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Observations on Inflation in Transition Economies

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The transition to market based economies began a little more than a decade ago in 27 different countries of Central Europe and the Former Soviet Union. Most observers in the early 1990s thought that the transition process would be long and tedious. Early transition experiences seemed to support that expectation. Most of the transition countries experienced sharp initial declines in output, periods of rapid inflation, including many hyperinflations, and enormous political obstacles to reform. There was ample reason to believe that transition would be a specific area of concern to economists for many years to come. However, the special transition experience is largely over and the term transition economics might even be disappearing from view. At the very least, the term is barely relevant in much of Central Europe although it is still applicable in the republics of the former Soviet Union. The other transition countries are now just a group of emerging market economies and some of them are quickly leaving that status. Nothing symbolizes this more than the forthcoming accession next spring to the European Union of eight formerly planned economies from the Baltics, through Central Europe and in the Balkans.

The rapidity of the transition experience is well illustrated by the path of inflation in these countries. Not surprisingly, one of the first manifestations of transition was high inflation. The causes of these inflationary outbursts were classical. First, the removal of

price controls and quantity allocations, which repressed demand, led to rapid adjustments to free market prices. Second, fiscal and financial crises resulted in periods of rapid monetary expansion as governments relied on seignorage to support budgets as well as state owned enterprises. In the early 1990s about half of the transition countries experienced at least one year of annual inflation rates in excess of 1000 per cent. However, stabilization policies were in place in virtually every transition country by 1995 and the policies were remarkably successful. By 1997 only three countries had inflation rates in excess of 100 percent. By 2002, annual inflation rates were below 15 percent in all but two countries and below 5 percent in most. The transition experience with inflation is nothing short of remarkable.

Why did the transition economies do so well so quickly in bringing inflation under control? One answer is that the consensus view of stabilization policy had just come into its own in the policy world by the 1990s. Approaches to macroeconomics and policy making which were not self-evident to the leaders and intellectuals of the less developed world in the 1960s, 70s and 80s, were learned quickly in the transition world in the 1990s. Thus, the Latin American experiences of generations that repeatedly fought inflation without a political consensus that accepted macroeconomic realities were not repeated in Central Europe. That is not to say that transition economics is a complete success. Although, the lessons of stabilization policy were largely learned, there are other areas economic issues where transition problems are still extant. In particular, health, education and pension systems are largely unchanged and subsidies to government owned enterprises are still common.

The influence of Western investors and institutions in the transition economies may be another important reason why the transition economies were able to adopt stabilization policies rapidly. Relatively large flows of FDI and portfolio investment into the fast track transition economies of Europe (Poland, Hungary and the Czech Republic) started immediately after the transition. These flows were large and were accompanied by institutional pressures for reform. In addition, reform elements in these countries found an environment with an institutional memory of market institutions and the human capital to jump start the process. As a result, policy and regulatory abuses in these countries were rather short lived. And by the mid-1990s, the fast track transition

economies had reformed the financial sector and established sound institutional structures for monetary policy. With these accomplishments, it is not surprising that stabilization policy fell into place.

Another important answer is the pull of Europe. For a variety of political and social reasons, the nations of central Europe have an overwhelming desire to be part of Europe and the institutions of the European community. So, a consensus commitment to join Europe led to a willingness to adopt stringent economic policies. The constraints of the Maastricht treaty influence even those countries that are not in the first wave of accession countries. For example, the other Balkan countries that do want to be left out of the second wave and also some of the other countries (e.g. the Ukraine) that do now want to appear un-European.

We begin the discussion with an overview of the inflation experience in transition. Only a brief overview is needed because this far from the first essay to take note of the remarkable inflation history in the region. Dabrowski (1999) and Cottarelli and Doyle (1999) looked at phenomenon as of the late 1990s. Table 1 shows annual CPI inflation rates for the transition countries separated into three groups with somewhat different experiences. The upper panel shows countries of Central and Eastern Europe and the bottom panels shows the countries of the former Soviet Union with the Central Asian Republics in the last panel. In both groups the median inflation rates have declined steadily. For the CEE countries the median dipped below 50% per year in 1993 while in the FSU, that milestone was passed in 1996. The 10% threshold for the median was passed in 1998 in CEE and in 2000 in the FSU. The strongest efforts to bring inflation down to European levels were in the countries selected for accession to the EU. The reference rate for inflation using the Maastricht convergence criteria was between 3 and 3.5 percent in the three years 2000-02.¹ The median accession country inflation rate passed this threshold in 2002 and was even less than the Euro area inflation rate of 2.3% in 2002.

¹ The Maastricht Treaty set the reference rate for inflation convergence as the average of the three lowest inflation rates in the EU plus 1.5%. If this rule is applied to the countries in the Euro area, the reference rates are 3.2, 3.5 and 3.0 in 2000-02.

Median inflation rates for country groups mask some of the interesting variation among countries and over time. In the course of extreme policy efforts to reduce inflation, many countries have experienced low and even negative inflation rates. A better measure of success is a measure of sustained low inflation, the average inflation rates for the 5 year period 1998-2002. The five year average was below 5% in the Baltics, Croatia, the Czech Republic and several additional countries where an observer might question the quality of the data. The five year average is above 10% in Central Asia as well as in Romania and the large countries of the FSU (Russia, Belarus and the Ukraine).

There is of course some variation in inflation experience among the 25 countries for which data are reported in Table 1. A few countries, which started some economic reforms in advance of the political transition, were able to avoid hyperinflation (Hungary, Czech Republic and the Slovak Republic). In some countries the disinflation was dramatic. Croatia went from 1000 per cent inflation to zero in one year. In others, the process was more gradual. The inflation rate in Hungary declined from 30 percent to 10 percent over the course of a decade. In still others, reforms were not immediately successful. In Bulgaria initial efforts at reform were unsuccessful and inflation returned with vengeance in 1996-7 until a second reform program was put in place.

Aggregating the data across the transition countries many of which are very small obscures the fact that inflation remains a problem in several large and important countries where financial reforms, extensive restructuring and genuine privatization have lagged. Specifically, the 2002 inflation rate was 15% in Russia, 18% in Romania and 35% in Belarus.

Another useful way to examine the disinflation is to look at the experiences that followed stabilization policies. Cottarelli and Doyle (1999) use the dating of transition stabilizations prepared by Fischer, Sahay and Vegh (1998) and show how long it took to reach disinflation mileposts. Table 2 provides a similar and updated version. In broad terms, the table shows how quickly stabilization programs take hold. A stabilization program brings inflation below 100% in about a year (the median for successful stabilizations). The median time for inflation to fall from 100% to 60% is just another 2 months. However, further progress in inflation reduction takes more time. The median

time for inflation to fall from 60% to 30% is 6 months, from 30% to 15%, 21 months and from 15% to 7.5%, 8 months.

The inflation experiences in transition countries have been extensively summarized in the two papers noted, the Cottarelli and Doyle (1999) IMF working paper and the CASE (Warsaw) report by Dabrowski (1999). These papers provide a wealth of information about the relationships between inflation and its macroeconomic determinants in the first few years after stabilization. Both of these papers reflect the amazement with which the successful disinflation programs were received. With a perspective of several more years, we can echo the amazement and note that the success of disinflation programs around the world are taken for granted. In addition to bringing some of the relevant observations up to date, it will be useful to evaluate the inflation experience and comment on some relevant issues.

1. How did the transition countries disinflate?

A discussion of disinflation in transition countries has to be divided into two parts, the end of high inflation and the end of moderate inflation. As noted already, there are several studies of the former. Not surprisingly control of the fiscal deficit is given the strongest credit in econometric studies and case analyses of high inflation episodes. There has been less analysis of the more recent experience with disinflation with the notable exception of Brada and Kutan (2002).

There are two basic pillars of any disinflation policy – the fiscal and monetary stance of policy. The initial stages of transition were accompanied by large fiscal deficits. Peak deficits in the general government balance were typically between 5 and 10 % of GDP in the advanced transition countries and often much more in the FSU countries. For example, the balance was –6.7% in Poland in 1991 and 92, -10.3% in Bulgaria in 1996, –8.4% in Hungary in 1994, -119% in Slovak Republic in 1994 and only –3.1 in the Czechs republic in 1992. These figures understate the true burden because quasi-fiscal deficits in the form of government support to enterprises through central bank credit were large as well. Nevertheless a hallmark of the disinflation era was that the deficits were reduced significantly. In all of the countries mentioned above, the

deficits were less than 2% of GDP for several years running by 1997 with the exception of Hungary.

Improved fiscal balances reduced the expectation that deficits would be monetized and helped lower inflationary expectations. Perhaps equally important was the development of a capacity for government deficit financing other than monetization. Treasury bills were introduced in the advanced transition countries in the early 1990s and in the former Soviet Union in the mid- 1990s. In addition, several countries were able to introduce 10 year government bonds by the end of the decade.

Although the capacity to absorb deficits without monetization has increased, the deficits have begun to increase as well. Most of the countries of central Europe were running fiscal deficits in excess of 5% of GDP in the last three years. Although there is no apparent inflationary impact, it may well emerge suddenly and powerfully.

