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FINANCIAL STRUCTURE AND THE TRANSMISSION OF MONETARY SHOCKS: PRELIMINARY EVIDENCE FOR THE CZECH REPUBLIC, HUNGARY AND POLAND

by Alessio Anzuini* and Aviram Levy*

Abstract

The paper analyses the financial structure of the private sector in the Czech Republic, Hungary and Poland and assesses its implications for the monetary transmission mechanism. The financial accounts of these countries provide a picture of a private sector which is predictably financially less mature than the EU average: the corporate sector relies significantly on non-market financial liabilities (such as trade credits and non-traded shares) and bears a substantial exchange rate risk; the household sector is less sophisticated both in terms of financial assets, whose composition is tilted towards bank deposits, and liabilities, the volume of which is still negligible. VAR system estimates conducted separately on each acceding country suggest that, despite the inferior financial development of these countries, the co-movement of macroeconomic variables conditional on a monetary policy shock is similar across countries and not dissimilar to what is found in the more advanced economies.

JEL classification: C30, E44, E52, F41.

Keywords: Financial structure, identified VAR, monetary policy shock, price puzzle.

Contents

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1. Introduction[1]

In May 2004 ten countries from Central and Eastern Europe and from the Mediterranean basin (henceforth Accession Countries or AC) joined the EU. In the short to medium term, it is to be expected that these countries will strive for closer integration with EU Member States in the monetary field as well by applying for ERM2 membership and, later on, for the adoption of the euro. In this respect, an important issue is whether there are significant differences between the financial structures of these countries and with respect to those of the current members of the euro area. In particular, the structure of financial assets and liabilities of the corporate and household sectors has important implications for the transmission mechanism of monetary policy: with a view to the adoption of the single monetary policy it is desirable that the effects of monetary policy not differ significantly between current and future members of the euro area. This issue was analysed by a large body of literature in the late 1990s, as part of the debate on whether countries with a diverse economic cycle and financial structure, such as the UK, would be able to adopt successfully a single monetary policy.[2]

Against this background, the main purpose of this paper is to provide a broad picture of the financial structure of the three largest acceding countries (Czech Republic, Hungary and Poland, henceforth AC3), with an emphasis on the private non-financial sector, and to present some econometric evidence of the transmission mechanism of monetary policy in these three countries. Previous research on the enlargement process has focussed mostly on the banking sector.[3] While providing an overview of the whole economy, this study focuses on the financial structure of the corporate and household sectors, whose behaviour is crucial for the transmission of monetary policy. In this context, the benchmark we chose for assessing the convergence of these three countries' financial structures is the 15-country EU average.

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[2] Recent studies on this issue are Guiso et al. (1999) and Angeloni et al. (2002).

[3] An exception is represented by Schardax and Reininger (2001).

Although we are aware that the EU includes an "outlier" such as the UK while our paper aims to judge how "ready" the three countries would be to adopt the single monetary policy, nonetheless we opted for the EU benchmark because by the time these three countries are expected to join the euro - 2008 to 2010 - it cannot be ruled out that the UK will also have adopted the single currency.

First the paper analyses the financial structures of the three countries - size, maturity, currency of denomination of assets and liabilities - using their "Financial accounts" (recently released by Eurostat) and provides a breakdown of financial balance sheets of all sectors. Data on the currency denomination of assets and liabilities, which provide information on exposure to exchange rate risk and are not available in the "Financial accounts", are calculated from national banking statistics. Next the paper presents some econometric evidence: the VAR estimates compare the effects of monetary policy in the three countries and then assess whether the results can be explained with the pattern of their financial structures. The main results of the paper can be summarised as follows.

