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ECONOMIC TRANSFORMATION AND REAL EXCHANGE RATES IN THE 2000s: THE BALASSA-SAMUELSON CONNECTION

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Paper commissioned by the secretariat of the United Nations Economic Commission for Europe and published as Chapter 6 in Economic Survey of Europe, 2001, No. 1.

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In a developing economy, one which is catching up with the income levels in the more economically advanced countries, productivity in the sectors producing tradeable goods will tend to rise faster than in those producing non-tradeables. Since wage increases tend to be more or less the same in all sectors, inflation will be relatively higher in the non-tradeables sector, an effect that will be strengthened if demand in a growing economy is biased towards services. The result is that relatively faster productivity growth in the tradeables sector will lead not only to an unavoidably higher inflation rate for non-tradeables but also to a real appreciation of the exchange rate. This hypothesis, known as the Balassa-Samuelson effect, is tested against the experience of the transition economies since 1990 and is found to hold. This is an ineluctable process for a developing economy, which has particularly important implications for those transition economies about to join the EU since it may create a serious conflict between the EMU targets for exchange rate stability and inflation.

1 Introduction

Since they embarked on the construction of new political and economic systems, the transition economies have adopted very different exchange rate regimes. Some have chosen the hardest version of pegs, a currency board, while others have opted for flexibility, and many have changed course along the way. There has also been great diversity in the extent to which they have chosen to liberalize the capital account, which is intimately related to the exchange rate regime.

The era of diversity is likely to come to an end for a substantial number of them in the near future. By the middle of the 2000s, several countries from central and eastern Europe will have joined the European Union, and the enlargement process is likely to continue. Barring surprises, by the end of the decade, 10 or more of them will have completed the process. EU membership imposes a number of obligations in this respect. In the long run, they must become members of the monetary union. Along the way, they must "converge", which implies a substantial degree of exchange rate flexibility. Before getting there, they are expected to eliminate all restrictions on capital flows. The not-too-distant future is therefore one of full capital mobility and the most extreme and irreversible form of exchange rate fixity.

This evolution raises a number of critical questions. To start with, a generally held view is that the differences in the exchange rate regime reflect in part the varied political-economic equilibria that have emerged following the collapse of the Soviet bloc.[1] Such equilibria, once established, only change very slowly. Undoubtedly, EU membership will exert a powerful influence in this respect, but the experience with the earlier EU members suggests that it would be unrealistic to expect rapid changes.

The conditions attached to EU membership, the *acquis communautaire*, have always been shaped to fit the particular characteristics of the existing members. In many respects, the transition countries are fundamentally different from previous entrants to the EU. For example, table 1, which refers to the per capita GDP of previous entrants at their date of entry and to similar 1998 figures for the transition countries, shows that the transition countries, with the exception of Slovenia, are considerably poorer than any of the previous new entrants to the Union. This comparison barely scratches the surface, as it ignores the larger differences in terms of economic structure, the welfare state, gender gaps, the development of the banking and financial systems, etc. Importantly, the EU has become more cohesive as economic and financial integration has deepened. Much of today's *acquis communautaire* would have been impossible to agree upon 20 years ago, when diversity

[1] See, e.g. S. Fischer and R. Sahay, *The Transition Economies After Ten Years*, IMF Working Paper WP/00/30 (Washington, D.C.), February 2000; and C. Wyplosz, "Macroeconomic lessons from ten years of transition", in B. Pleskovic and J. Stiglitz (eds.), *Annual World Bank Conference on Development Economics 1999* (Washington, D.C.), 2001.

TABLE 1

Per capita GDP (PPP-adjusted) in relation to the EU average, 1991 and 1998
(Per cent)

	1991	1998
Czech Republic	60.2	55.4
Hungary	44.9	45.9
Poland	29.3	34.2
Slovakia	41.7	43.5
Slovenia	55.7	64.1
Estonia	40.5	34.4
	Year of accession to EU	
Greece	62.4	
Portugal	60.8	
Spain	73.7	

Source: World Bank; IMF.

within the Union was wider than it is today, and yet much less than it will be when the transition economies have joined.

An implication of the relative backwardness of the transition economies is that they are expected to catch up with the EU – indeed, this is a key economic objective. Faster growth and continuing structural changes are bound to affect the exchange rate. In particular, the Balassa-Samuelson hypothesis implies a continuous real appreciation. Here again, previous new entrants to the EU faced a similar process but, as table 1 indicates, it is likely to have been significantly more moderate than what is in store for the transition economies.

In this paper, the focus is on the Balassa-Samuelson effect, which is potentially important for the future exchange rate policies of the EU candidate countries. Countries which join the European Union will have to agree on an exchange rate regime within the EMS framework and, eventually, they will join the Economic and Monetary Union. The presence of a sizeable Balassa-Samuelson effect will affect both the choice of the exchange rate path and their inflation performance once they are in the monetary union. Those countries which currently peg their currencies may already be facing a situation where inflation is influenced by this effect. As the candidate countries will have to meet the convergence targets of the EU, the presence of a sizeable Balassa-Samuelson effect is therefore potentially problematic. For those countries which operate a flexible exchange regime, the evolution of the nominal exchange rate may become a key policy instrument for meeting the convergence criteria.

The next section briefly looks at the restrictions that accession may impose on exchange rate policies. Section 3 presents the theoretical building blocks of the catch-up process and of the Balassa-Samuelson effect. Section 4 examines graphically whether these hypotheses are verified in the transition countries. Having confirmed their likely presence, section 5 proceeds formally to estimate and measure them. Section 6 draws some conclusions from the implications of the empirical findings.

This paper tries to cover all the transition countries. However, data availability is a serious constraint. It may seem that too much emphasis is put on the issue of EU accession, but the process involved offers a unique insight into how countries with different exchange rate regimes will converge towards monetary union and on the relationships between different exchange rate regimes and the catch-up process and the associated Balassa-Samuelson effect. Their experience is also instructive for countries for which EU membership is not at present on their agenda.

2 The choice of an exchange rate regime in the 2000s

(i) General principles

A number of countries from eastern Europe are likely to join the EU by 2004-2005. It has not yet been fully decided what restrictions will apply to their exchange rate regimes, but a number of principles have already been put forward. The whole situation is dominated by the fact that the end-point is known, namely, that they will eventually adopt the euro.[2] Two periods need to be distinguished: the first before joining the EU and the second before joining the monetary union.

Logically, since the final destination is known, the discussion must proceed backwards in time. The ECOFIN Council[3] has recently affirmed the principle of equal treatment of all member states. *Inter alia*, this implies the application of the convergence criteria to new members. According to the Treaty of the European Union, prior to joining the monetary union, a country must have achieved a high and sustainable degree of nominal convergence with the euro area. This is to be assessed on the basis of the convergence criteria laid down in Article 121 and the Protocol on the Convergence Criteria. In particular a candidate country must have remained in the ERM-2 for at least two years with its exchange rate within the prescribed fluctuation band, without significant tensions in its foreign exchange market, and without a change in the central parity of its currency against the euro as a result of an initiative by the non-euro state.

Prior to joining ERM-2, countries are required by the treaty to "regard their exchange rate policies as a matter of common interest". This essentially means that competitive devaluations are ruled out but the choice of

[2] In principle, a country can ask for an opt-out clause, as was offered to Denmark and the United Kingdom. In practice, however, such a request is likely to be turned down and, anyway, there has been no suggestion that any of the current candidates are interested in this option.

