats vis-à-vis the euro, even in the absence of consumer price changes in the EU. The depreciation of the euro has dampened increases in tradables' prices in Latvia (export prices of many products, expressed in lats, have decreased). The appreciation of the euro could also lead to higher Latvia's export prices, which may result in higher prices of tradables, depending on the degree of import substitution, which is supposedly quite high. Thus this effect also cannot produce a significant rise in the overall price level. Finally, price increases in the tradable sector may be caused by improvements in the quality of manufactured goods. In this case, rising prices might be the sign of an

improved competitiveness of Latvia's exporters in international markets rather than the loss of it.

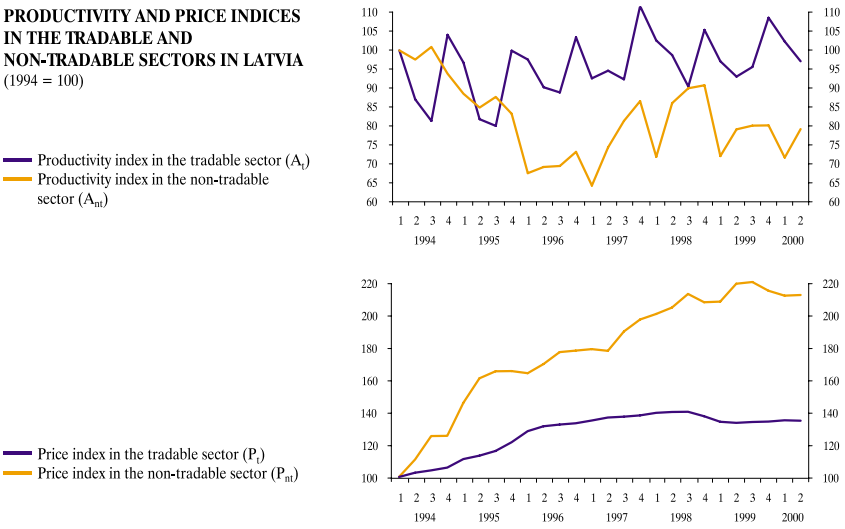
Relationship between Relative Productivity and Relative Prices

In this section, the relationship between the relative prices and relative productivity of non-tradables and tradables is examined. The manufacturing sector is taken as a proxy for tradables, while retail sale and wholesale, hotels and restaurants, and construction, the sectors where administrative prices have little or no influence at all, are a proxy for non-tradables. This excludes sectors where prices are not determined by market forces from the analysis.

In Latvia, productivity and prices have behaved in the way predicted by the economic theory in both the tradable and non-tradable sectors: in the last five years, on average, productivity growth in the tradable sector has been higher than in the non-tradable sector (see Chart 5). As a result, the prices of non-tradables have increased faster than those of tradables.

Chart 5

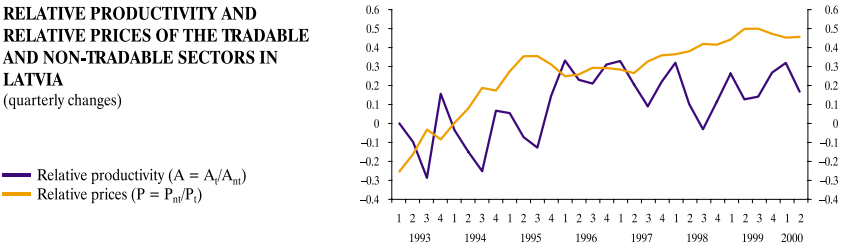
PRODUCTIVITY AND PRICE INDICES IN THE TRADABLE AND NON-TRADABLE SECTORS IN LATVIA
(1994 = 100)



Changes in the relative productivity and relative prices of tradables and non-tradables (see Chart 6) confirm that a relatively high degree of cointegration exists between both time series and that the difference between the two series narrows in the long run. At the same time, the chart also clearly shows the impact of the Russian crisis on relative productivity, which decreased sharply as the producers exporting mainly to Russia did not lay off the labour force in adequate numbers soon after their export market collapsed in hope that the situation would improve quickly.

Chart 6

RELATIVE PRODUCTIVITY AND RELATIVE PRICES OF THE TRADABLE AND NON-TRADABLE SECTORS IN LATVIA
(quarterly changes)



More conclusive evidence as to the degree of correlation between relative productivity and relative prices can be obtained from cointegration tests, which are carried out in the same manner as tests for Latvia's export prices and consumer prices in the EU. First, these series are tested for a unit root. The results are shown in Table 7. Unfortunately, the results obtained by statistical methods do not yield conclusive evidence, as the time series are too short. The conclusions about the existence of a unit root seem to depend on the inclusion of a constant in the regression equation. Thus, there is no indisputable evidence that the two series have a unit root; however, we still test for their cointegration, owing to the fact that in small samples unit root tests have low power to distinguish between series that are non-stationary and series that are stationary but have highly persistent dynamics (Canzoneri, Cumby, and Diba 1996).