Looking at the aggregate financial structures of these countries, three main features stand out. First, the economies lack financial depth: total financial assets are in a range of 2.5 to 4.5 times GDP, which is far behind the EU average of 8 times GDP; financial depth is greatest in the Czech Republic at 4.5 times GDP. Second, the countries have a low level of financial intermediation (measured as the ratio of financial assets held by banks to financial assets held by all other sectors), the exception being the Czech Republic, where the ratio is only slightly below the EU average (44 per cent). Despite the low level of intermediation, banks dominate capital markets in reallocating funds from savers to borrowers: at the end of 2001 the total assets of the banking system were in a range of 60 to 70 per cent of GDP in Hungary and Poland and close to 115 per cent in the Czech Republic, whereas stock markets capitalised between 13 and 19 per cent of GDP. Third, non-residents play an important role in these financial systems: at an aggregate level, the heavy reliance on foreign funds translates into large net foreign debt positions in Hungary and Poland (70 and 40 per cent of GDP, respectively). At the sector level, a significant role is played by foreigners in bank ownership (close to 70 per cent of bank assets) and a large share of total bank credit is granted to domestic firms directly by banks located abroad.

Sources of financing of the corporate sector differ significantly in these countries. In terms of relative weight, while the bulk of financial liabilities is represented everywhere by shares (mostly not exchange traded), in the Czech Republic and in Poland (but not in Hungary) the second largest source of financing is trade credits. While caution is needed due to measurement problems, this may suggest that in the Czech Republic and Poland financial markets are less efficient in providing credit to firms than in Hungary. The weight of bank loans in total liabilities is above the EU average, with the exception of Poland, where it is lower. Securities play a minor role in all countries, well below the EU average.

If one considers the size of financial liabilities in terms of GDP, Polish firms have the lowest volume of "market debt", i.e. outstanding securities and loans; the "market debt" for Czech and Hungarian firms is larger (63 to 67 per cent), but well below the EU average (80 per cent). Poland's firms also stand out for having the lowest "financial leverage ratio", i.e. the ratio of securities and loans to shares (0.5, in line with the EU average), while Czech and Hungarian firms have a higher leverage, 0.60 and 0.73 respectively. These data may seem to imply that in Poland firms are financially less vulnerable but monetary policy is less able to affect their decisions via the cost and amount of bank lending; the opposite case may be that of the Czech Republic, where firms are most dependent on external financing and, as a consequence, monetary policy may have more leeway.

The currency composition of corporate and household balance sheets is relevant for monetary transmission and for financial stability. Hungary's and Poland's firms denominate more than half the loans they receive from resident and non-resident banks in foreign currency; Hungary's firms stand out in terms of net worth in foreign currency, which is negative and close to 17 per cent of GDP. In these countries the trade-off between exchange rate risk of the corporate and the banking sector seems to favour the latter sector: Hungary's banks borrow heavily abroad (their net debt to foreign banks is 9 per cent of GDP, mostly in foreign currency), but nonetheless they do not have a currency mismatch in their balance sheets, implying that they fully transfer the exchange rate risk to domestic firms.

The household sector holds a much smaller amount of financial assets than in the EU. In Hungary households are financially more sophisticated than elsewhere, holding fewer bank deposits (46 per cent against nearly 60 per cent in the other two countries) and more securities and shares; despite the greater diversification, Hungary's households are still behind their EU

counterparts, which hold only one quarter of their assets in bank deposits. Household debt is very small (in a range of 6 to 8 per cent of GDP, compared with 60 per cent in the EU), as is households' exposure to exchange rate risk: despite non negligible amounts of foreign currency mortgage debt (in Poland 29 per cent of total mortgage debt), the large amounts of foreign currency deposits mean that the net foreign currency position of households is positive, in a range of 5 to 8 per cent of GDP.