[3] ECOFIN Council, *ECOFIN Council Conclusions on Exchange Rate Strategies for Accession Countries* (Brussels), 7 November 2000.

Box 1

The exchange rate mechanism-2

The arrangements for the new ERM-2 were set out by the Amsterdam Council Resolution of 16 June 1997 and the Agreement between the ECB and the national central banks of non-euro area member states of 1 September 1998. Central rates are to be set and adjusted jointly by the ECB and the relevant non-euro area national central banks (NCBs). Adjustments to central rates should be timely to avoid misalignments. The standard band of fluctuation is ±15 per cent around the central rate. Intervention at the limits is in principle automatic and unlimited and supported by very short-term financing. However, the ECB and the NCB concerned can suspend intervention if price stability is endangered. Narrower bands can be declared as a unilateral commitment by a non-euro area central bank or formally agreed at the request of a non-euro member state. In the latter case, the decision will be taken jointly by the ministers of the euro area member states, the ECB, and the minister and the NCB of the non-euro area state.

Thus, ERM-2 is compatible with a fairly broad range of exchange rate arrangements. The ECOFIN Council (2000) only excluded three regimes: any regime without a mutually agreed central rate to the euro, crawling pegs and pegs to currencies other than the euro. Entering the EU with a currency board arrangement tied to the euro is compatible with the ERM-2 in the sense that it could be regarded as a unilateral commitment by the acceding member state, with no obligations for the ECB beyond those implied by the regular rules of the system. It is understood that the currency board must have been in operation for a substantial period of time to prove the viability of its target exchange rate with the euro in order to be accepted by the ECB.

exchange rate regime remains free. However, the rules of accession to the monetary union imply that new member states will be expected to join the revised exchange rate mechanism ERM-2, which is summarized in box 1. There is no rule concerning the timing of entry into ERM-2 but that decision, and the choice of a central parity, requires agreement between the ECB and the country in question.

(ii) Historical overview of exchange rate arrangements

The types of exchange rate regime adopted since the early 1990s by a number of central and east European countries and Russia are summarized in table 2. It follows the IMF classification, which is based on official statements about exchange rate policies. At the beginning of the 1990s, conventional pegs with or without drift (regimes 3 to 6) were the most common exchange rate regime. The choice of this option was driven by the wish to use the exchange rate as the nominal anchor in the initial period of macroeconomic stabilization. Since the mid-1990s, there has been a tendency to move towards exchange rate regimes that are either relatively flexible or very rigid. The Czech Republic, Poland, Russia and the Slovak Republic have abandoned their crawling pegs or bands in favour of more or less managed floats. Romania and Slovenia have retained floating regimes since the early years of transition, although in practice Slovenia limits exchange rate movements severely. According to this classification, Hungary is the only country still maintaining a conventional crawling band. In contrast, Bulgaria and the Baltic states operate hard pegs: currency boards in Bulgaria, Estonia and Lithuania, a conventional peg with a zero fluctuation band in Latvia. While Bulgaria's and Estonia's currency boards are tied to the euro, Lithuania's currency board is tied to the dollar and Latvia's peg to the SDR.

Interestingly, the two countries that still operate conventional peg regimes, Hungary and, de facto, Slovenia, also maintain restrictions on short-term capital flows. According to the European Commission's most recent Progress Reports, the Czech Republic and Poland, which recently adopted more flexible managed floats, are now about to remove their last remaining restrictions on short-term capital flows. The countries with rigid pegs, Bulgaria, Estonia, Latvia and Lithuania, have already completed, or almost completed, the liberalization of short-term capital flows. That the accession states will enter the EU with practically full liberalization of capital movements makes the next enlargement markedly different from previous ones. In the enlargement of the 1980s, Spain and Portugal entered the EU with the possibility of retaining their restrictions on capital flows for a period that lasted more than 10 years.

(iii) The challenges of accession to the European Union

The principles described in section 2(i) imply that most of the candidate countries will have to reverse the recent direction of their exchange rate policies. In order to be admitted into the euro area, those which currently allow for a float will need to reduce the range of variability of their exchange rates; and those which have adopted hard pegs (currency boards or zero fluctuation bands, or narrow bands in the case of Hungary) will have to adopt some degree of flexibility.

(a) From flexibility to ERM-2

Regarding the first group of countries, those that will have to give up the no-commitment floating regime, it might be argued that the regime change will be largely formal since the ERM-2 allows for wide fluctuation bands (±15 per cent). There are, however, two reasons to doubt whether the change will be entirely benign. First, these countries will most likely be required to remove all remaining capital account restrictions on entering the EU. The experience with conventional pegs and free capital movement is not encouraging. From Latin America to

TABLE 2

Exchange rate arrangements in eastern Europe, the Baltic states and the Russian Federation, 1990-2000

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*
Bulgaria	3	8	8	8	8	8	8	2	2	2	2
Czech Republic	3	3	3	3	3	3	6	7	7	7	7
Hungary	3	3	3	3	3	6	6	6	6	6	6
Poland	3	5	5	5	5	6	6	6	6	6	8
Romania	3	7	7	7	7	7	7	7	7	7	7
Slovakia	3	3	3	3	3	3	6	6	7	7	7
Slovenia	..	..	7	7	7	7	7	7	7	7	7
Estonia	..	..	2	2	2	2	2	2	2	2	2
Latvia	..	..	8	8	3	3	3	3	3	3	3
Lithuania	..	..	8	8	2	2	2	2	2	2	2
Russian Federation	..	..	8	8	6	6	6	6	8	8	8

Source: J. von Hagen and Jizhong Zhou, "The choice of exchange rate regimes of transition economies", Zentrum für Europäische Integrationsforschung (Bonn), 2001, mimeo.

Note: Exchange rate regime description:

1 Dollarization: no separate legal tender;

2 Currency board: currency fully backed by foreign exchange reserves;

3 Conventional fixed pegs: peg to another currency or currency basket within a band of at most ±1 per cent;

4 Horizontal bands: pegs with bands larger than ±1 per cent;

5 Crawling pegs: pegs with central parity periodically adjusted in fixed amounts at a fixed, pre-announced rate or in response to changes in selected quantitative indicators;

6 Crawling bands: crawling pegs combined with bands of more than ±1 per cent;

7 Managed float with no pre-announced exchange rate path: active intervention without precommitment to a pre-announced target or path for the exchange rate;

8 Independent float: market-determined exchange rate and monetary policy independent of exchange rate policy.

Asia, and including the Czech Republic and Russia, and more recently Turkey, capital inflows have tended to surge only to be abruptly reversed.[4] While in some cases the reversals can be blamed on unsustainable macroeconomic policies, they have also occurred in countries with impeccable macroeconomic policy credentials. *Ex post*, the reversals have been associated with microeconomic weaknesses, but it is fair to say that these shortcomings had long gone undetected, and most of them were only identified after the crises had erupted. It is also likely that, in spite of all the monitoring associated with the accession process, the new EU members will remain vulnerable in a number of ways specific to the transition process which, while known, may not be recognized *ex ante* as a potential source of severe financial instability.

