# How would a Fixed-Exchange-Rate Regime Fit the Transition Economies? The cases of the Czech Republic, Hungary and Poland

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# HOW WOULD A FIXED-EXCHANGE-RATE REGIME FIT THE TRANSITION ECONOMIES?

## *THE CASES OF THE CZECH REPUBLIC, HUNGARY AND POLAND*

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*This paper is devoted to an extension of Dibooglu and Kutan's work [Journal of Comparative Economics, June 2001], in two directions. First, a bivariate VAR, including the real effective exchange rate (REER) and inflation, is tested not only for Hungary and Poland, but also for the Czech Republic, over the 1993:1-2002:12 time-period, which excludes the early transition years. Second, industrial production and the nominal interest rate are incorporated in a multivariate VAR to investigate the effects of policy shocks on the exchange rate. This helps to illustrate the possible gains and costs of the present exchange-rate regime in these CEECs and to draw some conclusions on the likely economic outcomes of adopting a firmly fixed exchange-rate regime like ERM II. Three main conclusions emerge: (1) contrary to Dibooglu and Kutan (2001), results testify to a high degree of flexibility in the CPI; (2) in contrast to the Czech Republic and Hungary, nominal shocks have a strong effect on the REER in Poland and, more specifically, there is evidence that the fluctuations in the nominal exchange rate explain a large part of REER fluctuations in this latter country; (3) in Poland, the policy mix seems more credible than in the other two countries. We infer from these conclusions that moving to the ERM II and the EU will be of less benefit to Poland than to the Czech Republic and Hungary.*

*JEL classifications*: C50, E63, F31, P22

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The entry of eight Central and Eastern European countries (CEECs) in the European Union (EU) in May 2004 is an important new step towards full integration within Europe. Though effective integration is already achieved in most of these CEECs, issues arise on the capacity of the new entrants to overcome the loss of monetary independence and control over exchange-rate policy and to satisfy the Stability and Growth Pact (SGP)[1]. Indeed, once entry in the EU is an accomplished fact, the exchange rate of acceding countries becomes of "common concern". Moreover, new entrants in the EU will have to join EMU sooner or later. On the way, they will have to participate in the so-called ERM-II (a fixed but adjustable exchange-rate regime, with fluctuation bands of presumably +/-15%) for at least two years. As regards the SGP, any EU member will need to ensure that actual deficits remain below the 3% GDP threshold in times of "normal" economic downturns (i.e. that the cyclically-adjusted budget balances are compatible with the 3% threshold for actual deficits also during below-potential growth periods). Anyway, a 3% GDP threshold for deficits is a nominal convergence criterion that new Member States of EU will have to respect in order to join EMU.

In this paper, we intend to shed light on the economic policies of the largest newcomers, the Czech Republic, Hungary and Poland. These three countries have moved from a fixed to a more flexible exchange-rate regime during the transition process, and have recently adopted inflation-targeting monetary policies. Since flexible exchange rates and inflation-targeting strategies are not characteristics of the EU or the Euro area, this obviously questions the ability of these countries to move back to a quasi-fixed exchange rate and a common monetary policy. Moreover, as will appear clearer in the last section of the paper, fiscal policy has been extensively used by the authorities of the three countries in the past few years, largely to sustain growth.

The analysis is focused on the degree of price flexibility in the three countries, and on the explanations of the variations in the real exchange rate. More specifically, we try to determine the extent to which these countries have managed the exchange rate in order to compensate for exogenous shocks or as a growth-oriented tool. In this regard, we first base ourselves on a paper by Dibooglu and Kutan (2001) [D-K (2001), hereafter] as well as on the in-depth analysis of Halpern and Wyplosz (1997). The latter authors showed that the persistent real-exchange-rate appreciation in transition economies could be attributable, first, to initial undervaluation and, second, to the rapid gains in efficiency once markets have been in a position to drive prices and allocation of resources has been improved.

1. On this topic, see Coricelli and Ercolani (2002) and Coricelli in the present Issue.

As for D-K (2001), they use a structural VAR model of the real effective exchange rate (REER) and the price level which makes it possible to analyse the extent to which price flexibility has improved in Hungary and Poland since the beginning of the transition process. Decomposing real-exchange-rate and price movements into those attributable to real and nominal shocks is also useful to assess the effectiveness of monetary and exchange-rate policies in these transition economies. As noted by D-K (2001), a large temporary component in the real exchange rate due to nominal shocks could indicate a high degree of nominal rigidity in commodity prices; hence some scope for exchange-rate policy as the latter may impair competitiveness.

We extend D-K (2001) in two respects. First, we study a third country, the Czech Republic, whose monetary and exchange-rate frameworks have been somewhat similar to those of Hungary and Poland. The most important difference between these three countries is the timing of reform. A more flexible exchange-rate regime was adopted as early as 1996 in the Czech Republic (larger bands), but only in 2000 and 2001 in Hungary and Poland respectively. Inflation targeting was adopted in 1998 in the Czech Republic and Poland, but only in 2001 in Hungary.

Second, D-K (2001) consider that the real shocks in their study could be attributable to changes in endowment, productivity and technology. These are typically supply shocks. Nominal shocks are caused mainly by non-expected variations in the nominal exchange rate or money growth. These are nominal demand shocks. However, as Canzoneri *et al*. (1996) argue, questioning the relevance of adopting a common currency, within the framework of the optimum currency area literature, necessitates consideration of more types of shocks. We therefore extend the decomposition by D-K (2001) to real demand shocks, thus incorporating industrial production[2], and to financial shocks, hence incorporating the nominal interest rate, both within the structural VAR model. Real demand shocks would reflect an unexpected change in policy, for instance a change in public spending. A large, persistent and positive component in industrial production due to a fiscal shock may thus reveal the future cost of implementing fiscal policy within the limits of the SGP. Now, a country experiencing misguided monetary policy innovations and/or speculative currency attacks (i.e. financial shocks) would be better-off within a monetary union than under a flexible exchange-rate regime. Moreover, adopting a multivariate decomposition incorporating economic policies helps to answer the following question: do exchange rates move only in response to shocks that cause national or international macroeconomic imbalances? The answer may be that they do not. The REER upward

2. Owing to the unavailability of GDP on a monthly basis, we have used industrial production as a proxy.

trend observed for CEECs since the beginning of the transition period may be partly due to noise and speculation, alongside the mere fundamentals of the economy.

The rest of the paper is organised as follows. Section 1 briefly provides an overview of macroeconomic policies in the three countries. Section 2 is devoted to the presentation of the data and of the methodology used. Section 3 presents empirical results ensuing from the structural bivariate model. Section 4 introduces and discusses further results. Section 5 concludes and discusses policy implications of the empirical outcomes.

# 1. Economic policies in the Czech Republic, Hungary and Poland

During the period under study (1993–2002), the three countries were characterised by a shift from a fixed-exchange-rate regime to a more flexible regime and by a shift from money supply targeting to inflation targeting. Of course, these two shifts were not independent of each other.

In the beginning of the transition period, a fixed-exchange-rate regime was adopted in most post-socialist countries as a nominal anchor for stabilisation purposes. Indeed, two-digit– or even three-digit– inflation rates were the rule (Arratibel *et al.*, 2002). Though the shifts in exchange-rate regime and monetary policy frameworks might be related to country-specific factors, capital inflows with a fixed exchange rate– leading to a real-exchange-rate appreciation, which in turn resulted in a significant loss of competitiveness and a worsening of the current account– might be the common story to explain the subsequent shift to a more flexible exchange-rate regime over the most recent years.

## 1.1. The Czech Republic

In 1990, the 50% devaluation of the currency allowed the Czech Republic to return quite rapidly to growth but, at the same time, it delayed restructuring of the economy. As a result, the Czech Republic was precipitated into a currency crisis in the spring of 1997, necessitating the introduction of two stabilisation packages in April and May 1997. The roots of the crisis were in fact to be found mainly in the state-controlled banks that provided easy access to credit, in largely unregulated capital markets and in confused corporate governance. In such an environment, domestic firms failed to restructure and lost competitiveness, the result being a mounting external imbalance (see

Table 1). Despite rising interest rates, these developments forced the authorities to abandon the fixed-exchange-rate regime in May 1997 in favour of a managed float against the DM, and to introduce several macroeconomic and structural measures, including a tightening of fiscal policy, a moderation of nominal wage growth, a substantial increase in regulated prices and plans for the rapid completion of the privatisation of both the banking sector and a number of state-controlled firms (Krkoska, 2001). Moreover, a few months later, in December 1997, the Czech National Bank (CNB) decided to adopt an inflation-targeting framework.

The combination of monetary and fiscal restraints contributed to a slowdown of GDP growth that set the stage for the recession of 1997-1998. Indeed, GDP fell by 0.8% in 1997 and 1.0% in 1998, mainly as a result of falling domestic demand. By closing the gap between the economy's aggregate supply and demand, the recession contributed to correcting the external imbalance. Imports declined, owing to the depressed state of the economy, and exports recovered in response to the improved competitiveness associated with the 1997 depreciation of the currency, so that the current-account deficit shrank to 2.4% of GDP in 1998. The drop in output, combined with nominal wage moderation, declines in food and energy prices and a pause in the process of price liberalisation, led to a substantial reduction in inflation, which fell from 10.7% in 1998 to 2.1% in 1999.

Admittedly, inflation picked up again somewhat in 2000 and 2001 under the effect of GDP growth and a reversal in the other afore-mentioned factors. At the same time, it also gained from the change in the monetary policy framework. The CNB succeeded in convincing the public that the acceleration in inflation was to a large extent due to the disappearance of exceptional factors (lower food and energy prices), so that no wage-inflation spiral was engaged. In the course of 2001, to operate even more efficiently on inflation expectations, the CNB changed the basis for its inflation target from net inflation– which excludes variations in indirect taxes and regulated prices– to the CPI. While the appreciation of the Czech Koruna, due to strong capital inflows, certainly contributed to a decrease in inflation, this target change also explains the low increase in the CPI (+1.8%) while permitting a low nominal interest rate (1.8%) in 2002 (Table 1).