The other pillar of disinflation is the monetary policy itself. Of course, fiscal and monetary policies are related and an early review of disinflation in transition (Begg 1997) notes that monetary policy rarely succeeds if sound fiscal policy had not been established. A money supply based disinflation to stop hyperinflation works because it is also a fiscal based disinflation when seignorage is the most important source of government revenue.

Needless to say, disinflation was accompanied by reduced money expansion. The interesting issue is how money expansion was kept under control. Macro conditions were far too chaotic in the pre stabilization period to adopt either money aggregates targets or interest rate targets. Large overhangs of forced saving meant that the initial money stocks were large. Although early high inflation eroded the value of these stocks, support of both enterprises and the government through money creation led to rapid growth of money. Furthermore, successful disinflation leads to a rebound in real money demand and increased intermediary activity. Money multipliers are variable and difficult to predict. It would have been impossible to target money aggregates in this environment. Any attempt to do so would not be credible. Similarly, high and variable inflation made interest rate targets equally impractical. Moreover, money markets institutions and instruments for the application of interest rate targets did not exist at first.

So, the exchange rate is the most obvious choice as a target for monetary policy. Although policy makers kept a careful watch on the exchange rate as the only reliable

indicator of the success of efforts to disinflate, only some countries adopted any formal exchange rate targets. For example Poland adopted a crawling peg exchange rate target in order to influence both policy and expectations. Estonia is exceptional; it adopted a hard peg. Most of the other countries avoided a formal peg and many moved towards floating exchange rates. This is surprising because formal exchange rate targets that are highly visible and effect prices directly through inflation pass through, can be very helpful in implementing a credible disinflation policy. There are difficulties in choosing an appropriate exchange rate path that complicate the use of formal exchange rate targets. First, capital flows can influence the nominal exchange rates and second, transition structural adjustments lead to changes in real exchange rates. Thus, an explicit target might have as many advantages as disadvantages. The number of transition countries with floating exchange rates increased over the 1990s.

Monetary policy management of the inflation rate in many of the transition countries was complicated by the role of capital inflows. Central banks usually absorb capital inflows in order to avoid currency appreciation and then sterilize the impact on the domestic monetary base. However, there are limits on the ability of a central bank to sterilize. First, sterilization is costly to the central bank that holds low interest earning foreign assets. Second, it constrains the central bank balance sheet and might make it difficult to react to domestic financial sector shocks.

The comparison of Hungary, Poland and the Czech republic through the mid 1990s is instructive (see Roubini and Wachtel, 1999). The commitment to a pegged exchange rate was strongest in the Czech republic (the Koruna was pegged from 1991 to 1997), weakest in Hungary that had repeated devaluations and somewhat stronger in Poland where the crawling peg was carefully managed. Inflation was highest in Hungary and lowest in the Czech republic. The Czech Republic had used a fixed exchange rate as a nominal anchor and cornerstone for its initial stabilization program. However, real appreciation and problems financing the external imbalance were factors inhibiting Czech growth towards the end of the decade.

Thus, the surprising conclusion is that disinflation in transition economies took place while the predominant form of monetary targeting was policy judgment. At the same time, a new approach to policy targeting was taking hold among the developed

countries. In the course of the 1990s, inflation targeting became all the rage and was picked up in the transition world as well. At first the use of inflation targets was informal but by the end of the decade several countries formally adopted inflation targets. This was only possible once inflation rates had subsided so that inflation forecasts over a medium term horizon could be taken seriously. Jones and Mishkin (2003) describe the use of inflation targets in the Hungary, Poland and the Czech Republic. The Czech Republic dropped its nominal anchor for a floating exchange rate in 1997. This left monetary policy without any target to help reduce the inflation rate and at the end of the year, the central bank formally adopted inflation targets.

Inflation targets have the distinct advantage in that they avoid the pitfalls of the traditional monetary targets – interest rates, exchange rates or monetary aggregates. Moreover, the few years of experience with inflation targets are promising. In addition, adopting inflation targets leads to better more transparent and more consistent communication from the central bank about policy, which helps establish credibility. However, there are two observations to bear in mind. First, missed inflation targets can lead to either abrupt, and perhaps, ill advised changes in policy.² Although everyone agrees that inflation targets should not be a straight jacket, there might be a loss of credibility to a transition country central bank that ignores overshooting that goes on beyond its stipulated policy horizon.

The transition central bankers may find pitfalls in their use of inflation targets. Poland adopted inflation targets in 1998 and continued to utilize a crawling band exchange rate target for policy operations until April 2000 when a floating regime was announced. The original short term inflation targets were 2 percentage points wide but in 2002 the bank specified a target of 5% with a permissible fluctuation band of 1 percentage point. According to the OECD (2002, p.41): “The Bank hopes that by emphasizing its desire to achieve a specific level of inflation as opposed to an outcome within a range, its communications will be better able to affect expectations.” This seems to be a dangerous strategy for a transition economy where non-market structural forces continue to effect inflation and for a small open economy where external shocks have

² This is basically the reason why the Greenspan Fed resists the formal use of inflation targets.

large effects. The bank does say that in event of a missed target, policy will be aimed at moving towards the medium term rather than the short term target.

Second, inflation targeting in the transition economies has really not been inflation targeting but EU targeting. All of the countries that have adopted inflation targets are accession candidates and the influence of expectations about accession is probably more important than the use of a particular policy approach over the last few years.

For many years it has been fashionable to attribute successful macroeconomic outcomes to central bank independence. Although the original econometric evidence has been criticized, it is still an interesting indicator. Cukierman, Miller and Neyapti (2002) look at the characteristics of central banks in transition economies. The central banks established in the transition economies score very well on various indexes of institutional, policy and legal independence when compared to other developing countries and even when compared to developed country central banks in the 1980s. Moreover, the central banks established later are institutionally stronger. Some early studies (Dabrowski, 1999) concluded that central bank independence is associated with lower inflation rates but Cukierman et. al. indicates that the relationship is weak in the initial stages of transition when price decontrol dominates. However, in later stages when liberalization is sustained, there is somewhat less inflation with a more independent of central bank. In our view, it is a mistake to look for causality from the institutional structure to inflation. Particularly, in the transition countries, central bank independence is endogenous.

The recent reduction in inflation rates to developed country levels might be due to monetary and fiscal discipline that convincingly established the disinflation bona fides of transition policy makers. Or it might be due to some positive external shocks and the development of political institutions. Brada and Kutan (2002) conclude that the later disinflation was due to positive shocks rather than the development of sound monetary and fiscal policy institutions and policies. They suggest that tight monetary policy through the 1990s only served to offset the lack of progress on true fiscal reform. They characterize monetary policy in the three advanced transition economies in the mid and late 1990s as inherently unstable. As noted above the Czech Republic quickly moved from various exchange rate pegs to floating to inflation targeting as it groped for an

effective policy tool. The reduction in inflation in this period was due to something other than the influence of a credible and stable monetary policy target.

The fall in import prices, particularly energy prices, after 1997 was an important external deflationary shock. Brada and Kutan conclude that the external shock rather than any shift in monetary regime was the source of the later disinflation. Since tradable can account for two-thirds of the components of the CPI, the shock can have a major influence on inflation rates.

There is little reason for optimism in the outlook for inflation in the advanced transition countries. The external shock from import prices is transitory. The fiscal deficits in these countries have been worsening and are now as large as they have ever been. There has not been a long enough period of management with inflation targets to create an environment where inflation expectations are really quiescent.

However, there is one wild card in this discussion. It is the influence of EU accession. Eight transition countries are scheduled to become part of the EU in May and all of these countries expect to be part of the Euro area soon thereafter. Although, the fiscal deficits and inflation rates might make it difficult for these countries to satisfy the Maastricht criteria, they expect to do so. In addition, countries of central Europe that were left out of the first round (e.g. Croatia) expect to be included in a second round that follows soon. The consensus, among the countries already in and the transition candidates is that the economic and monetary integration of Europe will go forth rapidly.

The anticipation of European integration has influenced inflation rates in at least two important ways. First, the high likelihood of accession has caused expectations of inflation to move towards European levels. This influence may be as important as the external shock from import prices but it will be hard to distinguish between these contemporaneous phenomena. Second, the enormous emphasis on accession enables policy makers to maintain a tight monetary policy in order to adjust to standards in the Euro area.

Entry into the European Union will have a positive effect on the transition countries. However, joining the Euro area has much different implications. Has transition restructuring gone far enough to allow for monetary integration? That is a

very broad question about the future of Europe that goes beyond the present topic. The answer however will clearly have bearing on inflation rates in transition.

2. Can we believe the numbers?

Inflation mismeasurement and biases in calculated inflation rates are frequently examined in developed countries. The 1996 Boskin report in the U.S. provided explicit estimates of the biases in the CPI. Since that time the BLS has improved both the measurement of prices and the calculation of inflation rates. Improvements include obtaining prices from new discount outlets. In addition, the index calculation now allows for regular changes in expenditure weights. In the Euro area there were similar concerns and efforts to improve price measurement with the establishment of the HICP (Harmonized Index of Consumer Prices). However, mismeasurement of prices in the less developed economies is rarely discussed. As long as the focus of interest is on a disinflation that brings inflation from, for example, 1000% to 10%, the quality of the data is not a central concern. But, with inflation rates consistently below 10% and with increased interest in cross country comparisons and small changes in the inflation trend, the quality of the data being examined is worth considering. Moreover, reliable measures of price indexes are essential for determining changes in real income. In particular, it is common to ask when and whether real output has reached its peak pre-transition level. With substantial price change compounded over 10 or more years, small errors in index measurement can lead to different conclusions.