Second, the relative economic backwardness of the transition countries suggests that their equilibrium real exchange rates will be appreciating. If this is absorbed through a nominal appreciation, the fluctuation margin could become much more uncomfortable than is commonly assumed on the basis of the experience with ERM-1, which brought together a much more homogeneous group of countries. If the real appreciation is absorbed through inflation, the risk is that the acceding countries will find it difficult to meet the convergence criteria. A possibly aggravating factor in this case is that the markets might conclude that EMU membership will be delayed and that the high inflation rate calls for a depreciation, thus triggering an exchange rate crisis. The optimistic view is that the magnitude of this effect is small enough to be contained within the large fluctuation bands of ERM-2. A key purpose of this paper is to provide estimates of the effect in order to judge which outcome is the more likely.

(b) From quasi-EMU to ERM-2 (and EMU)

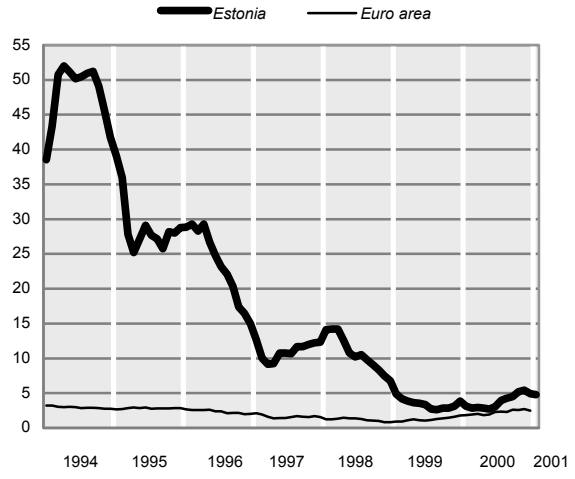
Bulgaria and the Baltic countries now have a regime almost equivalent to full EMU membership. Their central banks perform essentially mechanical tasks with no macroeconomic policy content. Unless they are allowed to bypass the ERM-2 requirement, they will have to re-establish a degree of flexibility which they have rejected in the past, and seem content to have done so. Such a step could be a source of potentially serious difficulties.

Even if it is assumed that the monetary authorities will not want to abandon the strong discipline that they have established in recent years, they will have to convince their political authorities and the financial markets that this is still their determination. With a regime of high capital mobility, false steps will quickly

[4] The literature on this issue, started by C. Diaz-Alejandro, "Good-bye financial repression, hello financial crash", *Journal of Development Economics,* Vol. 19, No. 1-2, 1985, pp. 1-24, has been growing fast. Useful references are B. Eichengreen, A. Rose and C. Wyplosz "Exchange market mayhem: the antecedents and aftermaths of speculative attacks," *Economic Policy*, Vol. 21, 1995, pp. 249-312; A. Demirguç-Kunt and E. Detragiache, "The determinants of banking crises in developing and developed countries", *IMF Staff Papers*, Vol. 45, No. 1, March 1998, pp. 81-109; and C. Wyplosz, *How Risky is Financial Liberalization in the Developing Countries?*, CEPR Discussion Paper No. 2724, March 2001.

CHART 1

Consumer price inflation in Estonia and the euro area, January 1994-January 2001



Source: Bank of Estonia, *Bulletin* (Tallinn); ECB, *Monthly Bulletin* (Frankfurt am Main).

attract speculative pressure. A necessary condition is that Maastricht-type independence be given to the central banks, but that may not be enough.[5] Vulnerabilities will have to be kept to a minimum.

A likely resolution of the problem is for these countries to adopt unilaterally a tight version of the ERM, allowing for no fluctuation band, in effect retaining a currency board arrangement. This is entirely possible within the framework of ERM-2. An even tougher solution would be to unilaterally euroize, but this is considered to be a different arrangement from ERM-2 and would therefore require the agreement of the ECB and the European Union.

Even if such a solution were adopted, the combination of a hard peg and a Balassa-Samuelson effect would result in a higher inflation rate than in the euro area. If this effect is strong, it is entirely possible that some of the convergence criteria would be missed (inflation, the nominal interest rate). Here again, it is necessary to determine the order of magnitude of the effect. A preliminary, partial indication is provided by the case of Estonia, a country that from June 1993 tied its currency to the deutsche mark and, therefore, since 1999 to the euro. Chart 1 compares the inflation rates in Estonia and the euro area since 1994. Two facts stand out. First, the disinflation process has been slow since 1994, taking over four years to get the rate down from around 50 per cent to just under 10 per cent; this was partly because the kroon may have been initially undervalued, and partly because many administered prices were only gradually liberalized.[6] Second, the inflation gap has increased since mid-2000. This development partly reflects the rise in oil prices, which is also visible in the euro area inflation rate. On average, inflation has been higher in Estonia by 5.6 percentage points over the period January 1997-February 2001, and by 2.1 percentage points from January 1999 to January 2001. This is a rough indication of how matters could develop.

3 The implications of catch up

The theoretical background used to analyse the real exchange rate appreciation inherent in the catch-up process is the Balassa-Samuelson effect. This can be described as follows. Trade integration implies that most of the productivity gains appear in the traded goods sector. This is not entirely correct, of course, as non-traded goods and services enter as intermediate inputs in the production of traded goods and are therefore facing indirect competition.[7] In addition, to the extent that many services – the bulk of non-traded goods – are superior goods, rising standards of living will be accompanied by increasing demand for them. In this sector as well, there are bound to be some economies of scale and scope, although their magnitude should not be overestimated.

There is, however, little doubt that productivity will rise faster in the traded than in the non-traded goods sector. Since rising productivity usually translates into rising wages, relatively faster productivity growth in the traded goods sector means that wages in this sector will tend to outpace those in the non-traded goods sector. The central assumption of the Balassa-Samuelson theory is that wage increases tend to be equalized across sectors. Two main reasons are advanced to justify this assumption. First, in the labour market, it is expected that supply will shift towards the better-paid jobs and thus will exert pressure towards wage equalization, even though inter-sectoral labour mobility is limited (skills, geographical location). Second, considerations of fairness or solidarity, possibly backed by trade union pressure, will act to limit large differences.

The non-traded goods sector, facing smaller productivity increases than in the traded goods sector, however, cannot remain profitable if it accommodates such wage increases. The solution is to raise prices faster for non-traded goods. Thus, the supply-side's reaction to the larger productivity increases in the traded goods sector is to generate a higher rate of price inflation in the non-traded sector.

What about the demand side? Rising productivity induces increases in income and wealth, hence rising consumption. If the demand for both traded and non-

[5] A particular difficulty is that, while Bulgaria's and Estonia's currency boards are tied to the euro, Lithuania's is tied to the dollar and Latvia's peg to the SDR. The last two countries will have to shift to the euro, always a delicate transition.

[6] The liberalization of administered prices is still not complete.

[7] The idea of the Balassa-Samuelson effect was initially developed to take into account technological progress that is biased towards the traded goods sector. This paper focuses on a different interpretation more relevant to the transition countries, namely, that growth is largely driven by the catch-up process.

traded goods grows at the same rate, demand is neutral and the supply-side effect dominates in the sense that it does not skew inflation towards non-traded goods and services. Only if demand growth were to be biased towards traded goods could the supply side effect be offset, partly or completely. If, as is usually thought to be the case, demand is biased towards services, which constitute the bulk of non-traded goods, the demand side effect reinforces that on the supply side.