1. Czech Macroeconomic Indicators, 1993 to 2002

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|
| GDP real growth rate | - 0.9 | 2.6 | 5.9 | 4.3 | - 0.8 | - 1.0 | 0.5 | 3.3 | 3.3 | 2.0 |
| CPI rate of inflation* | 20.8 | 10.1 | 9.1 | 8.8 | 8.5 | 10.7 | 2.1 | 3.9 | 4.8 | 1.8 |
| Broad money (nominal increase)** | n.a. | 21.4 | 19.9 | 17.0 | 6.8 | 6.2 | 8.9 | 6.5 | 10.9 | 7.0 |
| Nominal interest rate*** | 8.0 | 8.5 | 9.5 | 10.5 | 13.0 | 7.5 | 5.0 | 5.0 | 3.8 | 1.8 |
| *In % of GDP*: | | | | | | | | | | |
| Current account balance | 0.3 | - 0.1 | - 2.7 | - 7.4 | - 6.1 | - 2.4 | - 3.0 | - 4.8 | - 4.4 | - 6.5 |
| General government balance | n.a. | - 1.9 | - 1.6 | - 1.9 | - 2.0 | - 2.4 | - 2.0 | - 4.2 | - 5.2 | - 6.5 |
| Public debt | n.a. | 17.6 | 15.3 | 13.2 | 12.9 | 13.0 | 14.5 | 16.7 | 18.7 | n.a. |

*Note*: Following Coricelli and Ercolani (2002), fiscal data were taken from the EBRD. General government balance excludes privatisation revenues. Government public debt is a consolidated outstanding debt excluding the indirect debt of Konsolidacni Agency and publicly guaranteed debt.
* Year-on-year, in per cent.
** M2.
*** Official discount rate.
*Sources*: OECD, IMF, EBRD.

As regards fiscal policy, the goals of the Czech government changed dramatically in the late 1990s (Matalík and Slavik, 2003). From 1993 to 1998, fiscal policy was aimed at achieving a balanced budget and a reduction of the state's role in the economy. A target of zero-increase in public debt was explicitly set by the government. Up to 1998, the general government deficit was below 2% of GDP and the public debt was decreasing to reach 13% of GDP (Table 1). From 1998 to the present, on the contrary, fiscal policy has been directed at strengthening the state's stabilising role in the economy, culminating in 2002 when the government openly opted for promoting economic growth by means of public budget deficits. One of the direct results of this shift has been a substantial rise in public debt, which is expected to reach 30% of GDP in 2003 (European Commission, 2003). Increasing deficits are mainly due to high social transfers, investments in infrastructure and housing, and lower revenues in the early 2000s consecutive to the recession in 1998-99. Moreover, the budgetary position of the Czech Republic has for some years been considerably burdened by restructuring measures designed to tackle profound crises in the banking sector, whose cumulative costs amount to around 20% of GDP (Deutsche Bundesbank, 2003)[3]. EU entry and the impending adoption of the SGP may not give enough leeway to cope with a recession, via the automatic stabilisers, or to implement an ambitious public investment programme. Indeed, the shift in fiscal policy since 1998 has resulted in increasing mandatory state budget expenditures (i.e. expenditures predetermined by legislation and by binding agreements). In a wider concept, alongside pensions, sickness benefits and social security benefits, this includes wages of state employees, investment projects in progress, all these making up around 85% of all state expenditures in 2002 against around 76% in 1997 (Matalík and Slavik, 2003). This will severely limit the government's ability to implement contra-cyclical fiscal policy in the future (Matalík and Slavik, 2003, CNB, 2003).

## 1.2. Hungary

At the beginning of the transition period, Hungarian monetary policy included active exchange-rate management based on a currency peg with a narrow band of permitted fluctuations. However, this initial monetary policy, which aimed at a real appreciation of the Forint to help to curb domestic inflation, was rapidly found to be too costly because of the declining competitiveness of Hungarian exports and sluggish growth (D-K, 2001). Moreover, it failed to provide a nominal exchange-rate anchor to reduce inflationary expectations (see Table 2).

3. The measures are being financed largely by privatisation proceeds, which are not reflected in the deficits, although they are reducing the government gross debt.

These costs began to appear in 1993/94, when current-account and government deficits reached 9% and 7% of GDP respectively. The persistence of the twin deficits led to a macroeconomic situation that was certainly not sustainable in the long run. Foreign debt was growing steadily, putting Hungary at risk of insolvency. In such a macroeconomic context, liberalisation of foreign exchange-rate operations, combined with concerns by foreign creditors about the stability of the Forint, resulted in a period of strong macroeconomic vulnerability in March 1995, necessitating the implementation of extensive stabilisation measures and a shift in the exchange-rate regime (Szapary and Jakab, 1998; Krkoska, 2001). Fiscal policy was tightened to reduce the twin deficits through lower government expenditures, higher import tariffs, and reduced government borrowing. In order to restore investors' confidence, the Forint was devaluated by 9% and a pre-announced crawling-band exchange-rate system was introduced in March 1995. The band of permitted fluctuations was set at 2.25% on either side of the parity and was maintained until May 2001. The rate of crawl was set according to an inflation target. The initial monthly rate was 1.9%, being gradually reduced to 0.2% in April 2001.

Following the package of stabilisation measures, the government and current-account deficits were reduced (Table 2). Economic growth slowed shortly after the March 1995 measures had been implemented, but then soon accelerated. Inflation declined steadily, in part because of falling import prices and also to the slowing rate of depreciation of the forint. Nevertheless, up to 2000, the CPI-based inflation rate came close to 10% again (Table 2).

In May 2001, the Hungarian central bank changed the monetary regime from a crawling-band exchange rate to an inflation-targeting framework. The central bank widened the exchange-rate fluctuation margins to +/-15%, hoping for an appreciation of the Forint to achieve the inflation targets. Though inflation halved (falling from 9.2% to 5.3%), two years of experience in Hungary with inflation targeting has highlighted the fact that the disinflationary effect of exchange-rate appreciation might be somewhat smaller than originally expected by the central bank. According to Jakab and Kovacs (2003), private-sector wages have not yet adjusted to the lower level of inflation, and most of the adjustment has taken place in employment (mostly in the manufacturing sector)[4].

4. More precisely, their decomposition of exchange rate pass-through underlines the importance– and timing– of different markets in the Hungarian disinflation process. They found that "the quickest disinflationary effect comes from the permanent decrease in import prices. However, the adjustment process does not end here. The narrowing of the output gap (mark-up effect) helps in further disinflation. Lastly, labour market adjustment becomes a significant determinant in the exchange rate pass-through from year three and onward. This might happen as wage adjustment can be achieved via an increasing unemployment rate after the slowdown in GDP due to the real exchange rate channel. This result explains why companies reduce employment first and adjust wages only later" (Jakab and Kovacs, 2003, p.5).

2. Hungarian Macroeconomic Indicators, 1993 to 2002

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|
| GDP real growth rate* | - 0.6 | 2.9 | 1.5 | 1.3 | 4.6 | 4.9 | 4.2 | 5.2 | 3.8 | 3.3 |
| CPI rate of inflation* | 22.5 | 18.9 | 28.3 | 23.5 | 18.3 | 14.2 | 10.0 | 9.8 | 9.2 | 5.3 |
| Broad money (nominal increase)** | 19.8 | 14.3 | 14.9 | 22.9 | 18.6 | 17.7 | 17.4 | 15.0 | 16.2 | 10.1 |
| Nominal interest rate*** | 22.0 | 25.0 | 28.0 | 23.0 | 20.5 | 17.0 | 14.5 | 11.0 | 9.8 | 8.5 |
| *In % of GDP:* | | | | | | | | | | |
| Current account balance | - 9.0 | - 9.4 | - 5.6 | - 3.7 | - 2.1 | - 4.8 | - 4.3 | - 3.7 | - 2.1 | - 4.1 |
| General government balance | - 5.7 | - 7.5 | - 6.7 | - 5.0 | - 4.8 | - 4.8 | - 3.4 | - 3.3 | - 4.7 | - 9.2 |
| Public debt | 89.7 | 88.2 | 86.4 | 72.8 | 63.9 | 61.9 | 60.7 | 57.6 | 51.5 | 56.4 |

* Year-on-year, in per cent.
** M3.
*** Official discount rate.
*Sources:* OECD, IMF, EBRD.

Finally, after several changes in the currency basket during the 1990s, reducing the weight of the US dollar (and increasing the weight of the ECU or DM), the exchange rate has been completely tied to the Euro since January 2000. In October 2001, the Forint has been introduced in a purely +/-15% fixed band with the Euro: the pre-announced devaluation has stopped and the rate of daily devaluation is now nil. By most of its aspects, Hungary's exchange-rate regime now currently mimics ERM II. The behaviour of the Forint exchange rate over the past year shows how the sustainability of such a regime might be difficult to achieve, and that it might be especially costly in terms of interest rate manipulation[5].

Unlike the Czech Republic (but like Poland), no break in the conduct of fiscal policy has been observed over the past few years for the Hungarian economy. However, the fiscal deficit has increased significantly since the new millennium, culminating at 9.2% in 2002. Granted, such a high government deficit is attributable to one-off measures and reclassifications of budget items amounting to some 3% of GDP, which are then not expected to feed through to the ongoing budgets. Nevertheless, two main factors are likely to put a strain on the budget for some time to come: public-sector wage hikes resulting from the Parliamentary elections of April 2002 and the pursuit of investment and subsidy plans, launched by the previous government. As a result, in the next few years, the fiscal deficit might be difficult to curb. The public debt growth observed since last year could then continue, exceeding the 60% of GDP threshold in the very near future (European Commission, 2003) and perhaps pushing up interest rates to high levels.

## 1.3 Poland

The stabilisation of the Polish economy began under less favourable conditions than those found in Hungary (D-K, 2001). In particular, the inflation rate was very high and difficult to curb. The Zloty was devalued by almost 50% in January 1990 and by 17% in May 1991. Nevertheless, as high inflation was continuing, the competitiveness of Polish exports was reduced and the current account worsened. The Zloty's peg was abandoned in October 1991, replaced by a crawling peg with a pre-announced devaluation of 1.8% per month against a basket of currencies. Over time, the rate of depreciation has been reduced and there have also been one-off devaluations and revaluations to accommodate exogenous shocks. In 1995, the band within which the Zloty could fluctuate was widened to +/-7%. Poland's exchange-rate policy was so credible to foreign investors that short-

5. The reader is referred to Levasseur (2004) in the present Issue for a description of Forint exchange rate behaviour since October 2002.

term capital inflows began to be a problem for the National Bank of Poland (NBP). By 1995, despite NBP sterilisation, capital inflows amounted to 59% of the growth in the money supply (D-K, 2001). As a result, controlling the money supply became more and more difficult for the monetary authorities. The task was also complicated by the progressive vanishing of a stable and predictable correlation between the monetary aggregate and inflation– a consequence of the development of financial markets and of the progress made in macroeconomic stabilisation– two factors that led to a rise in money demand (OECD Economic Surveys, Poland, January 2000).