Not surprisingly, there are some important reasons why inflation measures in the transition economies might be subject to serious mismeasurement. Filer and Hanousek (2003) summarize their extensive project at CERGE in Prague on inflation bias in the Czech Republic. The major source of bias is the failure to account for quality improvements in goods sold and the entrance of new goods onto the market. Substitution bias from the use of fixed weight indices and outlet substitution due to new markets also contribute to the measured bias. Their estimates somewhat over time and with different assumptions but seem fairly robust. At least one-third of the measured average inflation

rates in the Czech Republic (about 10% per year) are due to measurement bias.³ The implications of this are large. Real growth (with GDP deflated by the measured CPI) over the decade was -0.7% per year. With inflation properly measured to correct for the estimated biases, the growth rate was + 3.6% per year.

A common way of measuring transition progress is to look at real GDP relative to its pre-transition (1989) level. In 1999, the EBRD data (EBRD, 2000) indicate that only three transition countries had regained the 1989 level – Poland, Slovak republic and Slovenia. By 2001, the Czech Republic and Hungary, Albania and Uzbekistan were added to the list. However, with proper measurement of the price changes these indicators might tell a different story.

Filer and Hanousek provide some additional evidence that indicates that economic well being has improved more than the GDP data suggest because inflation is overstated. They conducted focus groups to determine how consumers would allocate price change to inflation as opposed to quality change. They did this by asking Czech consumers how much they would pay at the current time for a brand new 1990 good. Their results indicate that much more of the observed price change should be attributed to quality change than the official CPI does. For example, clothing prices went up more than two and half times over the decade. The index attributes about 30% of this to quality change so that the CPI for clothing more than doubled. However, when consumer perceptions are used to measure quality improvements, the price increase is only about 50%.

The measurement problems will in all likelihood be solved with time as national authorities follow internationally accepted norms and improve their data collections procedures. In addition, with moderate inflation the biases do not create such large distortions. However, economic historians looking back on the transition decade will be well advised to keep this discussion in mind.

3. Did inflation do its job?

Perhaps one of the most important distinguishing characteristics of the formerly planned economies was the extent to which prices were distorted. Restrictions on trade

³ The Boskin report for the U.S. provides similar results. The overall bias in the inflation rate is about 1.2% per year with an average inflation rate of 2.8%.

and domestic allocation mechanisms kept the prices of even internationally traded commodities from reaching their world market prices. And the prices of domestically produced goods were set administratively and could venture far from what they would be if allowed to follow market forces. Thus, the removal of controls and price setting arrangements led to a rapid change in prices. In most transition economies there was also an accumulated stocks of liquid assets from forced saving. The removal of price restraints and the large overhang of liquid balances led to the immediate outbreak of inflation. Generally, the initial outburst of inflation was due to the following causes:

- Removal of price controls, constraints and administered price setting
- Seignorage financing of government
- Credit expansion to support government enterprises
- Spending of overhang of forced saving.

For the most part the inflation that emerges is costly. First, the value of financial assets savings erodes. Second, the support of inefficient enterprises continues. Third, hyperinflation inhibits the effective operation of the payments system. But there is also one possible way in which inflation, even at relatively high levels can be beneficial. The inflationary environment allows and encourages the adjustment of relative prices. The 'job' to be accomplished by the initial post-transition outbursts of inflation was to bring adjustments in relative prices.

Is there evidence that relative price adjustments took place?

There are several studies that have looked at this issue indirectly by examining the degree of price variability or the extent of price level convergence. The thrust of the evidence is that a large amount of price level adjustment took place early in the transition process but that the amount of adjustment has slowed down while there are still large differences in the structure of prices between the transition economies and the developed economies. The differences that persist are related to both non-market determinants of prices and productivity differentials between traded and non-traded goods sectors (the Balassa Samuelson effect that will be discussed later).

Coorey, Mecagni and Offerdal (1996) look at relative price variability measures such as the variance and skewness of inflation rates across price index components. They find that relative price variability is associated with the level of the inflation rates, a

finding established for developed countries already. Although, it is difficult to disentangle the direction of causality between inflation rates and relative price variability, there are some inferences that can be drawn for the transition economies. First, the data suggests that the variance among price index components is both particularly high in transition countries relative to developed economies, and also higher early in the transition process. In particular, there are spikes in relative price variability when the initial price liberalizations occur and there is evidence of causality from relative price variability to inflation.⁴ Although, the inflation in transition countries is clearly due to standard causes as well (money growth, wage pressures, etc.), price shocks from liberalization seem to play a significant role.

Wozniak (chapter 10 in Dabrowski, 2003) looks at disaggregated price movements in Poland, Hungary and the Czech republic and reaches very similar conclusions. Relative price changes had an impact on initial inflation rates, particularly in Poland where the initial distortions were greatest. Through, the mid 1990s, the gradual relaxing of administered price adjustments influenced inflation rates in all countries with the biggest effects in Hungary. There continues to be considerable debate among policy makers about the optimal way speed and magnitude of price liberalizations. The few studies of disaggregated price movements in transition have not provided any answers.

An association between spikes in prices due to liberalization and the overall inflation rate has an interesting implication. Efforts to disinflate with standard policy tools might be a mistake if low inflation will delay relative price changes. It suggests an added cost to disinflation in transition economies. That is, disinflation might have real costs if it delays price adjustments. Recall that most transition economies ended hyperinflation very quickly but then took several years to bring inflation below 10%. At the time this was faulted as the result of an unwillingness to maintain a credibly tight monetary and fiscal policy. However, it may well have been the correct strategy to follow because a moderately high inflation rate allows relative price adjustments to continue. Thus, the long periods of time shown in Table 2 to bring inflation from 60 to 15% per year in many advanced transition countries (e.g. Poland, Hungary, and the

⁴ A disaggregated analysis of price changes in Poland (Wozniak, 1998) confirms this.

Baltics) may have been in retrospect a better policy than the very rapid disinflations in some countries.

There is some rudimentary evidence in Table 3a that the countries with slower disinflations have undergone a greater overall price level adjustment. The price levels relative to OECD averages are higher in Poland and Hungary than in the Czech and Slovak Republics. The latter two countries did not experience ‘enough’ inflation to make as much overall price adjustment. However, the extent to which price levels in the transition countries are still very different from the OECD averages is shown in Table 3b. In particular goods prices have adjusted much more than service prices, particularly government services. There are also large country-to-country differences in the adjustments and large difference among categories of goods. The latter phenomenon is likely to be related to the influence of trade on goods prices.

Thus, the answer to the question posed in this section is probably ‘somewhat.’ First, liberalization of price controls contributed to inflation early on. Second, not all prices were liberalized in the initial phases. Along these lines, the inflation targeting procedure of the Czech National Bank uses a measure called “net inflation” that removes the influence of administered prices until they are liberalized. Even in this advanced transition economy, about one-fifth of the CPI is netted out. Third, price levels and price relatives are still very far away from developed country experience. So, even in the most advanced transition countries, there is still a lot of adjustment to go on. Inflation did its job but incompletely.

Disaggregated price movements in transition countries are clearly deserving of more study. The combination of fiscal and monetary discipline explains stabilization in transition economies but may have little bearing on the future of moderate inflationary rates. Some recent research on Albania presents a cautionary tale (Rother 2000, Domac and Elbirt, 1998). It is clear that conventional macro stabilization brought inflation down in the mid 1990s. Domac and Elbirt use Granger causality tests to show the impact of money growth, the exchange rate and to a lesser extent the fiscal balance. The aggregate disinflation path was not smooth. Political pressures for looser policies in 1996, the influence of the pyramid schemes in the financial sector and external shocks almost brought back hyperinflation in 1997. Our interest here is not the aggregate story

but the influence of price controls and disaggregated price movements. Although about one-half of prices were liberalized in 1992, many controls still exist. Rother's VAR analysis shows that the skewness of the distribution of price increases influences of inflation. Thus, with very low inflation rates, further price liberalizations can introduce significant inflationary shocks. The policy implication is that inflation targets can be too low if they do not allow for the accommodation of inflation shocks from liberalization or other sources. These observations could apply to many of the less advanced transition economies where disinflation may have been too successful. Aggregate policy and external shocks may have brought inflation down to levels that cannot accommodate the price liberalizations that are still underway.

4. Disinflation: case studies

The experience with disinflation in the two dozen or so transition countries, all in the same decade, provides a useful laboratory to study disinflation policies. Are there particular types of policies that worked better? Which policies seemed to have generated the successful disinflations? Or in other words, how did they do it?

A convenient way of addressing these issues is to look at policy history in a few countries. Following de Menil (2003), we will look at Poland and Romania and also examine Estonia.