The last step in the reasoning concerns the exchange rate. The ratio of non-traded to traded goods prices is often taken as a measure of the real exchange rate. In which case, the conclusion must be that faster productivity growth in the traded goods sector leads to a real appreciation.

If a wider definition of the real exchange rate is used, based for example on the consumer price index, one more step is needed. This starts with the observation that, for a small economy, the prices of traded goods are driven by world prices and the nominal exchange rate. Under the assumption that the nominal exchange rate is constant, the conclusion is that the change in the prices of traded goods is the same at home and abroad.

Non-traded goods price inflation is equal to the rise in prices for traded goods *plus* a measure of asymmetric productivity growth; it is therefore higher in countries where productivity is rising more rapidly. Catching-up countries, in this case the transition economies, are therefore expected to have higher rates of inflation in non-traded goods prices. This conclusion applies to the consumer price index, an average of the prices of traded and non-traded goods. The result is real appreciation of the exchange rate.

If the exchange rate is not constant, the result still holds as domestic traded goods prices rise at the same rate as the foreign traded good prices *plus* the rate of depreciation. When computing the real exchange rate, this effect is automatically taken into account.[8]

In conclusion, it is important to note that the Balassa-Samuelson effect is an equilibrium phenomenon, not an undesirable transitory effect that ought to be counteracted through policy actions. In fact policy is unable to check this process, at least without resorting to distortionary price controls. The real appreciation reflects the natural evolution of the economy, which has to be translated into relative price changes. It is also one channel through which standards of living – e.g. as proxied by wages – rise towards those in more advanced economies.

4 A first look at the evidence

(i) Relative wages

Before turning to direct econometric estimates of the Balassa-Samuelson effect, it will be useful to first look at the basic statistics for each of the various steps in the above reasoning. First, is the assumption that wages tend to be equalized across sectors or, at least, that their relative position remains constant. Chart 2 shows relative gross wages in industry and the services sector in 12 countries for the period 1992-1999, depending on data availability (note that the scale differs from one country to another).[9]

The two first rows provide evidence for the countries of central and eastern Europe as well as the three Baltic countries. In view of the considerable structural changes that have been underway, the margin of variation is typically quite small, usually no more than 15 per cent. In addition, the ratios typically display no trend, and where there is one it is towards unity, i.e. towards full equalization. The last row includes four CIS countries where the ratio has been changing more widely and not always towards unity. This is not surprising given that the market mechanism is far from being well-established in these countries. The conclusion is that a key assumption of the Balassa-Samuelson mechanism, namely, stability in relative wages across sectors, tends to be confirmed in the transition economies where markets have been developed most.

(ii) Relative productivity

The second assumption to be checked is whether productivity has been rising faster in the traded than in the non-traded goods sector. There is no direct measure of these sectors but it is customary to consider that much of the industrial sector produces traded goods, while most services are non-traded. In principle total factor productivity should be compared, but this requires estimation of production functions for each country which is impossible given the short time series available and the lack of capital stock data. Instead, the general practice in the literature of measuring labour productivity, the ratio of output to employment, is followed.

Chart 3 brings together the evidence for the six countries for which the data are available for enough years to produce meaningful graphs. After some irregular behaviour in the early years of transition, productivity is definitely growing faster in industry than in the services sector. The average annual difference from the trough to the last observation ranges from 4.6 percentage points in Slovenia to 11.1 percentage points in the Czech Republic. These are large numbers.

[8] Let π^T and π^N be traded goods price inflation at home, π^{T*} and π^{N*} abroad, and ε the rate of nominal exchange rate depreciation, so that $\pi^T = \varepsilon + \pi^{T*}$. Then the evolution of the real exchange rate is:

$$\varepsilon - (\alpha \pi^T + (1 - \alpha) \pi^N) + (\alpha \pi^{T*} + (1 - \alpha) \pi^{N*})$$

where α is the share of traded goods in consumption, assumed to be same at home and abroad for simplicity. The real exchange rate changes as:

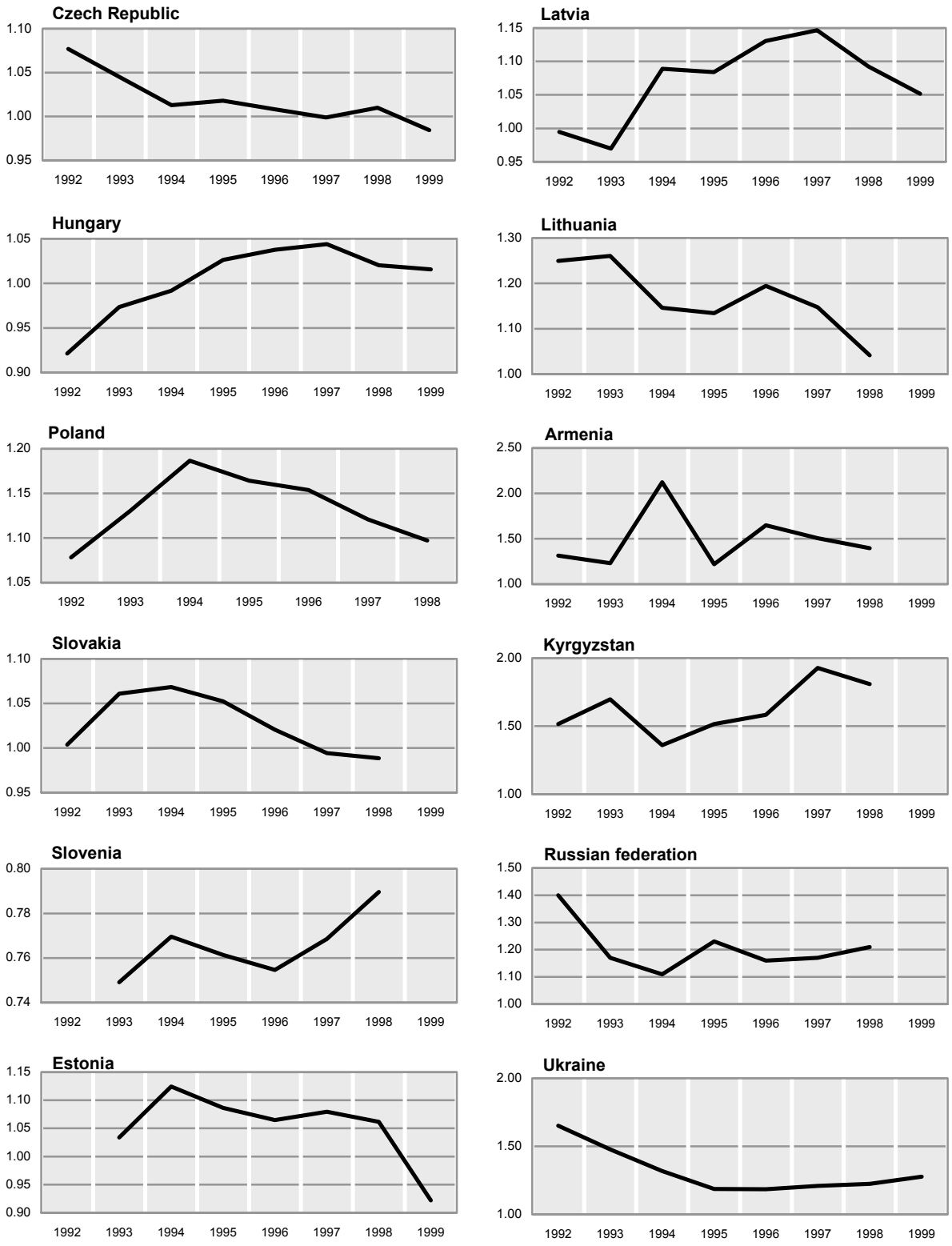
$$- (1- \alpha) [(\pi^N - \pi^T) - (\pi^{N*} - \pi^{T*})].$$

It appreciates when $\pi^N - \pi^T > \pi^{N*} - \pi^{T*}$.