In September 1998, the NBP adopted a new monetary policy framework: monetary targeting was replaced by inflation targeting. Before that date, to a large extent the central bank was trying to pursue two objectives (a monetary target and an exchange-rate anchor) with only one instrument, which frequently led to monetary dilemmas. A common dilemma occurred when the central bank had to intervene on the foreign exchange market to prevent an appreciation of the exchange rate, but at the same time had to take action to bring money supply within the announced target. To achieve the two objectives simultaneously, the central bank had to resort to large-scale sterilisation operations, which were costly for the banking system and increasingly difficult to put in place. A new framework was therefore required to re-organise the priorities of monetary policy and limit the number of objectives. The direct inflation targeting was accompanied in early 1999 by a considerable widening in the exchange-rate fluctuation band, to +/-15%. The crawling rate of the central parity in the fluctuation band was progressively reduced from 1% per month in early-1997 to 0.3% in March 1999, so that the inflation objective could be achieved more easily. Since April 2000, Poland has been under a fully-floating exchange-rate regime. After some difficulties in curbing inflation at the opening of the new millennium, the inflation rate now seems more or less under control (Table 3). The NBP attributes the past difficulties to the combined effect of three factors: first, considerable fluctuations in fuel and foodstuffs prices; second, considerable lags in the monetary policy transmission mechanism[6]; and third, an over-expansionary fiscal policy (NBP, 2003). As a result, the monetary authorities of Poland implemented a tight monetary policy between 1999 and 2002, at the expense of real economic growth (Table 3).

6. The time lag for the maximum reaction of the inflation rate to a change in interest rates by NBP is about 18 months (NBP, 2003).

3. Polish Macroeconomic Indicators, 1993 to 2002

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|
| GDP real growth rate* | 3.7 | 5.2 | 7.0 | 6.0 | 6.8 | 4.8 | 4.1 | 4.0 | 1.0 | 1.3 |
| CPI rate of inflation* | 35.3 | 32.2 | 27.8 | 19.9 | 14.9 | 11.6 | 7.3 | 10.1 | 5.5 | 1.9 |
| Broad money (nominal increase)** | 43.7 | 35.1 | 38.1 | 32.9 | 27.5 | 25.5 | 24.7 | 15.4 | 12.1 | 2.0 |
| Nominal interest rate*** | 29.0 | 28.0 | 25.0 | 22.0 | 24.5 | 18.3 | 19.0 | 21.5 | 14.0 | 7.5 |
| In % of GDP: | | | | | | | | | | |
| Current account balance | - 7.9 | 1.0 | 0.7 | - 2.4 | - 4.3 | - 4.4 | - 8.4 | - 6.0 | - 3.0 | - 3.5 |
| General government balance | - 2.1 | - 2.2 | - 3.1 | - 3.3 | - 3.1 | - 3.2 | - 3.7 | - 3.2 | - 6.0 | - 5.0 |
| Public debt | n.a. | 72.4 | 57.9 | 51.2 | 49.8 | 43.2 | 44.5 | 42.5 | 44.5 | 48.6 |

Note: General government balance excludes privatisation revenues.
* Year-on-year, in per cent.
** M2.
*** Official discount rate.
*Sources*: OECD, IMF, EBRD.

The mismatching of monetary and fiscal policies is clear, in retrospect. Since 2001, the general government deficit has risen to levels of around 5% of GDP. Combined with a considerable slowdown in privatisation, this has led to a rapid surge in the public debt from 42.5% in 2000 to over 48% in 2002 (Table 3). According to Golik and Jedrzejowicz (2003), such a drift in public deficits has its roots in the reform of 1999 consisting of four packages: pensions, decentralisation, health care and education. Although real GDP growth remained fairly high at 4.0% in 2000, domestic demand was subdued, as monetary policy was aimed at cooling off the overheating Polish economy. This slowdown in demand translated into lower revenues from indirect taxes while reforms led to a significant increase in central budget expenditures. In particular, the share of fixed items in total expenditures grew from 20.7% in 1997 to 32.4% in 2002, limiting the scope for discretionary fiscal policy and the potential for rationalising spending to free up funds for economic-growth-conducive purposes (Golik and Jedrzejowicz, 2003). Consequently, GDP growth was restricted to 1% in 2001 and 1.3% in 2002 (Table 3). Since then, monetary conditions have been relaxed under the impulse of interest-rate cuts and Zloty depreciation, driving the Polish economic recovery without inflationary pressures, due to the lagged effects of previously tight monetary policy. As regards fiscal policy, new expansionary budgetary proposals made by the government in summer 2003 (especially a corporate tax cut from 27% to 19% and higher current expenditures in addition to outlays related to EU accession) made it possible to assume a deficit of 5-7% of GDP for 2004. A medium-term plan proposes spending cuts that would come into force in 2005, but its credibility is uncertain given elections scheduled for 2004 (OECD, 2003).

## 2. Data and methodological issues

In our first-step bivariate decompositions, we consider the log of the price level, $p_t$, measured by the Consumer Price Index (CPI), and the log of the real exchange rate, $q_t$. The latter is the CPI-based real effective exchange rate index, that is, the relative price of domestic goods in terms of foreign goods. The data are monthly observations from 1992:12 to 2002:12 taken from OECD while CPI data are taken from the International Financial Statistics of the IMF.

In order properly to specify the VAR, we test for unit roots, stationarity, and cointegration. Table 4 presents the augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and cointegration test statistics. The maximum lag in the ADF test is specified using the general-to-specific procedure (Hall, 1994). Starting from a maximum lag of 16, the lag length is pared down depending on the significance

of the last coefficient. In testing for a unit root, we consider the possibility of a linear trend in price levels. The ADF test statistics indicate that a unit root (non-stationarity) cannot be rejected for real exchange rates and prices. PP tests in Table 4 confirm that stationarity can be rejected at conventional significance levels. Thus, both tests indicate that the real-exchange-rate and price levels are non-stationary, which is a necessary condition for cointegration. We have also checked that both variables for the three countries were integrated of order one. Table 4 also presents the two-step test for cointegration. In the first step, the real exchange rate is regressed on a constant and the price level. Then, the residuals are tested for unit roots using an ADF test. The test statistics in Poland, Hungary and Czech Republic indicate that the price level and the real exchange rate are not cointegrated; hence, a VAR in first difference is appropriate.

In what follows, we will also consider other decompositions, including industrial productions (IP) and nominal short-term interest rates (IRS). Data for industrial production are monthly and seasonally adjusted; they incorporate total industrial activities except construction. Data are taken from the OECD. As noted by Korhonen (2003), industrial production data are still more precisely measured than those for many other sectors of the economy. Moreover, the data fit better for explaining real-exchange-rate fluctuations since industrial production excluding construction is more open to international trade than private services, for instance. Data for the nominal interest rates are taken from the IMF. Tests for stationarity are also reported in Table 4. Unit roots can generally be rejected at the 5% critical level. To test for the cointegration between the real effective exchange rate, price level, industrial production and nominal interest rate, we use the same procedure as for the two-variable cointegration. The stationarity of residuals can be rejected at the 5% critical level. A VAR in first difference for these four variables is also appropriate.

## 4. Unit Root and Cointegration Tests

| | Czech Republic | | | | Hungary | | | | Poland | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | REER[a] | CPI[b] | IP[c] | IRS[d] | REER[a] | CPI[b] | IP[c] | IRS[d] | REER[a] | CPI[b] | IP[c] | IRS[d] |
| ADF stat(1) | - 0.5 | 0.1 | - 1.9 | - 1.7 | 0.6 | - 0.4 | - 3.0 | - 1.1 | - 1.0 | - 1.7 | - 0.9 | 0.02 |
| Lag length | 7 | 13 | 1 | 2 | 12 | 13 | 12 | 9 | 2 | 12 | 12 | 0 |
| PP statistic | - 1.3 | 0.4 | - 2.6 | - 3.9 | 0.6 | - 0.3 | - 3.3 | 0.3 | - 1.2 | - 2.0 | - 1.6 | - 0.2 |
| Cointegration ADF stat[e] | -1.06 | | | | - 0.44 | | | | - 1.97 | | | |
| Lag length | 10 | | | | 10 | | | | 10 | | | |
| Cointegration ADF stat[f] | - 3.64 | | | | - 2.52 | | | | - 3.39 | | | |
| Lag length | 3 | | | | 2 | | | | 1 | | | |

(1): The ADF critical value at 5% is -3.45 (Fuller, chap. 8, p.373, 1976).
a The test assumes a constant in the ADF and PP procedures.
b The test assumes a constant and a linear trend in the ADF and PP procedures.
c The test assumes a constant and a linear trend in the ADF and PP procedures.
d The test assumes a constant in the ADF and PP procedures.
e The cointegration test is the residual ADF statistic from the regression of the log of REER on a constant and the log of CPI. The critical value of the test for 2 variables with 100 observations and without trend at the 5 % significance level is -3.3988 (computed using tables in MacKinnon, 1991).
f The cointegration test is the residual ADF statistic from the regression of the log of REER on a constant, the log of CPI, the log of industrial production and the log of short run interest rate. The critical value of the test for 4 variables and 100 observations at the 5 % significance level is - 4.2096 (computed using tables in MacKinnon, 1991).
*Sources* : IMF, OECD, authors' computations.

Following D-K (2001), we will first consider two types of orthogonal shocks, each of which could be a source of variation in the observed movements in real exchange rates and prices. A supply shock, $e_{st}$, reflects changes in endowment, productivity shocks and technology while a nominal demand shock, $e_{ndt}$, is caused by nominal money supply shocks or devaluation/depreciation of the exchange rate. Because the vector $\Delta X_t = [\Delta q_t, \Delta p_t]'$ is stationary, it can be written as an infinite moving average in the structural shocks $(e_{st}, e_{ndt})$:

$$\begin{vmatrix} \Delta q_t \\ \Delta p_t \end{vmatrix} = A \begin{vmatrix} e_{st} \\ e_{ndt} \end{vmatrix}, \qquad (1)$$

$$\text{where } A = \begin{vmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{vmatrix}$$

and $A_{ij}$ are polynomials in the lag operator, $L$.