The econometric results suggest that, despite the lower level of financial development, the macroeconomic variables of the three countries react to a monetary policy shock in the standard way. Following a 1 percentage point increase in interest rates, in all countries industrial production declines significantly and persistently. If we exclude the first part of the 1990s, in all countries consumer prices tend to decline significantly after roughly 1 year. As for the exchange rate, in all countries a contractionary domestic monetary shock leads to an appreciation, which is strongest in Hungary. Using previous studies on monetary transmission in the EU as benchmarks, an important result of this exercise is that in the three accession countries considered the contribution of a domestic monetary shock to output fluctuation is in line with previous estimates for the four largest EU economies. We conclude that no evidence of asymmetric effects is found either between accession countries and current EU members or among accession countries. Three additional results are worth mentioning. The first is that for all countries the exchange rate seems to play an important role in the transmission mechanism, i.e. the exchange rate always reacts significantly in the expected direction. The second result is that in Hungary the effects of a domestic monetary shock on output and exchange rates are greater (on average) than in the other two countries. However, it is important to note that, even if the identification scheme is the same and the shock is normalised across countries so that comparisons are possible to some degree, the confidence bands are generally large enough to ensure that differences in averages may not be significant. The third result is that Poland has the most stable impulse response functions. For this country, the estimated responses are stable not only over time but also across different identification schemes.

The paper is organised as follows. Section 2 analyses the financial structure of the AC3 to assess its implications for the monetary transmission mechanism. Section 3 contains VAR system estimates, conducted separately on each acceding country, to trace the effects of a monetary policy shock. Section 4 concludes.

2. Financial structures of the Czech republic, Hungary and Poland

The Czech Republic, Hungary and Poland are the largest economies within the 10 ACs and they were among the first to complete the transition from planned to market economy, as witnessed by their early membership of the OECD (1995-96). While a macroeconomic analysis of these countries is beyond the scope of this paper, it is worth noting that they have made substantial progress in their convergence towards current EU members (see EU Commission (2002)), with some differences depending on whether macroeconomic (e.g. inflation and public finance) or structural convergence (per capita incomes, structure of value added, market functioning) is considered.

Before examining the financial structures of these countries it is worth recalling the main features of their monetary and exchange rate policy. While all three pursue a monetary policy strategy based on inflation targeting, some differences exist in their exchange rate policies.[4] The Czech Republic and Poland pursue a free float. The former adopted this regime - although de facto the float is partially managed - after the severe currency crisis of 1997 which forced the authorities to abandon the soft peg which was in place. In contrast, Poland has a longer history of exchange rate flexibility: in 1991 the authorities adopted a currency basket peg but in 1995 they switched to a "crawling band" regime, with the band of the crawl being gradually widened until the currency was allowed to float freely in April 2000. Hungary has traditionally been more averse to exchange rate flexibility: the country has slowly shifted from a narrow crawling band, adopted in 1995, to a horizontal and wide band, introduced in 2001. The size of the bands (± 15 per cent) suggests that Hungarian authorities have been shadowing the ERM 2 arrangements.

When considering the financial structures of the AC3, there are at least three features which stand out.[5] The first is the lack of financial depth. As can be seen from Figure 1, in the AC3 the amount of total financial assets is between 2.5 to 4.5 times GDP, as opposed to 8 times for the EU average. The size of financial assets also differs significantly among the AC3: in the Czech Republic financial assets are 4.5 times GDP (more than half the EU average), whereas

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[4] The alternative strategies for joining the ERM and adopting the euro in these countries have been discussed, among others, in Corker et al. (2000) and Begg et al. (2003).

[5] An overview of the financial structures of accession countries can be found in Caviglia et al. (2002); country analyses of the Czech Republic, Hungary and Poland are presented, respectively, by Ihnat and Prochazka (2002), Zsambòki (2002) and Bednarski and Osinski (2002).

for Hungary and Poland financial assets are less than 3 times GDP (and roughly one third of the EU average). If one considers financial liabilities the picture does not change significantly in terms of distance from the EU, although the gap among the AC3 becomes smaller.[6]

A second major feature of the AC3 is the low level of financial intermediation, which is associated, nonetheless, with the dominance of banks over capital markets.[7] A simple indicator of the role played the banking system is the "Financial Intermediation Ratio"[8] (the ratio of financial assets held by banks to financial assets held by all other sectors): Figure 2 shows that in Hungary and Poland the ratio ranges from 22 to 27; the Czech Republic stands out in that the relative share of banks (roughly 38 per cent) is much closer to the EU average (44 per cent). Nonetheless banks dominate capital markets in reallocating funds from savers to borrowers: at the end of 2001 the total assets of the banking system were in a range of 60 to 70 per cent of GDP in Hungary and Poland and close to 115 per cent in the Czech Republic (compared with total assets close to 280 per cent in the EU). In contrast, at the end of 2001 the stock markets of these three countries capitalized between 13 and 19 per cent of GDP (85 per cent in the EU).