[9] This procedure disregards differences in the structure of employment in different sectors. It is obvious that skill, gender, seniority, firm size, ownership, location, etc. affect wage differences.

CHART 2

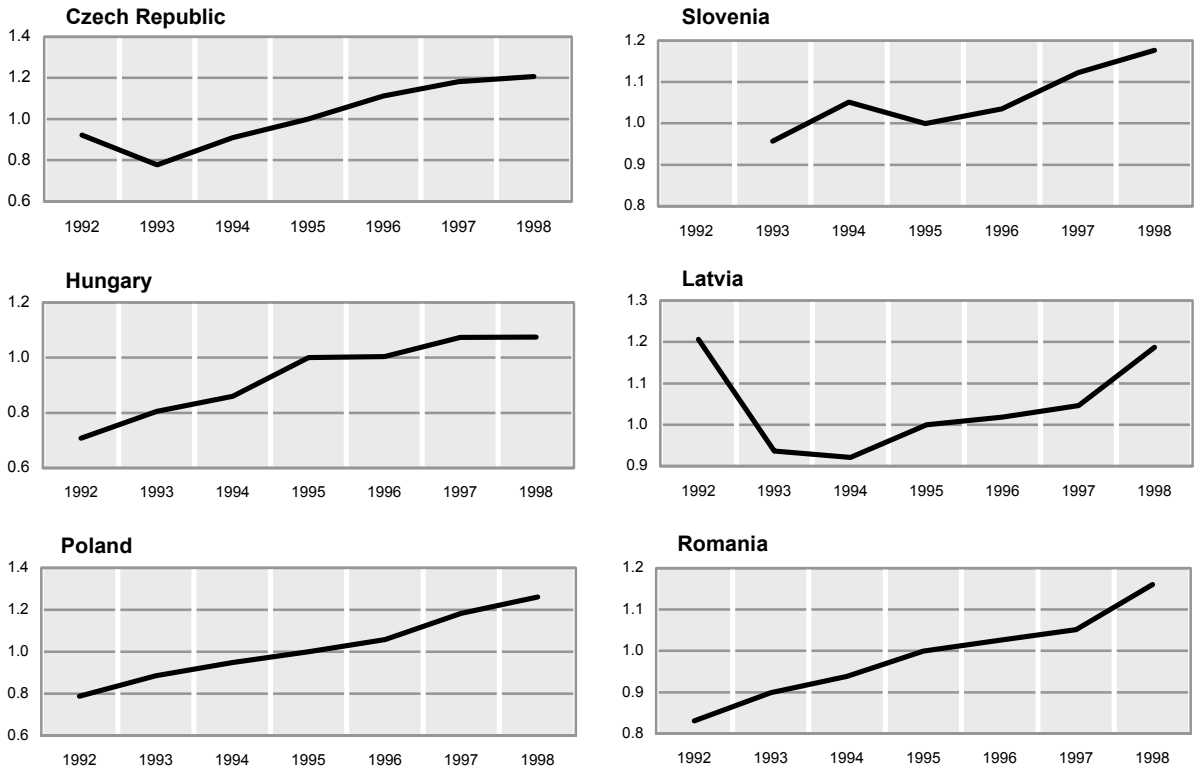
Relative wages in industry and services, 1992-1999



Source: UN/ECE Common Database.

CHART 3

Relative productivity in industry and services, 1992-1998



Source: UN/ECE Common Database.

(iii) Relative prices

Finally, as an approximation of the ratio of non-traded to traded goods prices, the evolution of the price of services relative to the producer price index for industrial goods is examined. Chart 4 presents the available information for 16 countries. Occasional sudden declines in the price ratio are related to sharp devaluations, often following a period of overvaluation. Over the whole period, however, a clear trend is discernible in all countries. The chart suggests that it is indeed worth undertaking a formal test of the Balassa-Samuelson effect in the transition countries.

6.5 Formal evidence

The visual examination of the data suggests that each step of the reasoning that leads to the Balassa-Samuelson effect is empirically verified. The accumulated evidence is strong, but it remains largely circumstantial as a number of other factors are likely to interfere with the postulated mechanism. For example, demand factors – including exchange rate changes – are likely to interfere with the Balassa-Samuelson effect. This could come about as a structural effect either associated with the luxury good nature of many services, or with a drop in demand for domestic production relative to previously unavailable traded goods. There could also be an adjustment effect if, through price moderation and possibly public subsidies, large manufacturing firms were able to overcome the drop in incomes and spending associated with the transition shock.