In order to identify the shocks within the bivariate SVAR, and following D-K (2001), it is assumed that nominal demand shocks have no long-run effect on the real effective exchange rate. This assumption draws on perfect price flexibility at least in the long run: a depreciation/appreciation of the nominal exchange rate would not influence the real exchange rate as prices would fully adjust.

Nevertheless, reliance on long-run restrictions might be detrimental to the understanding of short-run economic dynamics in these economies, confronted with a plague of goods whose prices have been long administered. Assuming perfect price flexibility, though the previous situation has largely changed (as our results will testify), is exaggerated.

Within the multivariate SVAR, we consider the following vector $\Delta Z_t = [\Delta y_t, \Delta p_t, \Delta i_t, \Delta q_t]$ and will adopt short-run identifying restrictions[7]. The data vector has been chosen so that the most exogenous series are preceding the most endogenous ones (Sims, 1980). The following equations summarise our identification scheme:

$$\begin{bmatrix} e_{\Delta y} \\ e_{\Delta p} \\ e_{\Delta i} \\ e_{\Delta q} \end{bmatrix} = \begin{bmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} \begin{bmatrix} u_{\Delta y} \\ u_{\Delta p} \\ u_{\Delta i} \\ u_{\Delta q} \end{bmatrix} \qquad (2)$$

7. Identifying long-run restrictions have been also introduced and VAR estimations performed. We have introduced the same restrictions as in Canzoneri et al. (1996), though adapted to a 4-variable rather than a 3-variable VAR. We have assumed that (i) the nominal shocks, financial shocks and fiscal shocks had no long-run effect on the real effective exchange rate; (ii) neither the nominal shocks nor the financial shocks had a long-run effect on the industrial production; and (iii) the financial shock had no long-run impact on the inflation rate. We have checked that, in this framework, we could reach the same qualitative conclusions regarding the IRFs of REER and inflation rate after either a supply shock or a nominal shock, as in a 2-variable system. Details are available from the authors upon request.

where $e_{\Delta y}$ $e_{\Delta p}$ $e_{\Delta i}$ $e_{\Delta q}$ are the structural disturbances, that is fiscal shocks, nominal shocks, monetary policy (or financial) shocks and supply shocks, respectively; and $u_{\Delta y}$ $u_{\Delta p}$ $u_{\Delta i}$ $u_{\Delta q}$ are the residuals in the reduced form equations, which represent unexpected movements (given information in the system) of each variable.

Identifying short-run restrictions have been linked to the expectations framework, and variables are ordered from the most backward-looking to the most forward-looking. It has thus been assumed that, in the short run, industrial production was exogenous; prices depend on expectations of industrial production[8]; the nominal interest rate depends on forward-looking expectations regarding industrial production and prices[9]; and the real effective exchange rate is assumed to depend strongly on the contemporaneous nominal exchange rate. As the latter is a forward-looking asset, it is then assumed that all variables have contemporaneous effects on the exchange rate.

We have considered that these short-run restrictions, based upon common knowledge of expectations regarding either the nominal exchange rate, the nominal short-run interest rate, or the inflation rate, were less debatable than long-run restrictions. The latter are generally the reminiscence of dichotomist macroeconomic theories, like the Quantity theory, although a prominent literature is now devoted to the interactions between monetary and fiscal policies, and their joint long-run effects on nominal and real variables. The Fiscal theory of the price level (Woodford, 2001) can be invoked in this respect, for instance.

## 3. Empirical results with a bivariate VAR

A finite-order bivariate vector auto-regressive model (VAR) is estimated for the Czech Republic, Hungary and Poland. The VARs have been pared down to 1 lag following the Schwarz information criterion[10]. In order to examine the possibility of exogenous shifts in the variables

8. This specification could be more or less related to the so-called hybrid Phillips curve which, following Calvo (1983), would make private inflation expectations backward- and forward-looking.

9. Levin *et al.* (2003) argue that a robust monetary policy rule should respond to a one-year-ahead forecast of inflation and to the current output gap. But Laxton and Pesenti (2003) show that, in a calibrated model for the Euro area and the Czech Republic, adopting a rule which responds more strongly to inflation forecasts would prove more efficient. Adopting a monetary policy rule which would respond to a one-month-ahead forecast of, respectively, inflation and industrial production, as is implicit in the short-run restrictions of the SVAR, would possibly give the same favourable outcomes since future industrial production is a key determinant of future inflation.

10. Though VARs generally include more lags, we have checked that reliance on a single lag did not lead to non-robust conclusions. More noteworthy, no significant "price puzzle" has emerged from adopting a single lag within the multivariate VAR. We also thank Guillaume Chevillon for having made clear to us that, according to Johansen, lags in a VAR should be kept to a minimum.

and regime changes, we have also tested for the significance of period and policy-specific dummies, as in D-K (2001).

First, for the three countries under study, the Asian and Russian crises from 1997 to 1998 may have influenced the time path of the endogenous variables. Second, the implementation of different exchange-rate and monetary regimes is also considered. Table 5 reports the definitions of the various dummies. Only those significant at the 5% critical level for at least one endogenous variable have been kept in the estimation. Since exchange-rate regimes and monetary (inflation-targeting) regimes are very likely to be closely linked, they have never been tested for simultaneously (*d2* and *d5*, for example, in the case of the Czech Republic).

The Asian and Russian crises dummy is not significant for either country. This result is consistent with the findings of D-K (2001). In the same manner, the dummy for the monetary regime is not significant for either country. By contrast, the exchange-rate regime matters: the dummy for the exchange-rate regime is significant for the three countries, especially with respect to the inflation rate. Hence, in the final VAR, we include *d2*, *d3* and *d4*, in order to control for the shift in the exchange-rate regime in the Czech Republic, Hungary and Poland, respectively.

5. Definitions of Period or Regime-Specific dummies

Asian and Russian crises: *d1* = 1 between 1997:5 and 1998:8, 0 otherwise.

Exchange rate regimes of the Czech Republic: *d2*
Peg 1993:1-1996:1 = 0,
Large bands 1996:2-1997:4 = 1,
Managed flexible exchange rate 1997:5-2002:11, = 2.

Exchange rate regimes of Hungary: *d3*
Fixed 1993:1-1995:2, = 0,
Narrow bands 1995:3-2001:9, = 1,
Large bands 2001:10-2002:11, = 2.

Exchange rate regimes of Poland: *d4*
Crawling peg 1993:1-1995:4 = 0,
Crawling band 1995:5-2000:3, = 1,
Flexible exchange rate 2000:4-2002:11, = 2.

Inflation targeting of the Czech Republic: *d5* = 1 between 1998:1 and 2002:11, 0 otherwise.

Inflation targeting of Hungary: *d6* = 1 between 2001:6 and 2002:11, 0 otherwise.

Inflation targeting of Poland: *d7* = 1 between 1998: 9 and 2002: 11, 0 otherwise.

## 3.1. The theoretical framework

Though VARs are a-theoretical, the inclusion of restrictions in the structural VARs (SVARs) leads one to expect some typical variations in the endogenous variables after a shock.

The implicit framework for the bivariate SVAR hinges on the Mundell-Fleming model with flexible prices. Three basic elements in the impulse response functions (IRFs) to a structural shock are of importance: the length of the discrepancy *vis-à-vis* the initial situation, its sign and its significance.

First, consider a supply shock, which is assumed to be a positive shock on productivity. A transitory impact on the real effective exchange rate will reflect the capacity of the terms of trade to absorb the shock, hence a high degree of domestic price flexibility in the short run. As a consequence, one can argue that expansionary monetary policies are inefficient in that they are only inflationary. But the reverse may also be true: restrictive monetary policies may be quite efficient in curbing inflation. To be confirmed, such a conclusion necessitates that a nominal shock has a low impact on other real variables in the short run (e.g. production). A transitory impact of supply shocks on real variables may also reveal that expansionary fiscal policy could be fettered by the flexibility of prices and may have an inflationary effect. The latter could be also confirmed by the impact of a real demand shock on inflation. If now, the impact of a supply shock on the REER is persistent, the flexibility of the price level can be questioned and policies may be more efficient than in the previous situation. As for the sign of the impact, a positive supply shock is expected to have a negative impact on prices, unless the productivity growth is overstated by wage increases that fuel domestic inflation. This may reveal the existence of a so-called Balassa-Samuelson effect.

Second, consider a positive nominal demand shock and assume it has no impact on the REER in the long run. In the short run however, nominal-exchange-rate depreciation is supposed to provoke an improvement in the terms of trade, hence a depreciation in the REER. The transitory improvement in the terms of trade should provoke a progressive rise in the price level, unless at least one of the following situations occurs: (i) prices are sticky; (ii) monetary policy counters the inflationary impact of the shock (in the case of an efficient inflation-targeting policy); (iii) fiscal policy is restrictive. Testing for the significance of the two latter assumptions is possible within the multi-variate SVAR.

Finally, analytic confidence intervals of the IRFs for the bivariate SVAR have been performed *via* our own computations. After trans-forming the SVAR representation:

$$Y_t = \sum B_{i,t}(L)Y_t + e_t \text{, with } e_t = Au_t \text{ and } u_t \sim N_{iid} \quad (3)$$

into a VAR using the estimated $A$ matrix in equation (1):

$$X_t = \sum A^{-1}B_{i,t}(L)AX_t + A^{-1}e_t \text{, with } X_t = A^{-1}Y_t, \quad (4)$$

we have multiplied the standard deviations of the IRFs of the VAR system in (4), obtained under the Eviews software, to matrix A of the SVAR system in (3) since, by construction, the variance of the estimated SVAR representation can be written as:

$$Var\ \hat{Y}_{t+1|t} = AVar\ \hat{X}_{t+1|t}A'. \quad (5)$$

The choice of analytic confidence intervals has been driven by its closeness to the bands of the VAR system in (4) which were computed by bootstrapping techniques (Hall, 1992) using the JMulti software[11].

## 3.2 First empirical outcomes

The dynamic paths of the real exchange rate and price level can be explored by examining the IRFs of the SVARs. Figure 1 (appendix II) presents the IRFs of the two endogenous variables to the supply and nominal demand shocks, respectively, for the three countries under study.