Disinflation in Poland. The Polish government introduced a stabilization program, the Balcerowicz Plan, on New Year's Day 1990 in an economy already suffering high inflation (the monthly inflation rate peaked at 54.8 in 1989). The Polish zloty was devalued to half its initial exchange rate and pegged to the dollar. Both monetary and fiscal policies were drastically tightened and credit creation stopped immediately. State subsidies were withdrawn, price controls removed, foreign direct investment encouraged and privatization programs started. A large decline in production followed, forcing the National Bank of Poland (NBP) to ease monetary policy later in 1990, only to retighten a few months later. Inflation shot up and the recession intensified. The zloty was devalued again and a crawling peg adopted was adopted. The hyperinflation had abated but inflation was still high. The intention was to gradually reduce the rate of crawl in order to control inflation expectations.

Over the next several years monetary and fiscal policy alternated between expansionary and contractionary episodes as the government tried to cope with unemployment problems, impose hard budget constraints on the government and enterprises and recapitalize the banking system. Although there were fits and starts to the stabilization, the commitment to the crawling peg as was deliberate and purposeful. From 1991 to 1998 the crawl was reduced from monthly rate of 1.8% to 0.5% and the bands were widened. By 1998, the inflation rate finally reached single digits. As inflation decreased and as the nominal peg decreased in importance due to the widening of fluctuation bands, the NBP adopted inflation targeting in 1998, aiming for around 7 percent inflation. The targets were not met in 1998 and 1999 and the NBP risked losing its hard earned credibility. Monetary policy was eased slightly and the gains from disinflation dissipated as inflation reached double digits again.

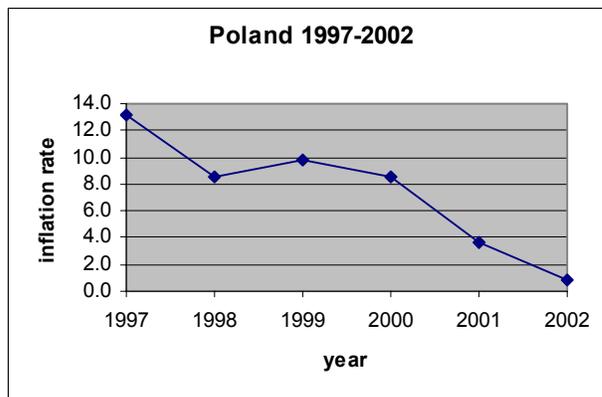
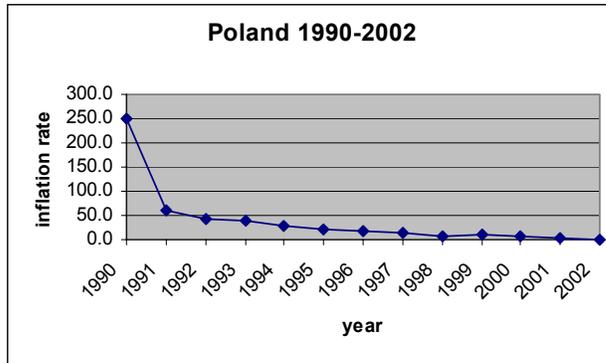
In April 2000, the monetary authorities adopted a floating exchange rate regime, and set out a goal of bringing inflation down to below 4 percent by the end of 2003. During the second half of 2000, real interest rates rose as the zloty appreciated against the euro and the dollar. The September 2001 terrorist against the United States further contributed to the appreciation of the zloty. The strong real appreciation of the currency had led the central bank to substantially tighten monetary policy. This environment of tight money and slowdown in European demand led to a sharp fall in investment activity, causing to an overall slowdown of the economy. It did bring about the welcome reduction in inflation, as inflation fell to 4 percent by 2001, and has remained under since. But the slowdown of the economy intensified, with GDP growing only 1 percent and unemployment reaching 19 percent in 2001.

The story of Polish transition and stabilization can be read in several ways. First, the disinflation was extremely slow; it took a full 7 years to bring inflation below 5%. Second, although growth in recent years has been robust and Poland is often viewed as the most successful transition country, there is still substantial unemployment. Although recent GDP growth is strong, there are persistent problems such as high wages in still state owned industries and persistent unemployment. The NBP has had over a decade of experience with nominal anchors. It began with a fixed peg, changed to a credible crawling peg and finally switched to an inflation target as the anchor. In the last few

years of the 1990s, inflation finally dropped quickly. This might be due to the credibility of the NBP's inflation targeting program or it might be due to the credibility of EU expansion plans effecting inflation expectations.

An evaluation of the experience with inflation targets must be mixed, especially in light of the slow progress at disinflation under the crawling peg. Inflation overshoot the target band as soon as they were introduced and then undershot them for two year is succession. This is not surprising for a small open transition economy where external price shocks and structural changes make inflation rates particularly volatile. As the OECD (2003, p.43) notes "the principal advantage of an inflation targeting regime over alternative anchors for monetary policy is its capacity to affect expectations." The Bank backs up its inflation target regime with a regular reporting of inflation developments by the policy council, an admirable degree of transparency. However, the drop in inflation rates into single digits in the last two years coincides with two unrelated policy.

Inflation expectations may well have come down considerably but recent macroeconomic developments do not support the sustainability of very low inflation rates. In response to a weak economy, monetary policy was significantly looser in 2002 than earlier. Short-term interest rates went from a peak in early 2001 of 19% to 8% in mid 2002 while the inflation rate went from around 7 % to 2%. Moreover, the fiscal deficit widened top 5% of GDP and the structural reforms that are needed to change the fiscal stance have slowed down. An increase inflation rates is forecast but it remains to be seen how that will effect inflation expectations.



Disinflation in Romania. The history of transition in Romania contrasts with that in Poland. As de Menil (2003, p.283) says “the dominant impression...of the first ten years of transition in Romania...is one of difficulty. The period was marked by a succession of crises...” The implications for inflation are clear. Romania is the only central European transition country that has not accomplished an effective disinflation program. There are two features of macro policy that have resulted in this outcome. First, although the formal structure of a reformed banking system dates to 1991, Romanian monetary and banking policy made the banks the automatic supplier of financial resources for state owned enterprises. Second, controls over domestic prices and control over foreign exchange transactions continued to be significant influences throughout the decade.

The inflation rate exceeded 200 percent in 1991 –93. A stabilization program introduced in 1993 as inflation reached 290 percent and output fell by 30 percent, one of the steepest falls in transition. Monetary policy was tightened, the currency devalued and price controls substantially reduced. However, the stabilization program was a short

lived success because it was not accompanied by structural reforms. Romania purposefully adopted a gradual approach to reform in order to ensure social support for the transition. . From 1994-1996, Romania experienced a volatile economic environment—a period characterized by positive growth but also high inflation (averaging 50 percent during the three year span), in addition to growing macroeconomic imbalances.

Fiscal deficits remained high due to large subsidies to the agriculture and energy sectors. In addition, banks continued lending to state owned enterprises. Monetary policy was accommodating and inflationary growth in credit resulted. There was little opportunity for any monetary policy tightening and efforts to control prices and manipulate the exchange rate were the tools used to fight inflation. In the absence of any significant enterprise restructuring or change in bank behavior, unsustainable fiscal deficits continued and the country was back in crisis by 1996.

The gradualist approach did nothing to reduce subsidies to the unprofitable agriculture and energy sectors. The central bank provided liquidity to the state owned banks that lent heavily to these sectors. Monetary policy was inherently accommodating because of the deterioration of the financial situation, causing persistent inflationary pressures. It was almost impossible for the Romanian central bank to pursue any effective monetary policy as its actions were constrained by the government's economic policy.

Because of the lack of any meaningful anti-inflation instruments, the government tried to control inflation through price controls and foreign exchange transactions. Although it helped to decrease inflation from 61 percent to 27 percent from 1994 to 1995, postponing the necessary price adjustments to stem inflation proved unsustainable in the long run.

At the end of 1996, a new government came to power, set on implementing a bolder approach to reform. It broke with the gradualist approach and dramatically accelerated the process of structural reforms. Prices and the foreign exchange market were fully liberalized. Tariffs were reduced, and subsidies for loss-making state enterprises were removed. The reforms also gradually reduced directed credits to the agricultural sector. The government sold 60 percent of the companies from the State

Ownership Fund in one year to drastically accelerate privatization. The policy of using the central bank as the main provider of credit to the real sector ended immediately.

This freeing finally allowed for the pursuit of monetary policy. The National Bank of Romania tightened monetary policy and set a budget deficit target of 3.5 percent of GDP. These ambitious goals were only partially successful. The reduction in credits, subsidies, and tariffs improved transparency, and the budget deficit was brought under control. However, the restructuring of the large enterprise sector still lagged behind. As a result, current account deficits were reduced while inflation soared to 150%, consistently higher than comparable transition economies of Central and Eastern Europe.