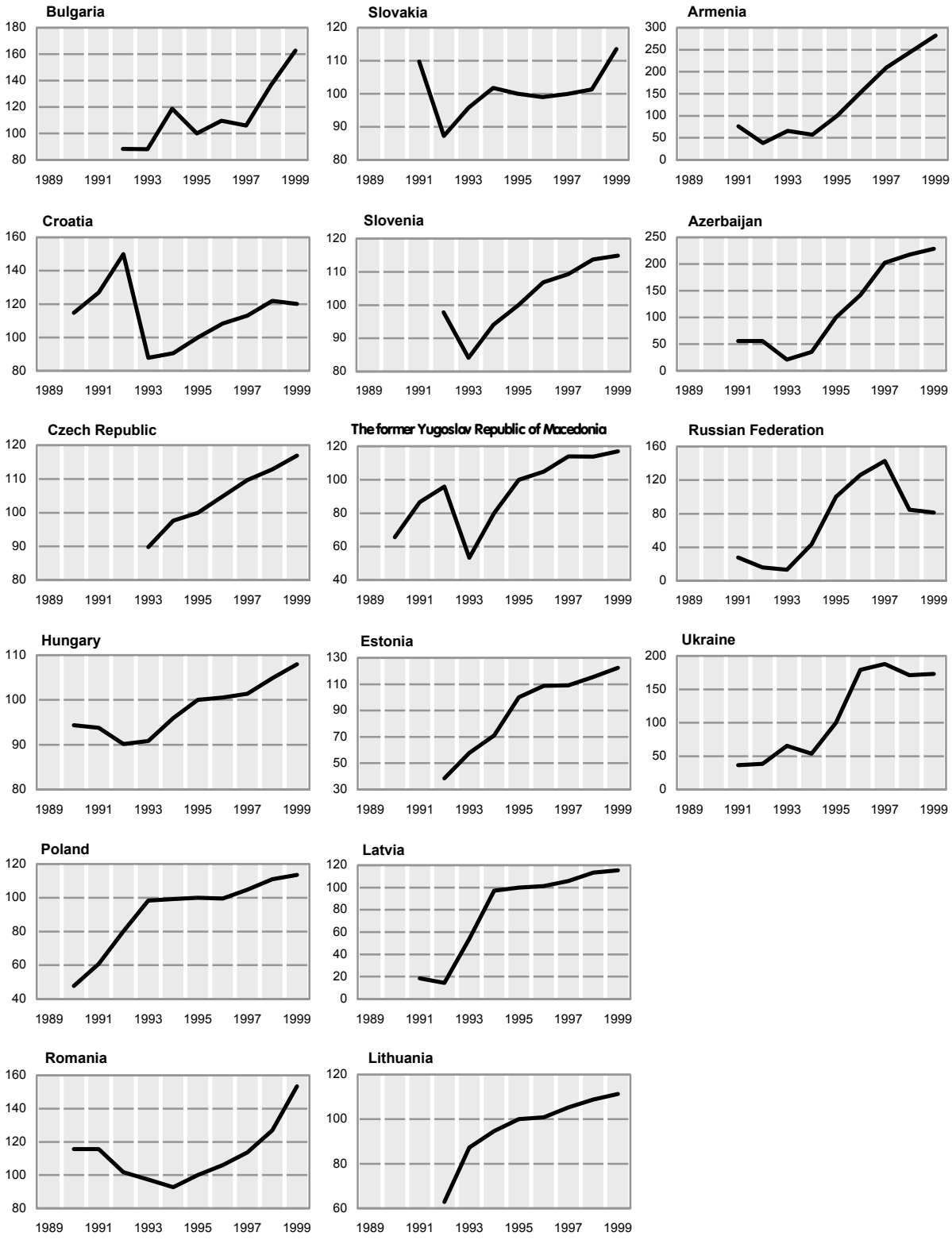
The analysis proceeds in several steps, following the same logic as in the previous section: since the Balassa-Samuelson effect rests on a number of mechanisms, the presence of each of them is checked before testing directly for the complete effect. First the behaviour of labour productivity is investigated, in order to confirm that it is driven by supply-side factors. Next, real product wages in industry and in services are related to productivity, gross and net wages being examined separately. The following step examines what has been driving growth in industry and in the services sectors. Importantly, these steps are not regarded as structural estimations, but simply as additional ways of exploring the statistical properties of the data and of detecting possible heterogeneity among countries in this process. The steps from productivity to real product wages, to real consumer wages and to growth allow the Balassa-Samuelson effect to be disentangled. The effect of these factors on inflation has not been included as the necessary assumptions would have been rather heroic. Finally, direct estimates of the Balassa-Samuelson effect are made, using the methodology developed by De Gregorio et al.,[10] which allows for demand factors as suggested by Bergstrand.[11]

[10] J. De Gregorio, A. Giovannini and H. Wolf, "International evidence on tradeables and nontradeables inflation", *European Economic Review,* Vol. 38, No. 6, June 1994, pp. 1225-1244.

[11] J. Bergstrand, "Structural determinants of real exchange rates and national price levels: some empirical evidence", *The American Economic Review,* Vol. 81, No. 1, 1991, pp. 327-334.

CHART 4

Relative prices of services and non-food manufactures, 1989-1999



Source: UN/ECE Common Database.

TABLE 3

Estimated regressions results for sectoral productivity
(Dependent variable: productivity)

Variables	*Industry*	*Service*
Constant	1.348217***	2.955725***
Productivity lagged	0.753621***	0.399006***
Total FDI/total GDP	0.024500***	0.066109***
Sectoral investment/sectoral GDP	0.050157*	0.015964***
Sample	1991-1998	1992-1998
Included observations	8	7
Number of cross-sections used	11	10
Total panel *(unbalanced)* observations	60	55
Adjusted R-squared	0.617728	0.483132
Standard error of regression	0.109048	0.042949
Mean of dependent variable	4.643807	4.608888
Standard deviation of dependent variable	0.176373	0.059740
Estimation method	GLS[a]	GLS[a]
Czech Republic	1992-1998	1992-1998
Hungary	1992-1998	1993-1998
Poland	1993-1998	1993-1998
Romania	1991-1998	1992-1998
Slovakia	1996-1998	1994-1997
Slovenia	1994-1997	..
Estonia	1994-1997	1994-1997
Latvia	1992-1998	1992-1998
Lithuania	1993-1998	1993-1998
Kyrgyzstan	1994-1998	1994-1998
Russian Federation	1996-1998	1996-1998

Source: Basic data from UN/ECE Common Database.

Note: Variables are in logs (net capital inflow was always positive for the observations used for estimation). Significance tests at the 10, 5 and 1 per cent level, respectively, are indicated by *, ** and ***.

[a] Cross-section weights.

TABLE 4

Estimated regressions results for sectoral real product wages
(Dependent variable: gross sectoral wage deflated by producer price index)

Variables	*Industry*	*Service*
Constant	-1.532179***	..
Country effect	..	..
Czech Republic	..	-0.063584
Hungary	..	-0.011136
Poland	..	-0.009449
Slovakia	..	0.025473
Estonia	..	0.059634
Latvia	..	0.180058
Lithuania	..	0.031741
Real product wage lagged	0.641248***	0.125584***
Productivity	0.283233***	0.479235***
Employment	-0.301050***	3.273128***
Unemployment rate	-0.023311***	..
Sample	1991-1999	1991-1998
Included observations	9	8
Number of cross-sections used	11	7
Total panel *(unbalanced)* observations	68	42
Adjusted R-squared	0.501623	0.892094
Standard error of regression	0.407117	0.184464
Mean of dependent variable	0.244320	0.183151
Standard deviation of dependent variable	0.576688	0.561551
Estimation method	GLS[a]	GLS[a]
Czech Republic	1991-1998	1991-1998
Hungary	1993-1998	1993-1998
Poland	1993-1998	1993-1998
Romania	1993-1998	..
Slovakia	1993-1998	1995-1998
Slovenia	1995-1998	..
Estonia	1994-1998	1994-1998
Latvia	1992-1998	1993-1998
Lithuania	1992-1998	1993-1998
Kyrgyzstan	1992-1999	..
Russian Federation	1995-1998	..

Source and note: As for table 3.

[a] Cross-section weights.

Panel data are used for all the transition countries for the period 1991-1999. However, due to many missing observations, the panel is unbalanced. Each table shows which countries and years are included in the regression equations.

(i) Sectoral productivity

Table 3 reports regressions of sectoral productivity (industry and services separately, in logs) on two explanatory variables: sectoral investment as a ratio to sectoral GDP, and total foreign direct investment as a ratio to total GDP.[12] It could be argued that foreign direct investment is subsumed in total investment. However, if foreign direct investment is an important channel for transfers of technology, it should play an additional role. An allowance is also made for slow adjustment by introducing lagged productivity. The sample includes 10 or 11 countries, depending on the sector under investigation. Various robustness checks (fixed and random effects, varying coefficients, different estimation methods, etc.) were conducted and these confirmed the substance of the results wherever they were found to be meaningful.

All the explanatory variables are significant at the conventional confidence levels and have the expected sign. Only for the investment ratio in industry is the coefficient significant at more than the 1 per cent level. It is worth noting that foreign direct investment adds to investment, and that this effect is significantly larger in the services sector. More detailed analysis is required to determine where exactly this additional effect is strongest; it could be in the banking sector or in retail trade, two sectors where foreign investments are known to have been important in building up know-how. Unsurprisingly, productivity has been adjusting faster in industry than in the services sector.