We begin with the supply shock. Let us briefly summarise the empirical results in D-K (2001, p.271). In Hungary and Poland, the impact of the shock is permanent on the REER, which tends to reveal high price rigidity even in the long run. The sole difference between countries lies in the response of the price level: while the increase is permanent in Hungary, prices respond cyclically and converge towards zero in Poland.

Our empirical results do not support the view of high price rigidity in the three countries under study, most notably in the Czech Republic and in Hungary, where the impact of the shock on the REER is transitory. The response of the REER to a (1%) supply shock in these two countries converges towards zero 3 and 4 months, respectively, after the shock. Also noteworthy, in the short run, the responses to the shock for the three countries are quite high (+1.5% on average for the three countries). As regards the inflation responses to the shock, these are initially positive in the three countries, and become negative in the second month (Czech Republic and Hungary) or remain positive until the effect vanishes (Poland).

This persistent Polish positive response to the shock can be attributed to the presence of a Balassa-Samuelson effect. A more prominent effect of this kind in Poland, in comparison with the Czech Republic and Hungary, has also been reported in Egert (2002).

11. See JMulti, http://ise.wiwi.hu-berlin.de/oekonometrie/.

Moreover, Table 6 shows that real wage growth in the Polish business sector has been quite high since 1994. Though this is not a direct evidence of the B-S effect, the underlying wage-price dynamics under way in Poland could well explain the positive impact of the supply shock on the price level.

Turning to the effects of a (positive) nominal demand shock, responses reported in D-K (2001) are initially a quite substantial depreciation in the REER, followed by an appreciation towards the pre-shock level. Prices increase linearly and permanently after the shock.

In our setting, the responses to a nominal demand shock are quite different from that reported in D-K (2001), most notably as regards the inflation dynamics. In the Czech Republic and Poland, the initial REER depreciation is low, whereas in Hungary the shock induces a real appreciation. This appreciation is in part due to the substantial increase in inflation (+0.8%, to be compared with +0.7% and +0.5% in Poland and the Czech Republic respectively) which dies away less rapidly than in the two other countries and thus pushes the terms of trade downwards. The real appreciation in Hungary is followed, first, by a depreciation and, second, by a return towards the pre-shock level after 5 months.

The response of inflation to the nominal demand shock, qualitatively similar from one country to another, tends to confirm high price flexibility in the three countries under study. The immediate rise may reveal the lower importance of administered prices in these three countries. This is confirmed in the case of the Czech Republic and even more importantly in the case of Poland (see Table AI.1 in the appendix I). The Hungarian case is more awkward in that the share of administered prices has risen since the early 1990s. Nevertheless, comparing the degrees of openness of the three economies under study can explain both why the response of inflation is higher in Hungary than in the Czech Republic and Poland, and also the difference in sign concerning the response of REER following a positive nominal demand shock (i.e. appreciation in Hungary, depreciation in the two others). Indeed, Hungary exhibits a higher degree of openness than the Czech Republic and even more than Poland (Table AI.2 in the appendix I). As a result, the nominal depreciation in the exchange rate due to the nominal positive demand shock may be followed by stronger and faster imported inflation in Hungary than in the other countries and explain the initial opposite response of REER. Finally, the immediate rise in the response of prices may also reveal the substantial progress made by these three economies towards a market economy, hence confirming the conclusions of Halpern and Wyplosz (1997)[12]. The private sector

12. Paukert (1997) noted that, as early as 1994, the privatisation process in the Czech Republic had already been a success, most notably as regards restitutions and small-scale privatisations which had not been detrimental to employment and could have therefore fuelled wage claims.

share in GDP is remarkably high in 2001 in relation to the situation prevailing almost ten years before, when this share was a mere 50%. It is now up to 75 to 80% in the three countries (EBRD, 2002), with Hungary at this peak since 1998, hence somewhat earlier than in the Czech Republic (1999) or Poland (2001).

One question, at least, remains on the efficiency of economic policies. Do these preliminary results indicate that monetary and exchange-rate policies are inflationary, so that they may be considered either inefficient or adequate to another goal, for instance growth? Or rather, should we infer from these preliminary results that monetary and exchange-rate policies aiming at curbing inflation and improving competitiveness would be very efficient[13]?

6. Real Wage Developments, 1994 to 2001

Annual percentage changes, business sector

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|
| Czech Republic | 7.4 | 9.2 | 8.2 | 2.9 | 0.3 | 4.9 | 3.8 | n.a. |
| Hungary* | 3.9 | – 6.6 | – 0.3 | 3.0 | 3.7 | 4.4 | 4.0 | 6.5 |
| Poland | n.a. | 3.4 | n.a. | 5.7 | 3.8 | 3.1 | 1.2 | 1.5 |

*: Nominal wage growth taken from the OECD Hungary Economic Survey 2001-2002; CPI inflation rate taken from the National Bank of Hungary; and real wage growth computed by the authors.
*Sources*: OECD Economic Surveys, various issues.

Beforehand, however, the puzzle resulting from deep differences between our results and Dibooglu and Kutan's deserves particular attention. We have thus replicated the estimations by D-K using the same data source (IMF for both variables) and the same sample (1990:1-1999:3). First, we have chosen the same number of lags (12) although it matched neither the Schwarz nor Akaike information criterion. Second, we have changed the number of lags (1) so that it could satisfy the Schwarz information criterion.

When searching the same IRFs as those presented and commented in D-K (2001), we were surprised by the need to perform accumulated IRFs[14]. This is a crucial point as it leads to very different conclusions on price behaviour: where D-K (2001) conclude in favour of price rigidity because accumulated IRFs persistently deviate from the initial steady state, we conclude in favour of price flexibility as IRFs are high in the short run but die away very rapidly.

The price features we emphasise are also confirmed when the VAR by D-K is pared down to one lag. As shown in figure 2 (appendix II), qualitative results in Hungary and Poland for the two shocks do not

13. OECD (2000, p.27) notes that, in the Czech Republic, the price behaviour since 1996 has been heavily influenced by exchange-rate changes.
14. Details are available from the authors upon request.

depend on the chosen sample period. It is also worth noting that with a sample that disregards the early years of transition (bold line), the response of inflation to a supply shock exhibits less Balassa-Samuelson effect in Poland than if these early years are taken into account. The reverse is true in the case of Hungary. Comparisons also show that a nominal shock has a lower impact on inflation in both countries when early years are dropped: this may testify to a more efficient monetary policy aiming at curbing inflation. Finally, the immediate real appreciation in Hungary after a nominal demand shock is lower with than without the early transition years, possibly due to a lower degree of openness towards developed countries in the beginning of transition. A large discrepancy *vis-à-vis* expected outcomes, though deviations of the inflation rate are higher with than without these early years, would be puzzling, unless the inflation targeting strategy implemented since 2001 has proven efficient and the nominal exchange rate has been very flexible.

# 4. Further analyses after incorporating fiscal and financial shocks

Issues regarding the efficiency of economic policies lie at the heart of our understanding of what drives REER and inflation-rate fluctuations in the Czech Republic, Hungary and Poland. Adopting a larger set of variables into a SVAR analysis should therefore prove useful.

Using a decomposition featuring the REER, inflation rate, industrial production and nominal short-run interest rate will make it possible to evaluate the incidence of real demand (fiscal) shocks and monetary policy (financial) shocks on the REER: do unexpected shocks on public expenditures have a persistent impact on the competitiveness of countries under study? Are they compensated by an active nominal-exchange-rate policy, in which case the entry into the ERM II would make these countries incur large costs? And what will be the cost/benefit trade-off consecutive to the renunciation of some monetary and fiscal activism or fluctuations in the nominal exchange rate?

As in the previous SVAR model, the new decomposition accepts dummies related to the shifts in the exchange-rate regime. They are thus incorporated in the SVARs. The Schwarz information criterion gave us one lag for the three countries. As already mentioned above, short-run restrictions have been incorporated.

IRFs are presented in Figure 3 (appendix II). It is worth noting that a nominal demand shock now provokes an immediate appreciation in the REER not only in Hungary but also in the Czech Republic and Poland. Reasons for this common reaction are different from one country to the other, though.

In the Czech Republic, this real appreciation can be partly due to a passive monetary policy: the short-term interest rate decreases though the inflation rate rises, but this explanation also needs to be coupled with a low sensitivity of the nominal exchange rate to the interest rate and inflation rate.

In Poland, the nominal exchange rate appears more sensitive to monetary policy than in the Czech Republic: the increase in the nominal short-run interest rate tends to re-appreciate the nominal exchange rate. Meanwhile, the terms of trade decrease. The strength with which the Polish monetary policy responds to the nominal demand shock is unique among the three countries under study and it is efficient in reducing both internal and imported inflation.

In Hungary, the real appreciation could be attributable to a very forward-looking monetary policy. Though price increases in Hungary persist over a longer period than in the Czech Republic and, to a lesser extent, in Poland, the Hungarian monetary policy is mute. But another explanation can emerge: monetary policy is not efficient in curbing inflation, and its main goal could be found elsewhere, namely on the real side of the economy. Indeed, after a financial shock, the impact on inflation is nil whereas industrial production is reduced. We could then infer from this that monetary policy was targeting nominal GDP rather than the inflation rate.

The small reduction in industrial production after a nominal demand shock also legitimises the absence of interest-rate hikes, so that we are inclined to favour the hypothesis that Hungarian monetary policy has long targeted the nominal GDP and that the conversion of the National Bank of Hungary to effective inflation targeting is very recent[15]. Finally, IRFs also show that a fiscal shock in Hungary has a very low impact on the inflation rate. Moreover, its impact on industrial production is positive though transitory, and the REER does not much react to this type of shock. Price and relative exchange-rate flexibility, coupled with a growth-oriented fiscal policy, are the important features of the economic policy framework in Hungary.

But where does the increasing trend in the Hungarian REER during the transition years thus come from? The B-S effect does not seem to work: after correcting the IRFs for the interactions of monetary and fiscal policies, a supply shock no longer leads to a sharp rise in the inflation rate, a rise over which we had elaborated on the B-S effect in the preceding section[16]. One explanation for the positive trend in the REER, based on the fundamentals of the economy, thus lies in the wage-prices dynamics, independently from the B-S effect. Except in 1995 and

15. Official conversion dates June 2001.

16. Recall that the reduction in the inflation rate following the supply shock had been expected provided the B-S effect was low.