A third major characteristic of the financial systems in the AC3 is the important role played by non-residents. The large reliance on foreign funds translates into large net foreign debt positions (Figure 3): net debt is above 70 per cent of GDP in Hungary and above 40 per cent in Poland. In this regard the Czech Republic is closer to the EU average: both have net foreign debts which are below 10 per cent of GDP. At a sector level the reliance on foreign capital takes two main forms. The first is the significant role played by foreigners in bank ownership: in all the AC3, foreign-owned institutions account for nearly 70 per cent of total bank assets. The second way of providing funds to the country is bank credit which is granted directly by banks located abroad to domestic firms, bypassing local banks. As we shall see below, in Hungary and Poland roughly 30 to 35 per cent of total bank credit to domestic

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[6] A detailed and updated analysis of financial structures of EU countries is provided by Bartiloro and De Bonis (2003)

[7] The banking systems of these countries underwent significant transformations in the 1990s. The painful transition from planned to market economies entailed severe banking crises and expensive bailouts: Schardax and Reininger (2001) put the fiscal costs of the crises occurring in the mid 1990s at 12 per cent of GDP in the Czech Republic and 7 per cent in Hungary. At present commercial banks in these countries are considered to be generally sound (in terms of capital ratios, asset quality and profitability) and well supervised (see ECB (2002)).

[8] This indicator was first proposed by Goldsmith (1969).

firms is granted directly by banks located abroad whereas in the Czech Republic - where the domestic banking system is much larger - this share is close to 16 per cent.

2.1 *The corporate sector*

A careful examination of balance sheets shows that the sources of financing of non-financial firms in the AC3 countries differ significantly. Table 1 provides an overview of the relative weight of financial liabilities. The bulk of such liabilities is represented everywhere by shares - most of them not publicly traded - which account for around 40 per cent in the Czech Republic and in Poland and over 55 per cent in Hungary, the same level as in the EU. In the Czech Republic and in Poland the second largest source of financing (around one third of total liabilities) is represented by trade credits (item "other accounts"). Reading the data at face value - but trade credits are difficult to measure in a precise and harmonised way - one may conclude that in these two countries the financial markets are less efficient in providing credit to firms than in Hungary, where trade credits account for less than 10 per cent, as in the EU.

Bank loans represent only 19 per cent of total liabilities in Poland and 34 per cent in Hungary, with the Czech Republic in the middle (27 per cent). With the exception of Poland, these values are above the EU level (25 per cent). Securities play a minor role in all countries (2 to 2.5 per cent in the Czech Republic and in Poland, 0.5 in Hungary), well below the EU average.

In Table 2 some of the above-mentioned financial instruments are presented in terms of GDP and a "financial leverage ratio" is calculated as a ratio of internal to external financing (i.e. the ratio of shares to securities and loans). In the last column a comparison is provided with the EU average. The table highlights the fact that Polish firms have the lowest "market debt", i. e. securities and loans outstanding, in terms of GDP (35 per cent), which compares with 63 to 67 per cent for the other two countries. The size of market debt of Czech and Hungarian firms is 60 per cent, which in turn is well below the EU average (80 per cent). Together with the lowest sheer size of market debt, Polish firms also boast the lowest financial leverage (0.5), which is the same as the EU average; in contrast, Czech and Hungarian firms have higher leverage, 0.60 to 0.73. To summarize, Polish firms seem to have the lowest leverage and Czech firms the highest: a possible implication for monetary policy transmission is that in Poland firms

are financially less vulnerable but monetary policy is less able to affect their decisions by controlling the cost and the amount of their financing. The Czech Republic represents the opposite case, with firms more dependent on external financing and, as a consequence, with potentially more leeway for monetary policy.