Table 7

TESTS FOR A UNIT ROOT IN RELATIVE PRODUCTIVITY AND RELATIVE PRICES
Sample period: 1994 Q2–2000 Q2

Dependent variable	Number of lags	t(ADF)	DW-statistic	R^2
Δln P	2	–0.575	1.81	0.41
Δln P (with constant)	0	–3.460	2.02	0.31
Δln P (with constant and trend)	2	–3.047	1.99	0.58
Δln A	2	–2.060	1.70	0.76
Δln A (with constant)	2	–3.362	1.85	0.81

The results of cointegration tests (along the lines of equations [3] and [4]) are shown in Table 8. The results support the existence of a long-term relationship between relative productivity and relative prices, confirming the results of the Balassa–Samuelson model. Moreover, according to the Balassa–Samuelson hypothesis, changes in relative productivity and relative prices should be proportionate in the long run.

The difference between the above time series [u = ln (P) – ln (A)] is tested for a unit root to examine this assumption. The results presented in Table 9 allow us to reject the null hypothesis with a 99-percent confidence. Thus, we may conclude that in Latvia

Table 8

LONG-TERM DYNAMICS OF RELATIVE PRICES IN LATVIA
Sample period: 1993 Q1–2000 Q2
Dependent variable: ln (P_{nt}/P_t)

Variable	Coefficient	T-statistic
Constant	0.21038	5.486
ln (A_t/A_{nt})	0.53447	2.805
Adjusted R^2		0.219
F-statistic		7.866

Dependent variable: $\Delta\varepsilon$

Variable	Coefficient	T-statistic
$\Delta\varepsilon_{t-1}$	0.22331	2.002
$\Delta\varepsilon_{t-4}$	0.55086	6.067
ε_{t-1}	–0.29777	–2.975
Adjusted R^2		0.716
DW-statistic		1.62

Table 9

TESTS FOR A UNIT ROOT IN $u = \ln(P) - \ln(A)$
Sample period: 1994 Q2–2000 Q2

Variable	Coefficient	T-statistic
Constant	0.083454	3.008
Δu_{t-1}	0.30970	3.065
Δu_{t-4}	0.54917	6.822
u_{t-1}	–0.47223	–4.095
Adjusted R^2		0.810
F-statistic		29.842
DW-statistic		1.84

the relation between the prices of tradables and the prices of non-tradables in the long run depends on changes in productivity in the tradable sector relative to changes in productivity in the non-tradable sector. Moreover, relative prices change in direct proportion to relative productivity.

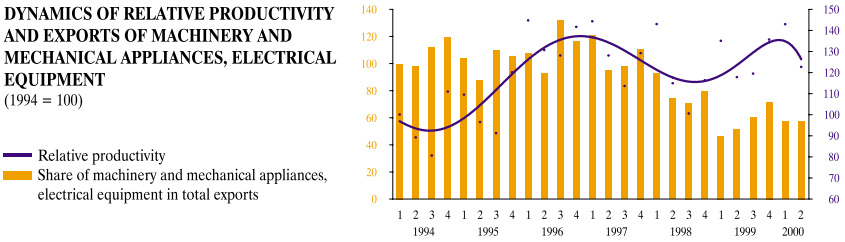
This conclusion serves as the basis for projecting future price developments. Although the prices of non-tradables have grown at a more rapid pace than those of tradables, on average they have increased far less rapidly than prices in the service sector as a whole, including the areas where prices are administratively controlled. In the tradable sector, productivity has not increased markedly in the last five years (see Chart 5). Taking into account the relationships discussed above, it can be projected that, with productivity in the tradable sector growing, a rise in the prices of non-tradables may be escalated. Therefore, to get some knowledge about the future dynamics of non-tradables' prices, factors behind relative productivity growth need to be identified.

One explanation for a rather slow growth of relative productivity could be high productivity increases in the service sector. Chart 5, however, shows that this does not work for Latvia during the given period.

Another explanation may be found by looking at relative productivity in the context of a country's external sector. Ito, Isard and Symansky (1997) propose that productivity in the tradable sector is a function of a country's stage of economic development, which can be substituted for by its export structure. Hence, a larger proportion of machinery and mechanical appliances, electrical equipment in total exports points to a higher stage of economic development, which means that productivity is higher in the tradable sector. Chart 7 shows the dynamics of relative productivity and the share of machinery and mechanical appliances, electrical equipment in total exports in Latvia. Indeed, the growth of relative productivity can be associated with the increasing share of machinery and mechanical appliances, electrical equipment in total exports. After the Russian crisis the share of high-value-added exports in the total declined, leading to a decrease in relative productivity. At the same time, with export-related sectors of the national economy recovering, productivity might rebound in the tradable sector, pushing up the prices of non-tradables, which could increase the overall price level in the future.

Chart 7

DYNAMICS OF RELATIVE PRODUCTIVITY AND EXPORTS OF MACHINERY AND MECHANICAL APPLIANCES, ELECTRICAL EQUIPMENT
(1994 = 100)



Source: Central Statistical Bureau of Latvia, Bank of Latvia.