1996, real wage increases in Hungary have been quite high (see Table 6) pushing the real exchange rate upwards. Finally, increases in the nominal interest rates, despite costs in terms of lower economic growth (see figure 3, appendix II), could have helped to reduce the REER but only through a puzzling mechanism: a high interest rate would not have reduced inflation but would have depreciated the currency (figure 3), thus questioning the credibility of Hungarian monetary policy[17].

The efficiency of monetary policy may also be questioned in the case of the Czech Republic. A financial shock has basically no impact on inflation and only leads to a real depreciation (figure 3), but contrary to Hungary, industrial production is not sensitive to monetary policy. In the case of the Czech Republic, the low monetary policy efficiency in curbing the Czech inflation should be attributed to the (continuing) sluggishness of domestic credit. In this country, the long-term banking depression, culminating in a major crisis in 1997/1998, has considerably limited the liquidity of financial institutions up to now (Musilek, 2003; OECD, 2002). The transmission channels of monetary policy towards the real economy are therefore fragile and probably inefficient.

We mentioned earlier that monetary policy in Poland responded toughly to a nominal demand shock, from which we concluded that this policy served to curb inflation dynamics downward. Now, a financial shock in Poland has a positive impact on the inflation rate. How can these two apparently opposite features coexist? The answer may lie in the expectations framework. An unexpected shock on monetary policy would temporarily deteriorate the terms of trade and lead to higher inflation, whereas an expected monetary policy would reduce inflation. It may testify to a higher credibility of the Polish monetary policy, in comparison with the Czech Republic or Hungary. Confirmation of the credibility and efficiency of monetary policy in Poland can be twofold: first, as shown in figure 3 (appendix II) , after a nominal demand shock the response of the Polish REER is consistent with a change in the nominal effective exchange rate, which has been driven by the increase in the nominal interest rate. Second, monetary policy responds to fiscal policy in order to compensate for its transitory inflationary impact (shock 1 in Poland, figure 3): where fiscal policy proves relatively inflationary, monetary policy proves definitely anti-inflationary. This substitutability between fiscal and monetary policy in Poland is not found in the Czech Republic where IRFs consecutive to a fiscal shock testify to a negative correlation between fiscal spending and the nominal interest rate. Economic policies in the Czech Republic could therefore be labelled "complementary". This may be at the heart of the immediate real appreciation in this country.

17. This latter explanation does not appear to fit the very recent interest-rate transmission mechanism in Hungary: increases in interest rates induce nominal appreciation of the exchange rate, which in turn has a disinflationary effect.

Finally, developments on the relative efficiency of economic policies in the three countries under study should not hide the fact that the very transitory impact of a supply shock on the REER is robust to the 4-variable model. Contrary to D-K (2001), one must conclude in favour of high flexibility in price dynamics and thus disregard price inertia.

# 5. Conclusion: policy implications

The EU enlargement towards eight CEECs in May 2004 still raises questions about the optimal road for adopting the Euro. Unilateral euroisation has been largely debated in the recent years, with some countries like Poland having envisaged unilateral abandonment of their currency in favour of the Euro (see Levasseur, 2004). However, the biggest incomers to the EU, among them Poland, have recently adopted a flexible exchange-rate regime. The entry into ERM II or the Euro area may thus have huge consequences for their economic policies, encompassing exchange-rate policy, but also for economic growth and the inflation path.

A first step of our work has consisted in a review of the monetary and fiscal policies in the largest incomers, namely the Czech Republic, Hungary, and Poland. Capital inflows within fixed exchange-rate regimes– which led to real-exchange-rate appreciations and to a consecutive loss of competitiveness and a worsening of the current account– might explain the shift to a more flexible exchange-rate regime in the three countries.

A second step has been devoted to a replication of D-K (2001) methodology to the three countries in order to evaluate their degree of price flexibility. Contrary to D-K (2001), impulse response functions show a very high degree of flexibility in the CPI, which reveals the lower importance of administered prices in the Czech Republic and Poland, and the substantial progress made by the three economies towards a market economy.

A third step has been devoted to an extension of D-K (2001) to a multivariate VAR incorporating industrial production and the nominal short-run interest rate (as a proxy for monetary policy). We have been able to refine the results obtained with a bivariate decomposition. Most noteworthy, Poland seems a rather particular country as regards the use of monetary and fiscal policies, in comparison with the Czech Republic and Hungary. First, fiscal policy is not inflationary. This is the consequence of a specific policy mix, under which monetary policy would be restrictive when fiscal policy would be expansionary. The former would be aimed at curbing inflation while the latter would boost growth. Second, exchange-rate policy in Poland seems to have been

more active than in the other two countries. In contrast to the Czech Republic and Hungary, nominal shocks appear to have a strong and persistent effect on the Polish REER.

These results have strong policy implications. First, in the three countries, high price flexibility, though a rather new phenomenon, surely puts them in line with countries already in the EU. This means that the transmission mechanisms of monetary policy in the three countries are converging towards the EU standards.

Second, there are still some intriguing responses of the price level to a supply shock. We showed evidence that the Balassa-Samuelson effect should not be overstated and that one should rather turn towards some uncontrolled wage-price spiral. Adopting a fixed exchange-rate regime, like the ERM II, will necessitate that real wage hikes are brought to an end, otherwise competitiveness will be largely impaired.

Third, this should be all the more true in the case of Poland, as this country has benefited substantially from the fluctuations of the nominal exchange rate to compensate for the real-exchange-rate appreciation in the past. Thus, adopting a firmly fixed exchange-rate regime in Poland seems rather problematic. The use of its fiscal policy would also be fettered by the dispositions of the Stability and Growth Pact, though the impact of a fiscal shock is rather short (ending up after 6 months, at best). Unless monetary policy in Europe is optimal to the Polish economy, the cost of participating in the EU might be quite high for this country and, at least, higher than in the case of the Czech Republic or Hungary.

A puzzle remains, though. The REER in the three countries do not move for long after a shock has occurred, be it a nominal demand, real demand, financial or supply one. The long-lasting positive trend in the REER of these transition economies would therefore be explained, either by a succession of shocks all through the transition years, or by noise and speculative trends which our framework has been unable to model. This latter question is left to future research.

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# APPENDIX 1

## Degree of price liberalisation in the Czech Republic, Hungary and Poland

Price liberalisation is still continuing in the Czech Republic while it is almost fully implemented in Poland. In this latter country, the share of administered prices is now very close to zero (table AI.1 below). In the Czech Republic, 12 % of prices were still administered in 2001, to be compared with a 18 %-share 6 years earlier. Hungary is a remarkable country as regards the share of regulated prices which still amounted to 18 % of the consumer price index (CPI) in 2001. It is also worth noticing that this share follows a positive trend since only 11 % of prices were administered in 1993. Despite this evolution, the EBRD index of price liberalisation is the same for Hungary and Poland, which should testify to the "good" evolution of the Hungarian economy towards a market economy.

AI.1. Share of administered prices in CPI

In %

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 17.9 | 18.1 | 17.4 | 17.4 | 13.3 | 13.3 | 13.3 | 13.3 | 12.4 |
| Hungary | 10.8 | 11.8 | 12.9 | 12.8 | 15.9 | 17.0 | 18.2 | 18.3 | 18.5 |
| Poland | 10.6 | 12.0 | 12.0 | 11.6 | 10.6 | 10.6 | 9.0 | 2.6 | 1.2 |

*Source*: EBRD, 2002.

AI.2. Degree of openness

In % of GDP, 2000

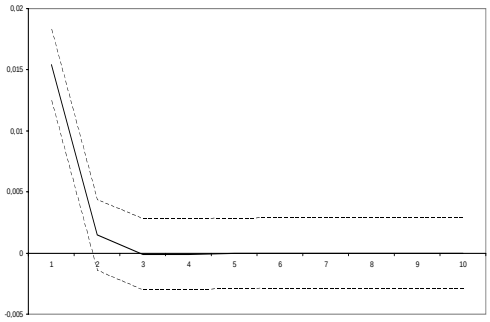
| | Exportations | Importations |
|---|---|---|
| Czech Republic | 54.7 | 59.6 |
| Hungary | 58.3 | 64.4 |
| Poland | 18.1 | 25.2 |

*Source*: European Parliament.

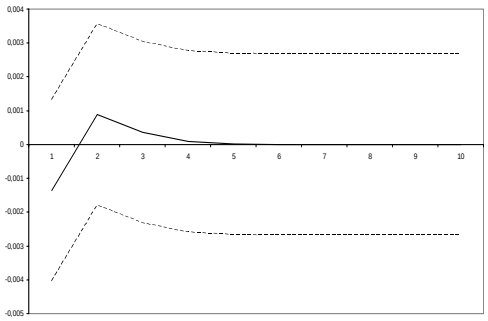
# APPENDIX II

Figure 1a. **Czech Republic**
Impulse response functions to a structural shock

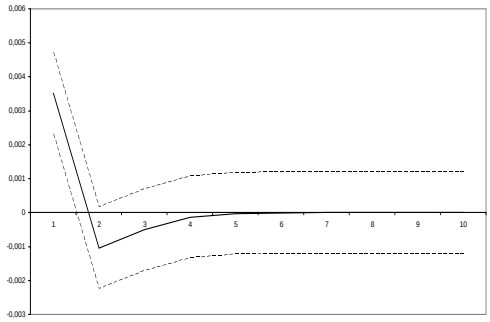
*Response of the RER in difference to Shock 1*



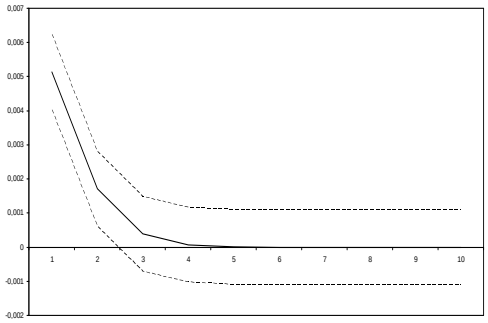
*Response of the RER in difference to Shock 2*



*Response of the inflation rate to Shock 1*



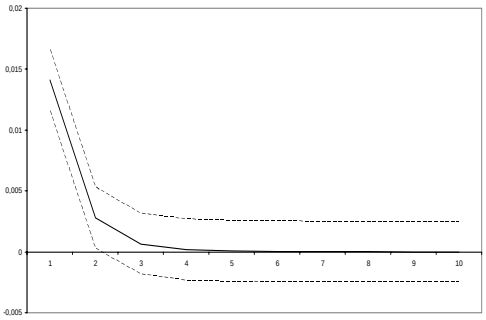
*Response of the inflation rate to Shock 2*



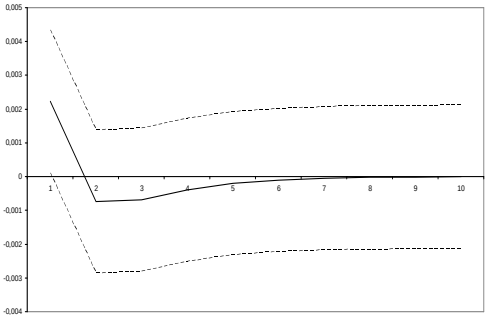
*N.B.*: IRFs with (analytic) confidence intervals.