In addition to the composition of financial liabilities by instrument, important information on the soundness of the corporate sector is provided by the analysis of the currency composition of debt. As already mentioned, foreign currency debt (provided by either domestic or non-resident banks) allows larger amounts of funds to be tapped at lower cost, since firms typically do not hedge the exchange rate risk. However, foreign debt represents a contingent liability which makes firms vulnerable to currency depreciation. As already highlighted by a large body of literature[9] such balance sheet effects and the associated wave of corporate bankruptcies can make Keynesian expansionary policies ineffective and, in extreme cases, trigger banking crises and costly public bailouts.

Table 3.1 shows the currency composition of corporate balance sheets. If we look at liabilities, the table shows that Hungarian and, to a lesser extent, Polish firms choose to denominate in foreign currency more than half the loans they receive (originating from resident and non-resident banks), whereas Czech companies denominate only one fourth of their loans in foreign currency. In order to have a complete picture it is useful to consider also the sheer size of foreign currency debt, i. e. the net worth in foreign currency[10] as a ratio to GDP (Table 3.2). In this case too, Hungarian firms have the largest imbalance (net foreign currency debt is 17 per cent of GDP) whereas Polish firms have the lowest net position.

The experience of the financial crises that hit many emerging economies in the late 1990s has shown that there is a trade-off between the exposure to exchange rate risk of the corporate sector as opposed to the banking system. Asian banks typically borrowed abroad in foreign currency (bearing all the currency risk) and lent in domestic currency to domestic firms (which bore no risk), whereas in Latin America, notably in Argentina, the opposite occurred.[11] The

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[9] See, among the most recent studies, Levy (2002), Cespedes Chang, and Velasco (2002), and Allen et al. (2003).

[10] Net worth is defined as the difference between foreign exchange assets and liabilities, vis-à-vis both resident and non resident counterparts.

[11] See, among others, Levy (2002).

data presented in Table 4 suggest that for the AC3 the trade-off follows the Latin American pattern. Hungary's banks borrow heavily abroad (see Table 4.2): their net debt to foreign banks is 9 per cent of GDP, mostly in foreign currency. This is consistent with the fact, noted above, that the country has a large net external debt. In contrast, Czech and Polish banks are net lenders: their net credit position is equal to 6 and 3 per cent of GDP, respectively. Despite the heavy external (which is mostly foreign currency denominated) debt, Hungary's banks do not have a currency mismatch in their balance sheets: Table 4.1 shows that 29 per cent of assets are in foreign currency versus 27 per cent of liabilities, suggesting that domestic banks borrow abroad but fully transfer these foreign currency funds to domestic firms, remaining with a slightly "long position" in foreign currency. Moreover Czech banks have no currency mismatch whereas Polish banks have a "long" foreign currency mismatch (25 percent against 19 per cent).

2.2 *The household sector*

Balance sheets of the household sector play an important role in the transmission mechanism of monetary policy. For instance, a monetary tightening can reduce consumption both via the increased cost of servicing mortgage or credit card debt (income effects) and via the reduced value of financial assets such as bonds and, sometimes, stocks (wealth effects). In this regard some information about the relevance of income and wealth effects can be extracted from the composition and size of households' financial assets and liabilities.

Two stylised facts emerge from the breakdown of financial assets shown in Table 5. First, households in the AC3 countries hold a much smaller amount of financial assets in terms of GDP (55 per cent in Poland, 83 in the Czech Republic and Hungary in the middle) than EU households (around 230 per cent). Secondly, in Hungary households are financially more sophisticated than elsewhere: they hold less bank deposits (45 against almost 60 per cent in the other two) and more securities and shares (44 against 25 per cent). Although financially more diversified than in Poland and the Czech Republic, households in Hungary are still behind EU households, which hold only one quarter of their assets in bank deposits.