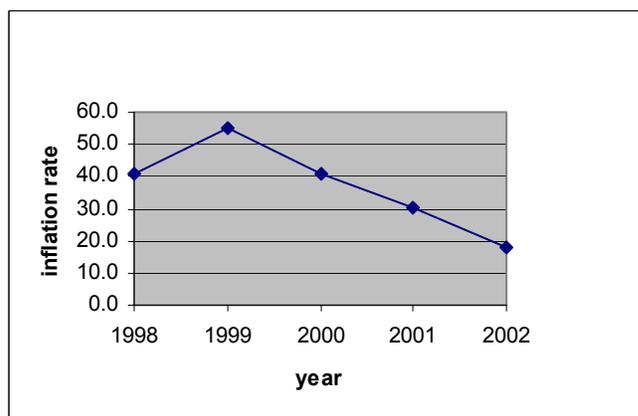
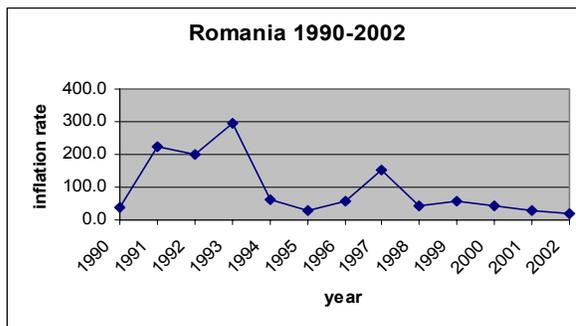
The resulting tight fiscal and monetary policy caused a large credit crunch in the private enterprise sector. Large state-owned enterprises were among the most affected, as they had previously benefited from easy financing. Monthly industrial output in 1997 had fallen by 20 percent since 1996. The government had to postpone its planned large-scale restructuring of large state-owned enterprises and the NBR relaxed monetary policy.

While the 1997 stabilization program failed its primary objectives, it did free up prices and correct the exchange rate. The conduct of monetary policy had been complicated by very high interest rate volatility driven by fluctuations in Treasury bill issuance, the occasional need to act as a lender of last resort to state banks, the country's weak balance of payment position, and the need to build up foreign reserves. These constraints ensured that a move towards inflation targeting would be premature. There was no room for exchange rate objectives either due to the lack of reserves. The NBR pursued a moderate real exchange rate appreciation to temporarily help disinflation.

By 1998 year end, inflation was down to 41 percent, in stark contrast to 150 percent a year earlier. This was largely driven by real appreciation of the exchange rate. But meanwhile, the East Asian financial crisis had deteriorated the international economic environment. Capital flows decreased drastically, particularly to transition countries. In spite of some progress in reducing inflation and the state budget deficit, the external deficit of almost 7 percent of GDP from 1996-1998 was unsustainable. In early 1999, Romania came close to a payment crisis due to excessively low foreign reserves. The government further reduced the federal deficit by corrective real exchange rate depreciation, bringing current account deficit down to 4 percent of GDP in 1999. An

International Monetary Fund loan supported these large adjustments. The expansion in the monetary base led to an increase in inflationary pressures, and at the end of 1999, the interest rate was 14 points higher than the year before. In December 1999, the European Council of Ministers decides to open the negotiation process for accession of Romania to the EU.

The NBR continued to focus on exchange rate policy in 2000 because it feared productivity gains would be lost through excessive real exchange rate appreciation. Inflation fell below its 1998 level, yet remained stubbornly high at 40 percent. In July, the central bank, finally free from budget and real sector financing, announced a tighter monetary policy stance. Fiscal reforms have reduced off-budget spending and improved tax collections and so the deficit in 2002 was only 3% of GDP, relatively low for the transition countries. Inflation went down to 17 percent by the end of 2002 and continues to decline slowly. Romania was as a late comer to transition reforms since two tries were needed. As a consequence the fundamentals point to further reduction in inflation rates.



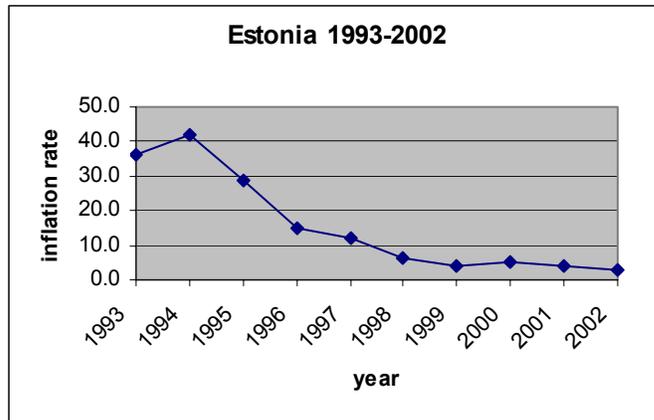
Disinflation in Estonia. Inflation reached 1000 percent soon after Estonia declared its independence from the Soviet Union and began its national existence under

very precarious circumstances. The national currency, the kroon, was introduced in 1992 and a currency board arrangement was put in place. At the same time, an ambitious program of price liberalization began in 1992. Further, 80 percent of the country's state-owned small businesses were sold off in two years, and there were three rounds of large-scale privatization with foreign participation for major enterprises.

The currency board fixed the Kroon exchange to the German mark. The kroon was fully convertible and central bank liabilities were fully backed by foreign exchange reserves. Loans to the government by the Bank of Estonia were prohibited, and the bank was not to be liable for the state's financial obligations. The currency board arrangement was chosen to gain credibility and provide a solid nominal anchor for restructuring.

After the monetary reform, hyperinflation continued for a few months before the first effects of the reform were seen in rapidly declining inflation level. By the end of 1993, inflation had drastically declined from 4 digits in the past year to 41 percent. Inflation rates continued to decline steadily over the next five years, but it was not until May 1998 that inflation reached single-digit levels. Currency boards have been characterized as a lack of monetary policy. The absence of monetary instruments worked well for Estonia, as it has remained committed to the nominal anchor provided by the currency board arrangement. As a result, substantial fiscal progress with fiscal reforms was made quickly. Inflation has averaged less than 4% over the last five years. However, a very large current account deficit may threaten the stability of the regime.

The currency may have appreciated in real terms, which can create problems for any fixed exchange rate regime. However, price increases are also somewhat higher in Estonia compared to those in advanced economies due to the Balassa-Samuelson effect. That is higher productivity growth in Estonia due to real convergence yields convergence of the structure and level of prices as well. Thus the Balassa-Samuelson effect is estimated to cause inflation difference of about 2 percentage points compared to inflation in advanced economies (Randveer 2000). Thus, it is unclear whether there has been too much real appreciation. So far, very large current account deficits have been easily financed. Any reversal in the financial markets could threaten the currency board and if it were abandoned, there would be a large immediate impact on inflation.



5. Is inflation inevitable in transition?

The story of inflation in transition countries is not just a tale of wild hyperinflation following a structural change that was followed by an astounding ability to disinflate. There are aspects of the transition process that inevitably lead to inflation. These issues are becoming more important now that the overall disinflation has been successful. As we have seen, inflation rates are at ‘western’ levels in many transition countries. Now an important issue faced by policy makers is whether the Euro inflation rate is the appropriate target or whether inflation somewhat greater than in Europe is the appropriate and realistic target. In this event, efforts to maintain too low an inflation rate can lead to recession. In this section we will examine the reasons why some inflation is inevitable and appropriate in transition.

Inflation might be inevitable in transition due to structural adjustments, income convergence and Balassa-Samuelson effects. The size of the inflation differential is particularly important in the countries that want to join the euro area in the near future. Higher inflation, resulting from income convergence, could in principle threaten the attainment of Maastricht criterion on inflation. This could, in turn, delay the countries’ entry into the euro area.

Following the seminal contributions of Balassa and Samuelson just 40 years ago, the Balassa-Samuelson effect is understood to explain the often observed tendency of prices for non-traded goods to increase faster than the prices of traded goods. The Balassa-Samuelson effect offers as an explanation the different productivity development

between the traded and non-traded sectors. Starting point for the analysis is the observation that productivity growth in the traded goods sector has been often faster than in the non-traded goods sector. The reasons for this in the transition countries are straightforward. With the freeing up of market controls and the opening of the economies, the sectors that were most quickly exposed to competitive pressures were the traded goods sectors. That is, it is assumed that the law of one price holds for traded goods (but not for non-traded goods). As productivity in the traded goods sector increases, wages in that sector go up as well. It is assumed that labor is mobile across sectors, and therefore wages rise in the non-traded goods sector (such as the service sector and government) as well. Higher wages in the non-traded sector are possible only if the relative price of non-traded goods increases. As wages increase throughout the economy more rapidly than average productivity, the overall price level increases as well.⁵ The resulting inflation leads to an increase in the real exchange rate.

In fact, interest in the Balassa-Samuelson effect stems from the observation of real exchange rate appreciation in transition countries. The Figure depicts evolution of the real effective exchange rate in a number of transition countries between 1994 and 2002. We can see that there has been a general tendency for the real effective exchange rates to appreciate, although there have been reversals in the trend in some countries (e.g. in Russia after the August 1998 crisis).

The enormous concern with EU accession has led to a large number of studies that test and measure the magnitude of the effect in the transition countries. Recent reviews are provided by Mihaljek (2002) and Égert (2003). Partly this strand of literature has been prompted by the EU accession countries' desire to enter the euro area. As the entry criteria to the euro area include both exchange rate stability⁶ and inflation convergence⁷, a strong tendency towards high inflation rates as the pace of structural

⁵ An appendix includes a formal presentation of the Balassa-Samuelson on inflation in the traded and non-traded goods sectors and on inflation differentials between countries (i.e. the real exchange rate changes).