Figure 1b. **Hungary**
Impulse response functions to a structural shock

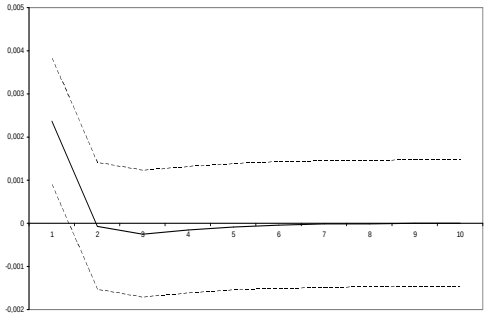
*Response of the RER in difference to Shock 1*



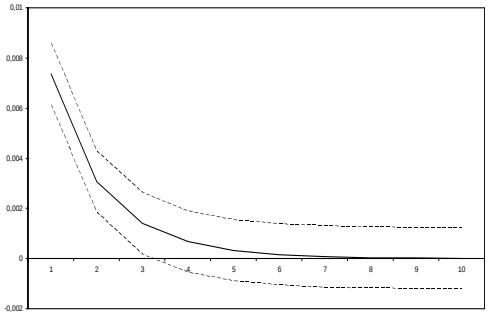
*Response of the RER in difference to Shock 2*



*Response of the inflation rate to Shock 1*



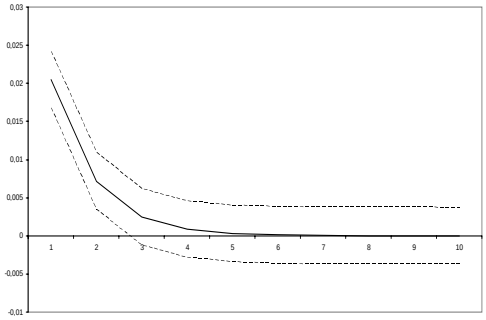
*Response of the inflation rate to Shock 2*



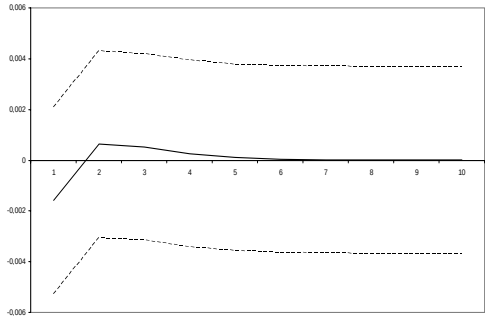
*N.B.*: IRFs with (analytic) confidence intervals.

Figure 1c. **Poland**
Impulse response functions to a structural shock

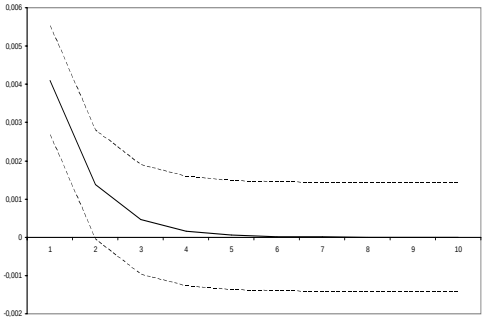
*Response of the RER in difference to Shock 1*



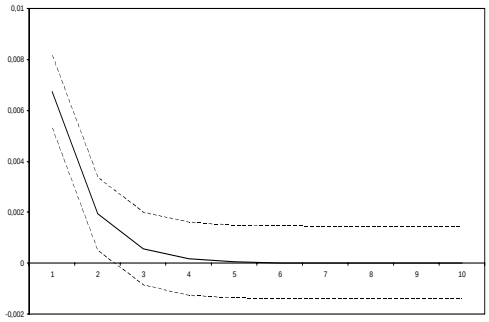
*Response of the RER in difference to Shock 2*



*Response of the inflation rate to Shock 1*



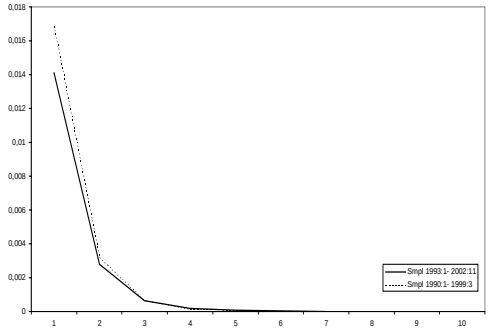
*Response of the inflation rate to Shock 2*



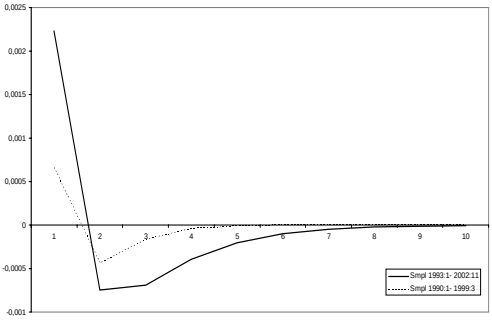
*N.B.*: IRFs with (analytic) confidence intervals.

Figure 2a. **Hungary**
Impulse response functions to a structural shock
A comparison with D-K former results (sample 1990:1-1999:3)

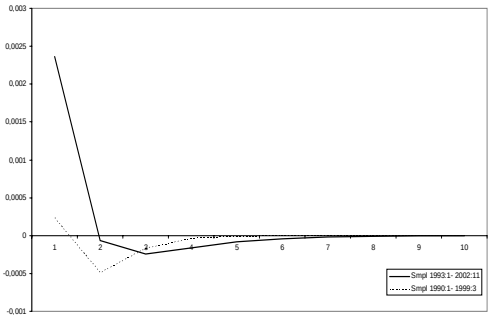
*Response of the RER in difference to Shock 1*




*Response of the RER in difference to Shock 2*




*Response of the inflation rate to Shock 1*




*Response of the inflation rate to Shock 2*

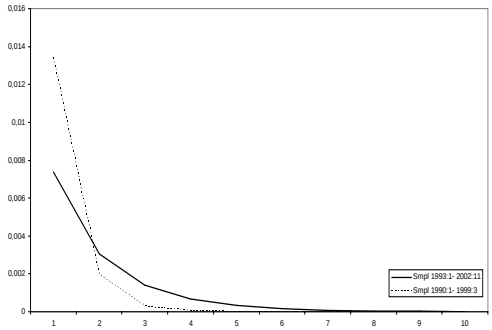
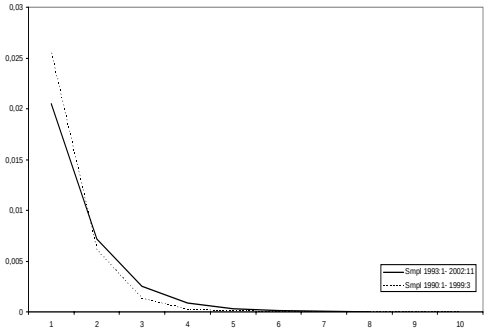
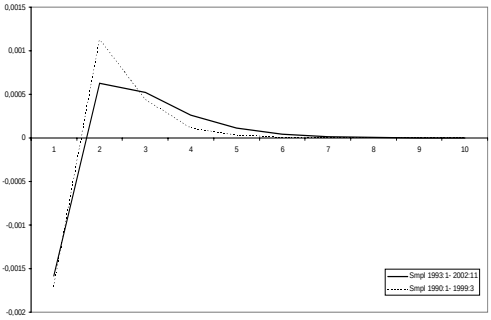


Figure 2b. **Poland**
Impulse response functions to a structural shock
A comparison with D-K former results (sample 1990:1-1999:3)

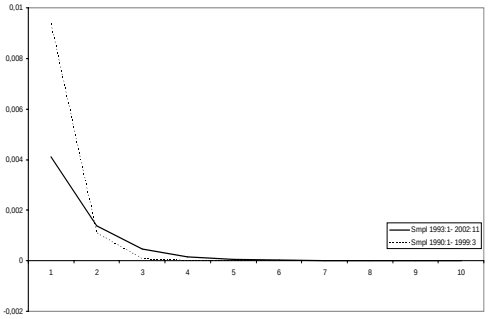
*Response of the RER in difference to Shock 1*