As for household borrowing, Table 6 shows that in all AC3 countries household debt is very small in terms of GDP, between 6 and 8 per cent; this compares with 60 per cent for the EU.

In these countries households' exposure to exchange rate risk is limited. The exception may be Polish households, for which 29 per cent of mortgage debt is denominated in foreign currency (Table 7.1). Reflecting the fact that bank deposits in foreign currency are much larger than foreign currency mortgage debt, the overall net foreign currency position of households in these countries is positive, ranging from 5 to 8 per cent of GDP (Table 7.2).

3. The effects of monetary shocks in AC3

The effectiveness of monetary policy is closely related to the transmission of a monetary impulse from the central bank's key rates to money market and then other fixed income interest rates. The transmission from the money market to the lending rates applied by banks to non-banks is the other part of the story. The degree of development of the financial markets and their proper functioning are therefore crucial for the propagation of monetary impulses. The effect of the interest rates on the exchange rate is obviously another important channel. The "closed economy effects" may be divided into three components: effects due to firms' behaviour, effects due to households' behaviour and the effects of financial structure development, i.e. the more developed the financial system the more effective is monetary policy. In the theoretical literature there are two major classes of models used to study the effects of a monetary shock: "limited participation models" and "money in utility function models" are standard examples[12]. In both classes of models, following a contractionary monetary shock the interest rate increases, prices decrease and output does not increase; it is worth noting, however, that similar effects are reached through very different transmission mechanisms.

In a "limited participation" model, following an injection of liquidity by the authority the available funds that banks can lend to firms increase, firms can raise investment and the increased investment boosts economic activity. In the real world this mechanism is represented by the credit channel. Since we expect the credit channel to play a central role in firms' response to changes in monetary policy, we use the share of bank loans to total liabilities as an indicator of firms' expected reaction to interest rate changes, i.e. the higher this share is, the more firms should be affected by monetary impulses. As Table 1 shows, Hungary has the highest share at 34 per cent. It is worth noting that this figure is high not only compared with

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[12] See Walsh (2001) for an extensive treatment of monetary models.

the other two AC considered (Czech Republic 27.2 per cent and Poland 19.2 per cent) but also compared with the EU average (24.8 per cent).

In a "money in utility function" model, some nominal rigidity is usually introduced in order to obtain real effects from a nominal shock; price stickiness, for example, is a standard assumption to obtain a positive co-movement of nominal and real interest rates. In this class of models, as in most microfounded models, the interest rate plays a role because it enters the Euler equation which gives the optimal consumption path for the representative household. An increase in the interest rate increases the cost of today's consumption in terms of future consumption and therefore the optimal household's response is a decrease in today's consumption. Since those models are usually demand driven, a contraction in one component of the demand reduces real activity. In the real world this mechanism is difficult to isolate. An increase in the interest rate may impact directly on the expected future income and through it on consumption if the share of mortgage payments to total payments is a non-negligible part of households' balance sheets. For this reason we use this share as an indicator of the expected reaction of households, i.e. the higher this share the greater the impact of monetary policy.

As Table 6 shows, in the AC3 household debt is very low compared with the EU average. For the Czech Republic and Poland loans to households account for 8 per cent of GDP and for Hungary 6 per cent.

The previous chapter presented a description of the financial systems in the AC3, Figure 1.1 shows the ratio of financial assets to GDP. While all AC3 are well below the EU average, the Czech Republic is above the other two countries. The so called "Financial Intermediation Ratio" (Figure 2) is lower than the EU average in all AC3, again with the Czech Republic closer to the EU. On a more disaggregated level the picture is slightly different. The structure of firms' financial liabilities suggests that Hungarian firms are able to raise risk capital to an extent similar to EU members. The fraction of stocks in total liabilities in Hungary is 56.1 per cent, a level very close to the EU average of 60.6 per cent. The share is lowest in the Czech Republic (39.5 per cent) and Poland's share is 42.9 per cent. Even if deposits are the favourite asset for carrying wealth over time (Table 6) in the AC3, the percentage of "shares and mutual funds" of Hungarian households (34.9 per cent) is very close to the EU average (33.5 per cent).