(ii) Sectoral real product wages

Critical to the Balassa-Samuelson effect is the link from labour productivity to wages. Does it exist in the transition economies? The relationship is explored in

[12] It would have been preferable to use sectoral foreign direct investment, of course, but the data are not disaggregated by sector. If spillover effects dominate sector-specific effects the approach here is appropriate but this may not be the case.

table 4 for a sample of eight or nine countries between 1991 and 1999, with variations depending on data availability. The dependent variable is the real gross product wage (in log form). The impact of productivity on the real product wage is found to be highly significant. Interestingly, reflecting the gradual process of retooling in industry, the effect is slower and initially smaller in this sector than in the services sector. In the long run, however, the impact is larger (the implied long-run coefficient being 0.79 in industry and 0.55 in the services sector).

The estimation also allows for labour market characteristics to affect real product wages. Unemployment is found to hold down wages, but only in industry. This surprising result in fact provides further support to the Balassa-Samuelson hypothesis, which sees wages in the services sector being driven not by labour market conditions in this sector but by a tendency towards equalization across sectors. Actually, the attempt to find empirical support for this proposition failed.

Sectoral employment has also been included as an explanatory variable. Employment affects the real product wage negatively in industry, positively in the services sector, both effects being highly significant. This finding supports the view developed by Grafe and Wyplosz,[13] according to which, in the transition phase, productivity is driven by the sectoral reallocation of labour from industry to services. Only when industry releases its inefficiently used labour force – or excess employment – inherited from central planning can the process of deep restructuring develop.

(iii) Sectoral real wages[14]

The wage equalization assumption really concerns net consumer wages, but unfortunately data on these do not exist for most transition countries. Accordingly, the estimates that follow, which includes only four or six countries, should be considered as very tentative or merely illustrative. A simple check is made for the transmission of real product wages and taxes (which create a wedge between gross and net wages) to net real wages.

The results reported in table 5 confirm the presence of such a transmission channel. All the coefficients have the correct sign and are significant at the conventional confidence levels, the effect from real product wages to real wages being weakest in industry.

(iv) Sectoral growth

The last check on the data concerns the annual growth of output (GDP) in each sector. The main purpose of this exercise is to determine the roles of demand and supply factors. Recall that the Balassa-Samuelson effect is presumed to originate in the supply side of the economy but that, under plausible conditions, demand-side effects should not work against it. At any rate, it is useful to evaluate the respective roles of these two channels.

TABLE 5

Estimated regressions results for sectoral real wage
(Dependent variable: net sectoral wage deflated by consumer price index)

Variables	*Industry*	*Service*
Constant	0.007912**	-0.029594***
Real wage lagged	0.671040***	0.687206***
Real product wage increase	0.061037*	0.529754***
Tax *(ratio of gross to net wages)* increase	-0.234936***	-0.310088***
Time	0.006196***	0.008691***
Sample	1993-1999	1993-1999
Included observations	7	7
Number of cross-sections used	6	4
Total panel *(unbalanced)* observations	38	23
Adjusted R-squared	0.449795	0.862067
Standard error of regression	0.126439	0.023095
Mean of dependent variable	0.068505	0.026499
Standard deviation of dependent variable	0.170459	0.062185
Estimation method	GLS[a]	GLS[a]
Hungary	1993-1999	1993-1999
Poland	1993-1998	1993-1998
Romania	1993-1999	
Slovenia	1993-1999	1994-1998
Latvia	1994-1999	1995-1999
Lithuania	1995-1999	

Source and note: As for table 3.

[a] Cross-section weights.

Table 6 reports the result of the estimated regressions of sectoral growth. The supply side is captured via employment and productivity, lagged to reduce the problem of reverse causality. Data availability allows the inclusion of eight countries in the (unbalanced) panel. The presence of supply-side factors is strongly confirmed by the data, although employment is not found to affect growth significantly in the services sector. A possible reason for this is that the services sector does not face a manpower constraint: it offers equally attractive wages as industry but is seen as providing more desirable occupations. Another possibility is that the services sector is quite heterogeneous, with a larger share of unskilled workers who may have nowhere else to go.

The other variables include demand-side factors, total domestic consumption and exports, both lagged. Consumption enters positively, as expected, and is highly significant. Exports do not affect growth in the services sector, confirming the non-tradeable characteristics of this sector.

(v) The Balassa-Samuelson effect

Having tested the presumptions concerning the different components of the Balassa-Samuelson hypothesis, its presence can now be tested directly. The purpose is to determine whether the relative prices of non-traded to traded goods respond positively to different

[13] C. Grafe and C. Wyplosz, "The real exchange rate in transition economies", in M. Blejer and M. Skreb (eds.), *Balance of Payments, Exchange Rate and Competitiveness in Transition Economies* (Kluwer Academic Publishers, 1999).

[14] Net wages in each sector deflated by the consumer price index.

TABLE 6

Estimated regressions results for sectoral output growth
(Dependent variable: sectoral GDP at constant prices)

Variables	*Industry*	*Service*
Constant	-4.507638***	0.413191*
Sectoral employment lagged	0.511320***	..
Sectoral productivity lagged	0.459751***	0.723927***
Consumption lagged	0.783707***	0.182189***
Exports lagged	0.227025***	..
Time	..	0.018402***
Sample	1992-1999	1992-1999
Included observations	8	8
Number of cross-sections used	11	10
Total panel *(unbalanced)* observations	62	58
Adjusted R-squared	0.785472	0.324213
Standard error of regression	0.091454	0.068647
Mean of dependent variable	4.710958	4.628120
Standard deviation of dependent variable	0.197452	0.083506
Estimation method	GLS[a]	GLS[a]
Czech Republic	1992-1999	1992-1999
Hungary	1993-1998	1993-1998
Poland	1993-1998	1993-1998
Romania	1992-1999	1992-1999
Slovakia	1996-1998	..
Slovenia	1994-1999	1994-1999
Estonia	1996-1999	1996-1999
Latvia	1997-1999	1997-1999
Lithuania	1992-1999	1992-1999
Kyrgyzstan	1993-1999	1994-1999
Russian Federation	1996-1998	1996-1998

Source and note: As for table 3.

[a] Cross-section weights.

TABLE 7

Estimation results on service-to-consumer goods price ratio

Variables	*Base version*	*Exchange rate regime effect*	
		With inflation acceleration	*Without inflation acceleration*
Constant	2.060734***	1.108583***	2.451394***
Service-to-non-food price ratio lagged	0.444020***	0.446326***	0.329490***
Productivity in industry	0.242327***	0.174235***	0.247501***
Exchange rate effect[a]		0.007960***	0.005915***
Productivity in services	-0.184074*	0.128094*	-0.106654**
GDP/capita (PPP)	0.027596**	0.006321	
Inflation acceleration			
Country effect			
Czech Republic	-0.001539**	-0.002185***	
Hungary	0.001177**	0.002089***	
Poland	-0.003233**	-0.003756**	
Romania	0.000553	0.000522*	
Slovenia	0.003063***	0.003482***	
Estonia	0.001503**	0.001395**	
Latvia	-0.004271***	-0.004174***	
Lithuania	-0.000796**	-0.000586***	
Russian Federation	-0.006278**	-0.006452**	
Sample		1991-1998	
Included observations		8	
Number of cross-sections used		9	
Total panel *(unbalanced)* observations		56	
Adjusted R-squared	0.954151	0.954108	0.442372
Standard error of regression	0.065048	0.065078	0.226850
Means of dependent variable		4.567562	
Standard deviation of dependent variable		0.303785	
Estimation method		GLS[b]	
Czech Republic		1994-1998	
Hungary		1992-1998	
Poland		1992-1998	
Romania		1991-1998	
Slovenia		1993-1998	
Estonia		1993-1998	
Latvia		1992-1998	
Lithuania		1993-1998	
Russian Federation		1995-1998	

Source and note: As for table 6.1.1 and table 6.5.1, except that inflation acceleration is not in logs. (The consumer goods prices refer to the consumer price index less food and less services.)