⁶ Defined as participation in the Exchange Rate Mechanism for at least two years without devaluation of the central parity and without significant tensions in the foreign exchange market. Also, the exchange rate must be close to the central parity for the two-year period.

⁷ Inflation can not exceed the average inflation of the three EU countries with the *lowest* inflation by more than 1.5 percentage points. Taken literally, the new candidates to the monetary union could be judged by the inflation performance of three countries not in the monetary union.

adjustment in the traded and non-traded goods sectors diverge could endanger the simultaneous attainment of both criteria. As the accession countries have grown faster than the current EU members, convergence in the income levels is taking place, although there are still considerable gap between per capita GDP in the current EU countries and the accession countries.⁸ Therefore higher inflation, resulting from Balassa-Samuelson effect, is at least a possibility, if the nominal exchange rate is fixed. Also, as noted earlier, price levels in the accession countries are clearly lower than in the EU countries, and also in this respect there is room for catching up, i.e. higher inflation.

A number of studies look at the explanations for the development of the relative price of non-traded goods and regress this variable on some indicator of labor productivity in both sectors. Some recent contributions include Arratibel et al. (2002), Coricelli and Jazbec (2001), Mihaljek (2002), and Égert (2003). Arratibel et al. use monthly data between 1990 and 2001 (when available) for 10 accession countries, and include a large number of control variables in their estimations. They find that Balassa-Samuelson effect is “relatively insignificant” in explaining inflation developments in the accession countries. Coricelli and Jazbec (2001) include also countries of the former Soviet Union in their estimations (period 1990-1998, for some countries the data is not available for the whole time period). Coricelli and Jazbec argue that in the early years of transition structural reforms were more important in explaining relative price movements. Their estimate of the contribution of the Balassa-Samuelson effect is approximately one percentage point per annum. Mihaljek (2002) tries to explain inflation differentials between the euro area and six transition countries with differential growth of productivity across sectors. The quarterly data starts from the mid-90s, and therefore the study avoids using observations from the early years of transition. With the exception of Slovenia, contribution of the Balassa-Samuelson effect to the annual inflation differential is less than one percentage point.

One recurring problem in estimating relative prices is the definition of traded and non-traded sectors. Many studies proxy traded goods prices with producer price index and non-traded goods prices with consumer price index. Some others divide, for example,

⁸ In 2002, the average per capita GDP in the ten countries slated to join the EU in May 2004 was 46% of the EU average (Eurostat, 2003).

GDP deflator into traded and non-traded parts. Sometimes everything except manufacturing is deemed non-traded, and sometimes agriculture is traded and sometimes not. Égert (2003) uses a very detailed dataset⁹, which allows better distinction between traded and non-traded sectors. Although the study concerns only Estonia, it can also shed light on the evolution of the Balassa-Samuelson effect in the other transition countries. Although the Balassa-Samuelson effect is estimated to average between 2% and 3% for the whole sample period (1993-2002), it is shown to decline quite clearly over the decade in question. At the end of the period the inflation contribution is less than one percentage point.¹⁰ This is quite understandable, as Estonia has rapidly converged towards the EU level, both in per capita income and in productivity.

In addition, empirical studies on Balassa-Samuelson effect have concentrated on the behavior of the real exchange rates. De Broeck and Sløk (2001) explain real exchange rate (against the USD) movements in a sample of 26 transition countries (and 17 OECD countries) with e.g. productivity growth in different sectors. They find that differential productivity growth exerts different influence on real exchange rate in the accession countries and the other transition countries. In the EU accession countries the Balassa-Samuelson effect appears to have its predicted influence on real exchange rate, but in the other transition countries there appears to be very little connection between the two. In the accession countries of the Central and Eastern Europe, De Broeck and Sløk estimate the Balassa-Samuelson effect to raise annual inflation by one percentage point at the end of the sample period. Fischer (2002) derives a model where investment demand also appreciates the real exchange rate. In his empirical estimations he adds to conventional productivity measures demand-side variables and indicators relating to structural reforms in the accession countries. Results are somewhat different from the previous studies, as increase in the productivity in all sectors appreciates the real exchange rate. Therefore Fischer argues that shocks to productivity affect real exchange rate also through investment demand channel. Approximately one half of the observed real exchange appreciation can be explained by rising productivity, whereas one quarter of appreciation

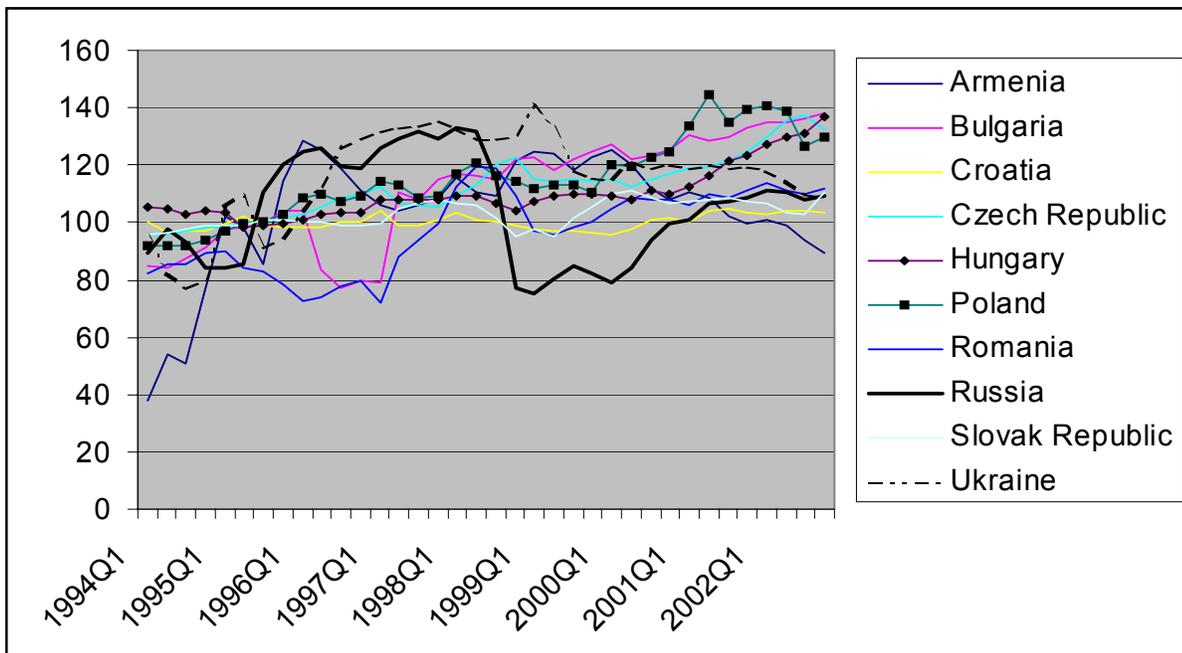
⁹ CPI disaggregated into 260 items and GDP disaggregated into 15 sectors.

¹⁰ As Estonia has a rigidly fixed exchange rate, the Balassa-Samuelson effect should manifest itself as higher inflation.

is due to demand factors. Fischer also concludes that variables relating to structural reforms will not be significant in explaining real exchange rate movements in the future.

The empirical research on Balassa-Samuelson effect confirms that it has had influence on inflation and real exchange rate developments in the transition countries. However, the estimated magnitude of Balassa-Samuelson effect is relatively small, generally around one percentage point per annum. Moreover, the size of the Balassa-Samuelson effect is supposed to decrease as income convergence takes place. This is also what is found in the empirical studies. Policymakers in the accession countries can rest easy. The thrust of the research on the Balassa-Samuelson effect suggests that inflation differentials are no more than 1-2 percent and will diminish over time. In the other transition countries, where stabilization, and consequently return to growth, was slower, Balassa-Samuelson effect will in all likelihood have a clear impact on inflation and exchange rate developments also in the coming years.

Real effective exchange rate in selected transition countries, 1/1994-4/2002, 1995=100



6. Conclusions

Disinflation in the transition economies has been, as we noted at the outset, remarkable. However, there can be too much of a good thing. The very low inflation rates attained in the in 2001 and 2002 throughout the region may not be sustainable. First, there are large relative price adjustments still to be made. These adjustments are similar to an external shock that can influence inflation rates. Second, any acceleration of inflation that results can easily erode confidence in policy makers and effect inflation expectations. Third, the very low inflation rates divert attention from some of the macro fundamentals that could be problematic. In particular, increases in government deficits are surprisingly large. Similarly, structural reforms need to effect some hard to reach sectors such as health and pensions. So, contrary to our original thoughts, perhaps the roller coaster ride called transition is not over. Inflation rates might well diverge from developed country levels in many of the transition economies and it is not obvious how policy will respond.