*Response of the RER in difference to Shock 2*




*Response of the inflation rate to Shock 1*




*Response of the inflation rate to Shock 2*

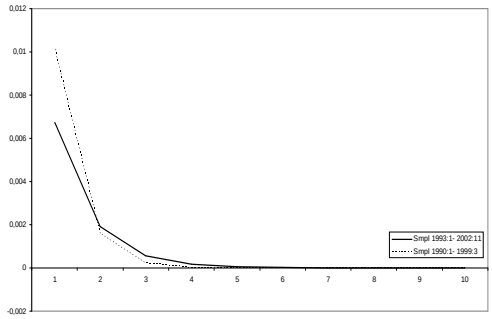
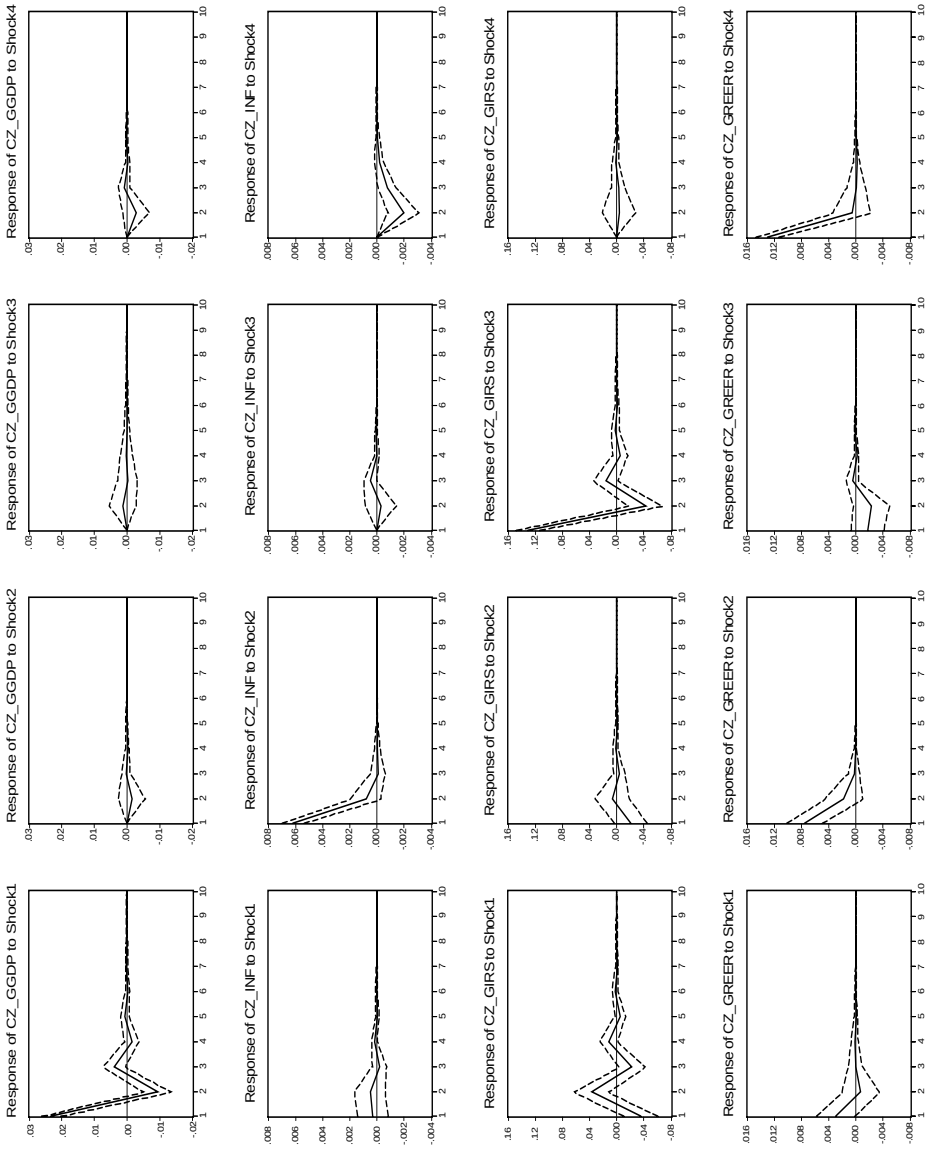


Figure 3a. **Czech Republic**
Impulse response functions to a structural shock

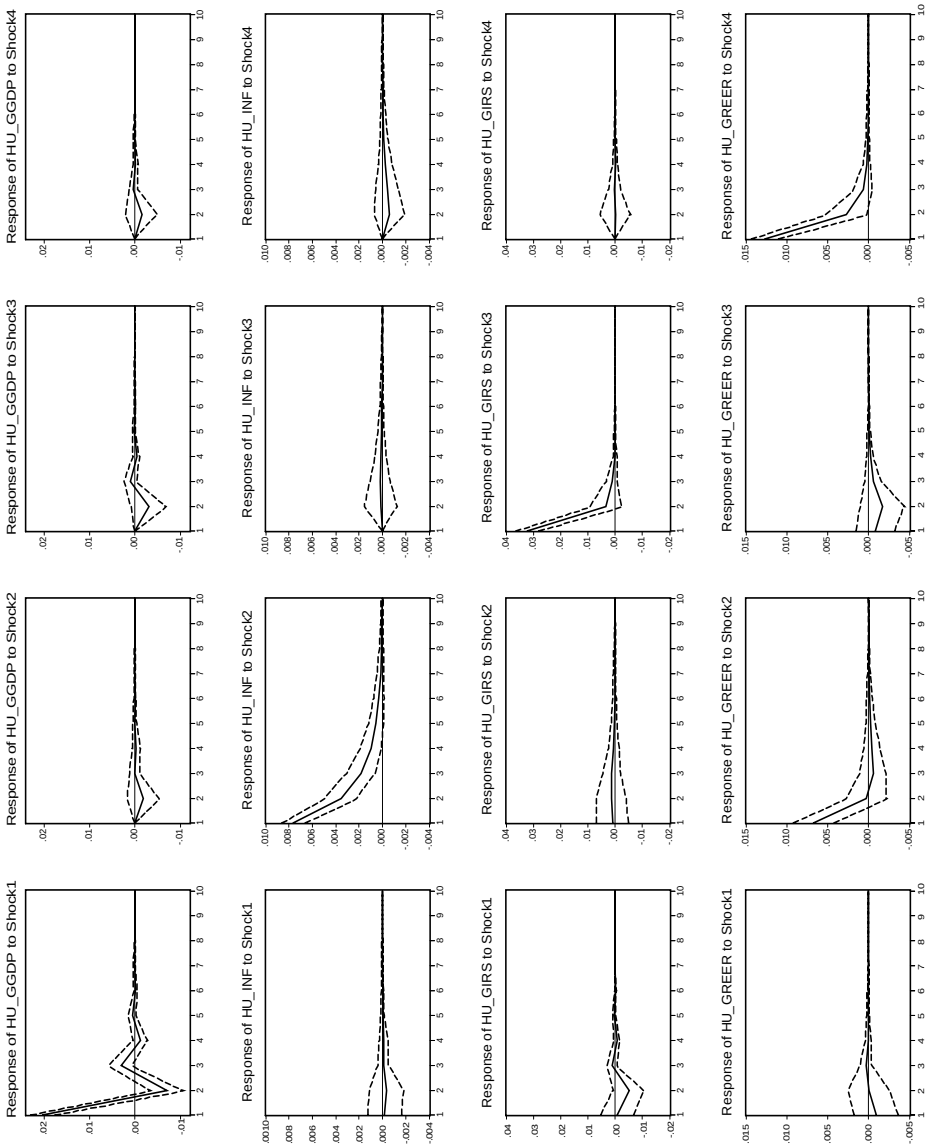
Response to Structural One S.D. Innovations ± 2 S.E.




*N.B.*: IRFs with (analytic) confidence intervals.

Figure 3b. **Hungary**
Impulse response functions to a structural shock

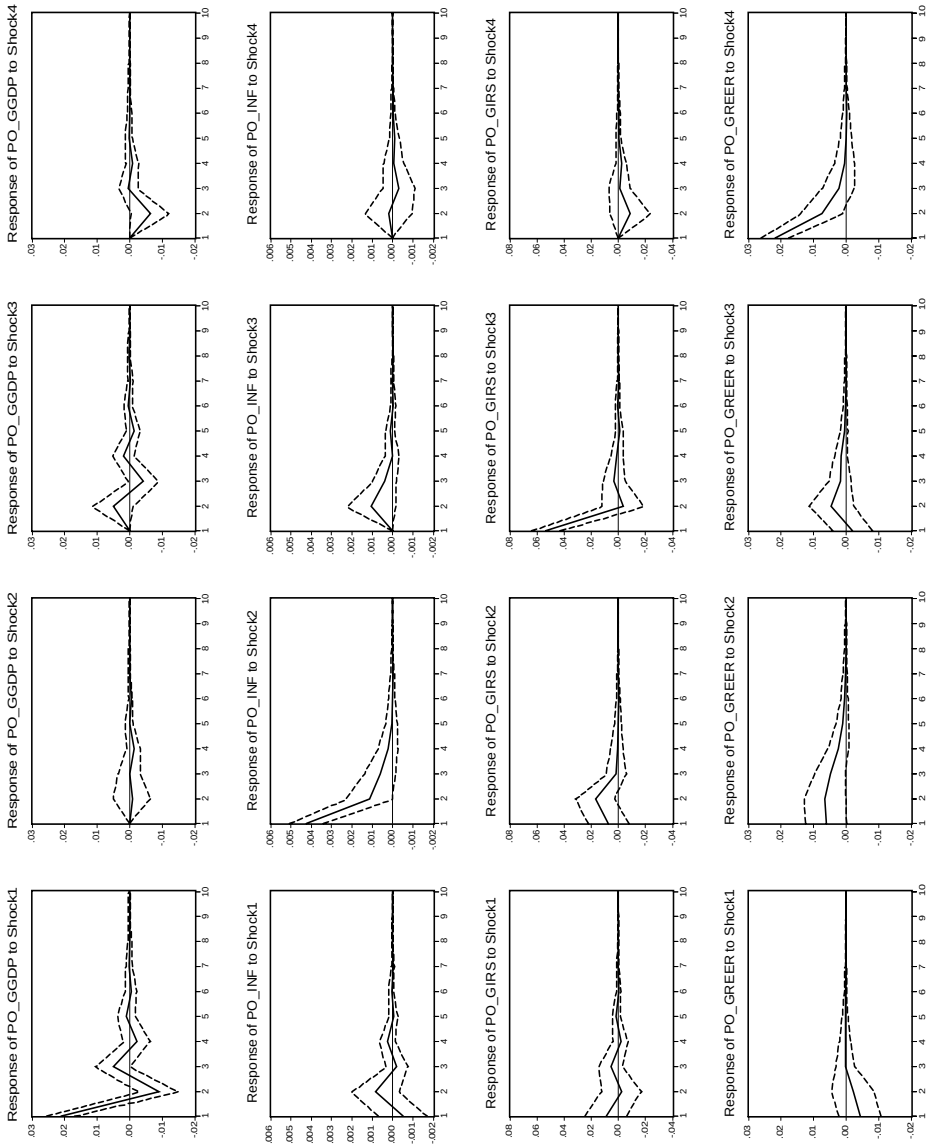
Response to Structural One S.D. Innovations ± 2 S.E.




*N.B.*: IRFs with (analytic) confidence intervals.

Figure 3C. **Poland**
Impulse response functions to a structural shock

Response to Structural One S.D. Innovations ± 2 S.E.




*N.B.*: IRFs with (analytic) confidence intervals.