[a] Exchange rate regime without any formal commitment (managed or free float).

[b] Cross-section weights.

secular trends in the two sectors, with a possible additional role for demand factors.[15]

As before, all the available data are used to build a panel of nine countries over the nine years 1991-1999. The relative price change is shown in chart 4, i.e. the ratio of the services price index to the non-food manufacturing producer price index. Labour productivity is displayed in chart 3. Following Bergstrand,[16] demand-side effects are captured by two variables, GDP per capita (PPP-adjusted) and the change in the rate of inflation.

The basic regression is reported in the first column of table 7. Crucially, the two productivity coefficients are significant and have the correct sign, confirming the presence of the Balassa-Samuelson effect: productivity growth in industry leads to a real appreciation, productivity growth in services to a real depreciation. The former enters with a larger coefficient, as expected given that the services sector is usually more labour intensive than industry. If productivity rises by 10 per cent in the industrial sector alone, the relative price of non-traded to traded goods increases by 2.4 per cent in the short run and by 4.4 per cent in the long run.

GDP per capita also enters the equation significantly and positively, suggesting the possibility of a bias towards non-traded goods. The inflation acceleration term differs from one country to another, as reported in table 7.

This regression equation survived a variety of robustness checks. Different estimation methods (fixed and random effects, OLS and GLS regressions) were tested; allowance was made for a potential bias in government spending; the possibility that the relationship may have changed over time was explored by allowing for additive and multiplicative dummy variables to

[15] Following the formulation in J. De Gregorio et al., op. cit., pp. 1225-1244, the Balassa-Samuelson equation can be written as follows:

$$\log (PN/PT) = a0 + a1[\alpha N/\alpha T \log(\pi T) - \log (\pi N)] + \text{demand factors},$$

where PN/PT is the ratio of non-traded to traded goods prices, αN and αT are the shares of labour in, respectively, the non-traded and traded goods sectors, and πT and πN is productivity in each sector.

[16] J. Bergstrand, op. cit, pp. 327-334.

capture the number of years since the beginning of reforms (using the dating proposed by Fischer and Sahay).[17] Since productivity in industry, in some cases, declined in the early transformation period, a check was made to see if there were different coefficient values during these years. None of these potential effects turned out to be significant, and none had any substantial effect on the results.

The only variation that seems to matter is the exchange rate regime. This possibility is suggested by the behaviour of relative prices as shown in chart 4. Using the classification shown in table 2, three categories of exchange rate regime were established: hard pegs (regimes 1 to 3 in table 2), exchange rate commitment (regimes 4 to 6) and no explicit commitment (regimes 7 and 8). The resulting dummy variables were used to test for an effect on the productivity coefficients. Table 7 shows that the only exchange rate regime to make a difference is the no-commitment one. The second column indicates that the effect of productivity in the traded goods sector (industry) increases under this regime while it changes sign in the non-traded goods sector (services), being marginally significant. In the third column, the effect of productivity in the non-traded goods sector is again found to be negative, as predicted by the Balassa-Samuelson assumption, while the role of productivity in the traded goods sector remains enhanced under the no-commitment exchange rate regime. We conclude that a floating rate regime strengthens the Balassa-Samuelson effect. This is not surprising: if the exchange rate is free to absorb some of the equilibrium real appreciation in the form of a nominal appreciation rather than forcing adjustment through absolute price changes, the effect is bound to appear faster, which makes a difference given the short time series. Of course, with a longer data series, such nominal short-term rigidities should vanish. The result therefore essentially confirms the robustness of the evidence regarding the Balassa-Samuelson effect. In particular, the estimate of the all-important coefficient of productivity in industry remains unchanged.

6.6 Policy implications

The likely continuing presence of a Balassa-Samuelson effect is a serious complicating factor for the process of integration of the transition countries into ERM-2 and, eventually, EMU. In t<his respect, the next accession round raises more serious challenges than previous ones.

First, the economic distance for the new entrants to catch up is much larger than for any previous entrants to the European Union, as documented in table 1. The scope for catch up of the largest transition country, Poland, is about twice that facing Greece or Portugal when they joined. By 2004, they will have moved further ahead, of course. Another message from the table, is that the 30 per cent average real appreciation (as measured by the ratio of non-traded to traded goods prices) between 1995 and 1999 corresponds to only a minute closing of the initial gap. Even if growth remains rapid until 2004, the scope for catch up and real appreciation will still be considerably larger than was ever the case in previous accessions.

Second, previous accessions allowed for a larger menu of options. ERM membership was not required, EMU was not in existence. Even if the transition economies elect to move slowly, an option discussed below, the fact that eventually they must first join the ERM, and then EMU, is an important constraint which affects both the behaviour of forward-looking financial markets and the authorities. Finally, at the time of previous accessions, capital controls were not actively disallowed. Greece, Portugal and Spain all made extensive use of this possibility. (Whether it helped to stabilize their exchange markets remains another, and controversial, issue, however.)

A number of policy implications emerge from the analysis of this paper. A sizeable real appreciation will characterize the transition countries for a long time to come, and most likely for long after they have joined EMU. This means either a trend appreciation of their nominal exchange rates with inflation at the EMU average, or an inflation rate in excess of the EMU average if the exchange rate *vis-à-vis* the euro is kept constant, and even more inflation if the nominal exchange rate is allowed to depreciate.. The estimates in table 7 allow a "guesstimate" of the size of this effect. Assuming a continuation of the average rates of growth of trend productivity in both sectors over the last five years for the countries displayed in chart 3 (8.6 per cent a year for industry and 1.9 per cent for services) and ignoring the per capita GDP term which reinforces the Balassa-Samuelson effect, the implied average annual rate of real appreciation lies between 2.9 and 3.1 per cent – say 3 per cent.[18]

During the two-year ERM membership period, which is required prior to EMU entry, there will be a trade-off between exchange rate stability and the inflation target. Keeping the nominal exchange rate stable, as required for accession to EMU, could lead to an inflation rate 3 percentage points above that in the euro area. Preventing such an inflation rate, which is also required for entry into the monetary union, will require the nominal exchange rate to appreciate each year by 3 percentage points. Over two years, this would represent about half of the ERM-2 bandwidth.

This may seem comfortable but it is not. Indeed, the tendency for real appreciation could be reinforced by capital inflows. In fact, the inflows will affect the real exchange rate both via the nominal rate and via the Balassa-Samuelson effect as foreign investment has been found to significantly raise productivity growth more in industry, and less in the services sector. Such an outcome could absorb the remaining half of the bandwidth. The risk of currency crises in the acceding countries is therefore far from negligible.

[17] S. Fischer, and R. Sahay, op. cit.

[18] It is assumed that there is no real appreciation elsewhere; otherwise these results would be modified.