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REFERENCES

- Begg, David. "Monetary policy during transition: progress and pitfalls in central and Eastern Europe, 1990-6," *Oxford Review of Economic Policy*, 13, Summer 1997, 33-46.
- Begg, David. "Disinflation in Central Europe: The Experience to date," in Cottarelli and Szapary (1998).
- Brada, Josef C. and Ali M. Kuan. "The end of moderate inflation in three transition countries?" William Davidson Institute Working Paper 433, January 2002.
- Budina, N and S van Wijnbergen. *Fiscal Deficits, Monetary Reform and Inflation Stabilization in Romania*. *Journal of Comparative Economics*. Volume 29 (2): 293-309, June 2001
- Coorey, S., M. Mecagni and E. Offerdal, "Disinflation in Transition Economies: The Role of relative price adjustment," in Cottarelli and Szapary, 1998.
- , "Achieving low inflation in transition economies: The role of relative price adjustment," *Finance and Development*, IMF, March 1998.
- Coricelli, Fabrizio and Jazbec, Bostjan (2001) Real exchange rate dynamics in transition economies. CEPR Discussion Paper 2869.
- Cottarelli, Carlo and Gyorgy Szapary, eds. *Moderate Inflation: the experience of the transition economies*, IMF and National Bank of Hungary, Washington, D.C. 1998.
- Cukierman, Alex, Geoffrey P. Miller and Bilin Neyapti. "Central bank reform, liberalization and inflation in transition economies – an international perspective," *Journal of Monetary Economics*, 49, 2002, pp. 237-64.
- Dabrowski, Marek and others. *Disinflation, monetary policy and fiscal constraints: Experience of the Economies in Transition*, CASE Reoporst #16, Warsaw, Poland, March 1999.
- Dabrowski, Marek, ed. *Disinflation in Transition Economies*, Central European Press, Budapest, 2003.
- De Broeck, Mark and Sløk, Torsten (2001) Interpreting real exchange rate movements in transition countries. Bank of Finland Institute for Economies in Transition Discussion Paper 7/2001.
- De Menil, Georges. "History, policy and performance in two transition economies: Poland and Romania" in D. Rodrik, ed., *In Search of Prosperity*, Princeton U. Press, 2003.

Domac, Ilker and Carlos Elbirt. "The Main Determinants of Inflation in Albania,": World Bank Policy Research Working Paper #1930, 1998.

Filer, Randall K. and Jan Hanousek, "Inflationary Bias in middle to late Transition Czech Republic." August 2003.

Dragulin, I and E. Radulescu. *Monetary policy in Romania: Challenges and Options*. Economic Transition in Romania, CEROPE and the World Bank, Arta Grafica, Bucarest, pp. 457-476.

Égert, Balazs, (2003) Nominal and real convergence in Estonia: The Balassa-Samuelson (dis)connection. Bank of Estonia Working Paper 4/2003.

Fischer, Christoph (2002) Real currency appreciation in accession countries: Balassa-Samuelson and investment demand. Bank of Finland Institute for Economies in Transition Discussion Paper 8/2002.

Jones, Jiri and Frederic Mishkin. "Inflation Targeting in Transition Countries: Experience and Prospects," NBER Working Paper 9667, April 2003.

Mihaljek, Dubravko (2002) The Balassa-Samuelson effect in Central Europe: A disaggregated analysis. Paper presented at the 8th Dubrovnik Economic Conference.

OECD, Economic Surveys: Poland, 2002.

OECD Economic Surveys. Romania: Economic Assessment. Volume 2002/17.

Randveer, M. The Income Convergence between EU and Accession Countries. Eesti Pank Working Papers No. 6. 2000.

Rother, Philipp C. "Inflation in Albania," IMF Working Paper, December 2000.

Roubini, Nouriel and Paul Wachtel. "Current Account Sustainability in Transition Economies," in *Balance of payments, exchange rates and competitiveness in transition economies*, M. Blejer and M. Skreb, eds. Kluwer Publishers, 1999.

Romania: 2002 Staff Report. IMF Country Report No. 03/11. January 2003.

APPENDIX: The Balassa-Samuelson effect

More formally, we can briefly sketch a version of the Balassa-Samuelson effect. A similar exposition can be found e.g. in Obstfeld and Rogoff (1999). It is assumed that a small open economy produces two composite goods, tradables and non-tradables. If we let the subscript T to denote the traded sector and NT the non-traded sector, output is given by constant-returns technology production functions:

$$\begin{aligned} Y_T &= A_T F(K_T, L_T) \\ Y_{NT} &= A_{NT} G(K_{NT}, L_{NT}) \end{aligned} \quad (4.1)$$

K_i denotes capital used in the sector i , and L_i labor in sector i . The supply of labor is fixed at $L = L_T + L_{NT}$. Labor is immobile internationally, but can move between the two domestic sectors. This insures that workers will earn the same wage in both sectors. Capital is mobile internationally, and because of this domestic capital's rate of return is equal to the world interest rate r . We can define capital-labor ratios in the two sectors as $k_T \equiv K_T/L_T$ and $k_{NT} \equiv K_{NT}/L_{NT}$ and express output per a worker employed as $y_T = A_T f(k_T) \equiv A_T F(k_T, 1)$ and $y_{NT} = A_{NT} g(k_{NT}) \equiv A_{NT} G(k_{NT}, 1)$. The relative price of non-tradable goods in terms of tradables is p . With this notation, we can write four first-order conditions (two relating to traded sector and two to non-traded) from representative companies' profit maximization problems:

$$\begin{aligned} A_T f'(k_T) &= r \\ A_T [f(k_T) - f'(k_T)k_T] &= w \\ p A_{NT} g'(k_{NT}) &= r \\ p A_{NT} [g(k_{NT}) - g'(k_{NT})k_{NT}] &= w \end{aligned} \quad (4.2)$$

As r is given by the international capital markets, the four first-order conditions allow us to determine the four unknown, w , p , k_T and k_N .

To assess the dynamic implications of the aforementioned analysis, one can take logarithmic derivative of p :

$$\hat{p} = \frac{\mu_{LNT}}{\mu_{LT}} \hat{A}_T - \hat{A}_{NT} \quad (4.3)$$

Here variables marked with “ $\hat{}$ ” denote logarithmic derivatives (or very small percentage changes), and μ_{LT} and μ_{LNT} are the labor's share of income generated in the tradables and non-tradables sectors, respectively. As wages are equal across sectors, the ratio of μ_{LNT} to μ_{LT} can be written also in the following form:

$$\frac{\mu_{LNT}}{\mu_{LT}} = \frac{L_{NT} Y_T}{p L_T Y_{NT}} \quad (4.4)$$

The Balassa-Samuelson effect assumes that purchasing power parity holds for the traded goods, i.e. their price is the same across countries (when expressed in the same currency). In the following, we use the price of tradables as numeraire and set it to be 1. If one writes the price level both in the home country (P) and rest of the world (or in the relevant trading partner, P^*) as a geometric average of the tradable and non-tradable goods, with the weight of tradables being γ , the ratio of home to foreign price level is:

$$\frac{P^*}{P} = \left(\frac{p^*}{p} \right)^{1-\gamma} \quad (4.5)$$

Here p is the price of non-tradables in the home country and p^* is the price of non-tradables in the foreign country. By log-differentiating 4.5 and using the expression for changes in the price of non-tradables (4.3), we can assess the effect of relative productivity changes on real exchange rates (or, the ratio of two countries' price levels):

$$\hat{P}^* - \hat{P} = (1-\gamma)(\hat{p}^* - \hat{p}) = (1-\gamma) \left[(\hat{A}_{NT} - \hat{A}_{NT}^*) - \frac{\mu_{LNT}}{\mu_{LT}} (\hat{A}_T - \hat{A}_T^*) \right] \quad (4.6)$$

If the ratio of μ_{LNT} to μ_{LT} is larger than one, real exchange rate of a country will appreciate, if productivity in its tradable sector, relative to the foreign country, rises faster than productivity in its non-tradables, again relative to the foreign country. It is generally assumed that this is the case in poorer countries, which are in the process of catching up with more affluent economies.

Table 1. Consumer Prices (% change, end of year)

Central and Eastern Europe

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Albania		104.10	236.60	30.90	15.80	6.00	17.40	42.10	8.70	(1.00)	4.20	3.50	2.10
Bulgaria	72.50	338.90	79.20	63.90	121.90	32.90	310.80	578.60	1.00	6.20	11.40	4.80	3.90
Croatia	136.00	250.00	938.00	1,149.00	(3.00)	3.80	3.40	3.80	5.40	4.40	7.40	2.60	2.90
Czech Republic	18.40	52.00	12.70	18.20	9.70	7.90	8.60	10.00	6.80	2.50	4.00	4.10	0.60
Macedonia	606.00	230.00	1,925.00	230.00	55.00	9.00	(0.60)	2.70	(2.40)	2.30	6.00	3.70	1.10
Hungary	33.40	32.20	21.60	21.10	21.20	28.30	19.80	18.40	10.30	11.20	10.00	6.80	5.30
Poland	249.00	60.40	44.30	37.60	29.40	21.60	18.50	13.20	8.60	9.80	8.50	3.60	0.80
Romania	37.70	222.80	199.20	295.50	61.70	27.80	56.90	151.40	40.60	54.80	40.70	30.20	17.90
Slovak Republic	18.40	58.30	9.10	25.10	11.70	7.20	5.40	6.40	5.60	14.20	8.40	6.50	3.40
Slovenia	105.00	247.10	92.90	22.80	19.50	9.00	9.00	8.80	6.50	8.00	8.90	7.00	7.30
<i>CEE median</i>	<i>72.50</i>	<i>163.45</i>	<i>86.05</i>	<i>34.25</i>	<i>20.35</i>	<i>9.00</i>	<i>13.20</i>	<i>11.60</i>	<i>6.65</i>	<i>7.10</i>	<i>8.45</i>	<i>4.45</i>	<i>3.15</i>
<i>CEE mean</i>	<i>141.82</i>	<i>159.58</i>	<i>355.86</i>	<i>189.41</i>	<i>34.29</i>	<i>15.35</i>	<i>44.92</i>	<i>83.54</i>	<i>9.11</i>	<i>11.24</i>	<i>10.95</i>	<i>7.28</i>	<i>4.53</i>