The relationship between relative productivity and relative prices gives a general idea of price developments in Latvia in the coming years. For this purpose, we use the data published by the Eurostat (The GDP of Candidate Countries, Eurostat. Issue date: August 13, 2001), which reveal differences in per capita GDP between the EU and Latvia. According to the data, per capita GDP in Latvia was about one-third of the average EU level in 2000. The difference is likely to narrow in the course of time. Accordingly, the speed at which the average income in Latvia converges on the EU average will depend on output growth in Latvia and the EU. Table 10 shows GDP growth rates that would allow Latvia to reach 67%–75% of the EU average income in 10 to 30 years, assuming GDP grows on average by 2%–3% in the EU.

Total factor productivity growth that is needed to ensure the desired GDP growth can be calculated, using the estimates obtained from a Cobb–Douglas production function

Table 10

IMPLICATIONS OF INCOME CONVERGENCE FOR INFLATION IN LATVIA
(%)

	Years of convergence			
	n = 10	n = 15	n = 20	n = 30
GDP growth	12	9	7	6
Productivity growth	5.8	3.3	1.5	0.7
CPI changes	5.9	3.0	0.9	0
CPI changes, based on IMF calculations*	4.8	3.6	2.8	2.4

* *Source: "Accession of Transition Economies to the European Union: Prospects and Pressures."* World Economic Outlook*, International Monetary Fund, September 2000.*

for Latvia. Assuming that the real stock of capital (net of depreciation) grows at an annual rate of 5% and the stock of labour force remains roughly the same, total factor productivity should grow by 0.7%–5.8% on average each year, depending on the speed of income convergence. Then, calculating the share of tradables in the country's GDP and assuming that productivity in the non-tradable sector grows by 0.7%–1.0% on average each year (an average growth rate in Latvia before the Russian crisis), it is possible to measure the influence that the convergence of income in Latvia on the EU average will have on inflation. It depends on output growth in Latvia (for changes in the CPI, see Table 10). Annual GDP growth below 7% does not have any substantial impact on inflation; however, if the annual growth approaches 10%, the effects on inflation may be significant.

As calculations assume a constant growth rate of capital stock, the price elasticity with regard to output growth ranges from 0.13 to 0.49. The calculations for the countries of Central and Eastern Europe by the IMF staff assume a constant price elasticity of 0.4. As seen from Table 9, despite methodological differences, the results obtained are close, in particular in the presence of GDP growth that significantly affects inflation, i.e. above 7%. Our highest estimate of elasticity (0.49) fits in with the IMF's studies on the Baltic States. The main conclusion that arises from the analysis is that income convergence on the EU average in the future may give rise to consumer price inflation in Latvia even if the Bank of Latvia remains committed to strict monetary policy.

V. CONCLUSIONS

The analysis of price dynamics in Latvia in the last decade and projections regarding price developments in the future were carried out with a view to the Bank of Latvia's objective as laid down by law and the need to achieve price stability as a precondition for joining the EMU.

The Latvian experience shows that the central bank's successful monetary policy, together with the government's prudent policies, helps to reduce inflation: in less than a decade, inflation in Latvia has been brought down close to levels observed in the industrialized countries. The evidence available and statistical analysis confirm that, due to Latvia's small size and high degree of openness of its economy, the exchange rate plays a significant role in determining inflation in the country. External factors are more important determinants of inflation than domestic ones, such as labour costs. From this perspective, the Bank of Latvia's interim objective—the stability of the exchange rate—has been the key to fulfilling its main task—achieving and maintaining price stability.

Nevertheless, in Latvia inflation continues to be affected by factors that are beyond the central bank's control; therefore, it is premature to expect a further decline in inflation in the coming years. On the one hand, changes in administratively regulated prices are likely to remain among the factors affecting inflation. In transition economies, low inflation that has been achieved by adopting fixed administrative prices signals rather the absence of liberalization policies than successful monetary policy. In the more distant future, when the welfare of the population will have increased and administrative prices converged on price levels in the industrialized countries, the role of the central bank's monetary policy in influencing the overall price developments will become more important.

On the other hand, we can expect that in the future non-tradables' price changes will be determined by the differential between productivity growth in the tradable and non-tradable sectors, as Latvia narrows the per capita income gap. In Latvia, prices in the tradable sector already now move closely in line with prices in the main export markets, so that in the future price increases in this area in Latvia will be determined primarily by quality improvements. Increases in prices of non-tradables, however, are likely to depend on the rate of output growth in Latvia. According to estimates, at GDP growth of about 10%, consumer prices may rise significantly. Since producers of tradables are guided by the need to preserve external competitiveness, the room for price increases in the economy through indirect or second-round effects appears to be limited. Should such price increases affect unfavourably the price-wage spiral, the Bank of Latvia will have to tighten its monetary policy to maintain price stability and, given the importance of labour costs for inflation, follow developments in the labour market.

In light of the fact that many factors that determine inflation in Latvia are beyond the central bank's control (administrative prices, productivity growth), the pursuit of a strategy based on inflation targeting appears to be difficult, at least in the near future. Moreover, the task of inflation targeting is impeded by the unstable money demand in Latvia. Hence, the maintenance of the exchange rate peg until the EU accession seems to be an optimal policy for the Bank of Latvia.

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