Former Soviet Union

Armenia			1,241.20	10,896.00	1,885.00	31.90	5.80	21.80	(1.30)	2.00	0.40	3.00	2.00
Azerbaijan		126.00	1,395.00	1,294.00	1,788.00	84.50	6.50	0.40	(7.60)	(0.50)	2.20	1.50	3.30
Estonia		304.00	954.00	36.00	42.00	29.00	15.00	12.00	6.50	3.90	5.00	4.20	2.60
Belarus			1,559.00	1,996.00	1,960.00	244.00	39.00	63.00	181.70	251.30	107.50	46.30	34.60
Kazakstan		137.00	2,984.00	2,169.00	1,160.00	60.40	28.60	11.30	1.90	17.80	9.60	6.40	6.60
Latvia		262.00	959.00	35.00	26.00	23.10	13.10	7.00	2.80	3.20	1.80	3.20	1.40
Lithuania	8.40	345.00	1,161.00	189.00	45.00	35.50	13.10	8.50	2.40	0.30	1.40	2.00	(1.30)
Kyrgystan		170.00	1,259.00	1,363.00	95.70	31.90	35.00	14.70	18.40	39.90	9.50	3.70	2.30
Moldova		151.00	2,198.00	837.00	116.00	23.80	15.10	11.20	18.20	43.80	18.50	6.40	4.40
Russia		161.00	2,506.10	840.00	204.40	128.60	21.80	10.90	84.50	36.80	20.10	18.60	15.00

Tajikistan	204.00	1,364.00	7,344.00	1.10	2,133.00	40.50	163.60	2.70	30.10	60.80	12.50	14.50	
Turkmenistan	155.00	644.00	9,750.00	1,328.00	1,262.00	446.00	22.00	19.80	21.20	7.40	11.70	7.80	
Ukraine	161.00	2,730.00	10,155.00	401.00	182.00	40.00	10.00	20.00	19.20	25.80	6.10	(0.60)	
Uzbekistan	169.00	910.00	885.00	1,281.00	117.00	64.00	50.00	26.10	26.00	28.20	26.40	22.00	
<i>FSU median</i>	<i>8.40</i>	<i>165.00</i>	<i>1,311.50</i>	<i>1,328.50</i>	<i>302.70</i>	<i>72.45</i>	<i>25.20</i>	<i>11.65</i>	<i>12.35</i>	<i>20.20</i>	<i>9.55</i>	<i>6.25</i>	<i>3.85</i>
<i>FSU mean</i>	<i>8.40</i>	<i>195.42</i>	<i>1,561.74</i>	<i>3,413.50</i>	<i>738.09</i>	<i>313.34</i>	<i>55.96</i>	<i>29.03</i>	<i>26.86</i>	<i>35.36</i>	<i>21.30</i>	<i>10.86</i>	<i>8.19</i>

8 Accession Countries

Czech Republic	18.40	52.00	12.70	18.20	9.70	7.90	8.60	10.00	6.80	2.50	4.00	4.10	0.60
Estonia		304.00	954.00	36.00	42.00	29.00	15.00	12.00	6.50	3.90	5.00	4.20	2.60
Hungary	33.40	32.20	21.60	21.10	21.20	28.30	19.80	18.40	10.30	11.20	10.00	6.80	5.30
Latvia		262.00	959.00	35.00	26.00	23.10	13.10	7.00	2.80	3.20	1.80	3.20	1.40
Lithuania	8.40	345.00	1,161.00	189.00	45.00	35.50	13.10	8.50	2.40	0.30	1.40	2.00	(1.30)
Poland	249.00	60.40	44.30	37.60	29.40	21.60	18.50	13.20	8.60	9.80	8.50	3.60	0.80
Slovak Republic	18.40	58.30	9.10	25.10	11.70	7.20	5.40	6.40	5.60	14.20	8.40	6.50	3.40
Slovenia	105.00	247.10	92.90	22.80	19.50	9.00	9.00	8.80	6.50	8.00	8.90	7.00	7.30
<i>EUA median</i>	<i>25.90</i>	<i>153.75</i>	<i>68.60</i>	<i>30.05</i>	<i>23.60</i>	<i>22.35</i>	<i>13.10</i>	<i>9.40</i>	<i>6.50</i>	<i>5.95</i>	<i>6.70</i>	<i>4.15</i>	<i>2.00</i>
<i>EUA mean</i>	<i>72.10</i>	<i>170.13</i>	<i>406.83</i>	<i>48.10</i>	<i>25.56</i>	<i>20.20</i>	<i>12.81</i>	<i>10.54</i>	<i>6.19</i>	<i>6.64</i>	<i>6.00</i>	<i>4.68</i>	<i>2.51</i>

Table 2
Time to Stabilize
(Subject to revision)

	Peak Monthly Inflation Rate (at AR)	Date of Peak monthly inflation rate	Stabilization Program Date	Months for inflation rate to go from --				
				Stabiliz, to <100	<100 to <60	<60 to <30	<30 to <15	<15 to <7.5
Albania	336.7	1992, Oct.	1992 Aug.	12	1	54	7	3
Armenia	27,169.2	1994, May	1994 Dec.	11	1	5	25	1
Azerbaijan	1,899.6	1994, Nov.	1995 Jan.	11	1	3	5	3
Belarus	2,795.7	1994, Aug.	1994 Nov.	75	7	Never	Never	Never
Bulgaria I	2,019.5	1997, Mar.	1994 Dec.	5	4	6	Never	Never
Bulgaria II			1997, Apr.	10	0	1	6	37
Croatia	19,331.3	1993, Jun.	1993, Oct.	10	11	1	1	1
Czech Rep.	67.6	June 1991	1991, Jan	N/A	N/A	30	12	9
Estonia	480.1	1993, Jan.	1992 Jun.	13	1	19	21	20
Georgia	2,671.2	1995, Jan.	1994 Sep.	12	0	13	38	2
Hungary	36.9	May 1991	1990 Mar	N/A	N/A	6	66	43
Kyrgyz R.	48.5	1999, Oct	1993 May	N/A	N/A	6	2	14
Latvia	366.1	1993, Jan.	1992 Jun.	14	2	13	24	12
Lithuania	752.4	1993, May	1992,Jun.	10	5	20	7	13
Macedonia	253.6	1994, Jan.	1994,Jan.	9	2	3	4	7
Moldova	82.7	1999, Dec.	1993,Sep.	Never	3	6	10	2
Poland	1173.0	Feb. 1990	1990 Jan.	1	11	42	25	16
Romania I	317.1	1993, Nov	1993, Oct.	12	2	6	Never	Never
Romania II		1997M10	1998?	?	1	45	Never	Never
Russia I	1,066.7	1993, Sep.	1995, Apr.	10	8	7	Never	Never
Russia II	126.5	1999M7	1998-9?	?	4	0	Never	Never
Slovak R.	73.7	June 1991	1991 Jan	N/A	N/A	36	81	16
Slovenia	89.6	Dec. 1990.	1992 Feb	N/A	11	3	25	84
Ukraine	90.8	Dec. 1993	1994 Nov.	18	5	0	56	3
* <100 for three months without going over 100 again								
N/A means inflation rate has never been as high as the threshold level								
Never means inflation rate never went under the threshold level								

Table 3a Price levels relative to the OECD or the US

	Relative to OECD 29				Relative to OECD 30			Relative to the US
	1990	1993	1996	1998	1999	2000	2001	2003
Czech republic	23	30	39	41	39	36	39	55
Hungary	38	43	44	45	42	39	43	54
Poland	29	38	46	49	45	45	51	53
Slovak republic					33	32	33	37

Table 3b
Price levels relative to OECD, 1999 by type of goods

	Bu	Cr	Cz	Es	Hu	La	Li	Po	Ro	Ru	Sk	Sl	Uk
Consumer Non durables	42	77	58	60	60	63	59	61	43	40	51	87	34
Consumer Semi durables	43	90	65	72	62	93	74	68	32	53	54	85	45
Consumer durables	48	90	70	64	73	79	69	81	63	69	63	79	71
Producers goods	40	66	60	77	66	74	71	64	43	31	59	80	37
Consumer services	19	39	26	31	30	29	24	34	24	13	20	51	11
Government services	12	39	23	23	24	19	19	27	13	8	17	47	5
GDP	24	54	39	43	42	42	38	45	29	22	33	64	17