If we take those numbers as a proxy of financial development we can say that the AC3 have low levels of financial depth and financial intermediation. Moreover, an important role is

played by non-residents. At an aggregate level, the financial development of those countries is still behind that of EU. At a microeconomic level the behaviour of firms and households in Hungary is more in line with the EU average. However, despite the lack of financial development, we argue that in the AC3 the effects of a contractionary monetary policy shock are qualitatively not dissimilar to that found in the more advanced economies and not dissimilar from the predictions of a large class of theoretical models.

3.1 *The empirical model*

This exercise aims to analyze the effects of a contractionary monetary shock in the AC3. We estimate a five variable VAR system, one for each AC country considered, i.e. Czech Republic, Hungary and Poland. All estimated VARs are just identified systems. All identifying restrictions are short run restrictions, i.e. zeros in the impact matrix. All variables are expressed in log levels (except interest rates); we implicitly assume that there is enough cointegration so that they are jointly covariance stationary, Sims (1990). In all regressions, a complete set of dummy variables is included to capture any seasonality effect. The lag length of each system is chosen to strike a balance between two needs: eliminate the autocorrelation of residuals and preserve as many degrees of freedom as possible. We chose to perform a Ljiung-Box test and increase the number of lags up to the point where the autocorrelation was not significant at a 5 per cent level. Since the Ljiung-Box test has a strong small sample bias we always evaluate the lag structure obtained from this test against a set of alternatives using AIC (Akaike Information Criterion) and SBC (Schwartz Bayesian Criterion). In the VAR literature no general consensus has emerged on the ordering to assume for the variables included in the system. An illuminating survey on the topic is Christiano, Eichenbaum and Evans (1998). Moreover, no general consensus has emerged on the use of the recursive structure in the identification process. However, it is possible to put the identification schemes based on short run restriction into two groups: the recursive structure as in Christiano, Eichenbaum and Evans (1998) and the non-recursive structure as in Kim (1999). Both identification schemes are designed to recover only the effects of a monetary policy shock. In both schemes a contractionary monetary policy shock is a positive innovation in the nominal interest rate and the line in which the nominal interest rate appears as endogenous variable is interpreted as a reaction function of the monetary authorities. While in the recursive structure the Wold order of the variables implicitly assumes that monetary authorities choose the interest rate by

looking at the current level of prices and output and assumes that output and the price level do not change in the impact period but react only with one period delay, in the non-recursive identification approach (hereafter, Structural VAR) each line has its own interpretation (see Kim, 1999) and it is assumed that monetary authorities, due to an information delay, do not see the current value of prices and output when choosing the interest rate[13].

More precisely, the variables are stored in the vector y_t. The structural form is:

$$C\left(L\right)y_t = \eta_t$$

where $C(L)$ is a polynomial matrix in the lag operator and $VCV\left(\eta_t\right) = \Lambda$ is a diagonal matrix with the variances of the structural shocks as elements. We estimate (ignoring predeterminates) the reduced form:

$$y_t = A\left(L\right)y_{t-1} + \varepsilon_t$$

where $A\left(L\right)$ is a polynomial matrix in the lag operator and $VCV\left(\varepsilon_t\right) = \Sigma$ and $\eta_t = C_0\varepsilon_t$ therefore $\Sigma = C_0^{-1}\Lambda C_0^{-1'}$. In order to obtain a just identified system we need $\frac{n\times(n-1)}{2}$ restrictions. The recursive identification scheme is:

$$\begin{bmatrix} \eta_t^1 \\ \eta_t^2 \\ \eta_t^3 \\ \eta_t^{monetary} \\ \eta_t^5 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ g_{21} & 1 & 0 & 0 & 0 \\ g_{31} & g_{32} & 1 & 0 & 0 \\ g_{41} & g_{42} & g_{43} & 1 & 0 \\ g_{51} & g_{52} & g_{53} & g_{54} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{cpi} \\ \varepsilon_t^{ip} \\ \varepsilon_t^{m} \\ \varepsilon_t^{i} \\ \varepsilon_t^{cp} \end{bmatrix}$$

where the variables in the vector $y_t = (cpi, ip, m, i, cp)$ are: prices, industrial production, money, interest rate and commodity prices. The C_0 matrix identifies the relation between the structural disturbances η_t and the reduced form residuals ε_t. We also try a version of the system excluding money from the VAR. While results, in this specific exercise, did not change significantly, it is worth noting that the estimation of a VAR system without money carries risks in the sense that a confusion is likely to arise between a money demand shock and a money supply shock.

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[13] Sims and Zha (1995) made similar assumptions.

In the non-recursive scheme the C_0 matrix takes the form:

$$\begin{bmatrix} \eta_t^{monetary} \\ \eta_t^2 \\ \eta_t^3 \\ \eta_t^4 \\ \eta_t^5 \end{bmatrix} = \begin{bmatrix} 1 & g_{12} & 0 & 0 & g_{15} \\ g_{21} & 1 & g_{23} & g_{24} & 0 \\ 0 & 0 & 1 & g_{34} & 0 \\ 0 & 0 & 0 & 1 & 0 \\ g_{51} & g_{52} & g_{53} & g_{54} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^i \\ \varepsilon_t^m \\ \varepsilon_t^{cpi} \\ \varepsilon_t^{ip} \\ \varepsilon_t^{cp} \end{bmatrix}$$

where a g_{ij} means that the coefficient is not constrained. The first line is a money supply equation modeled as a reaction function of the monetary authority, the second line is a standard money demand equation, the third and fourth lines encapsulate the hypothesis of price stickiness or adjustment cost. The fifth line is an arbitrage equation.

In the first scheme we normalize the shock to a 1 per cent increase in interest rates whereas when we use the second scheme the size of the shock is the commonly used one standard deviation.

In both schemes the last variable is the world export price in domestic currency, i.e. the product of the nominal exchange rate and the world export price in U.S. dollars. The inclusion of the last variable is motivated, in the VAR literature, by the need for some control for imported inflation or, more generally, to control for an endogenous increase in the interest rate. Since we are dealing with a very small open economy we will interpret the movements of this last variable, conditional on a monetary shock, as the movement of the nominal exchange rate. Both identification schemes allow nominal exchange rate to react immediately to the monetary shock, but only the second one assumes that monetary authorities look at the contemporaneous value of the exchange rate while choosing nominal interest rate. In order to avoid changes in the transmission mechanism of a monetary policy shock we would like to deal with economies for which the exchange rate arrangements do not change in the estimation period. Unfortunately, all the small open economies considered have modified the exchange rate regime in the sample period used for the estimates (see the Table 8).

This last consideration may cast some doubts on the plausibility of a stable linear model for AC3 countries. However, even if a model with stochastic regime switches might be more appropriate for transition economies, the estimates in this paper may be of some interest as they summarize relations in the data averaged over different states. Moreover, it is not completely clear how the exchange rate regime affects the transmission of a monetary shock in less industrialized economies (see for example Canova, 2003).

In all the systems we identify only a monetary shock. In all systems impulse response functions with a 48 month horizon after the shock are considered. Following a standard Montecarlo experiment, confidence bands at 68 per cent and 95 per cent significance level are plotted in all impulse response functions recovered with the first identification scheme. Confidence bands at 68 per cent significance level, calculated by means of a Bayesian Montecarlo experiment (Sims and Zha, 1999), are plotted for all estimates obtained using the second identification scheme. We use monthly data covering the period 1993-2002. Results are encouraging: despite the lack of financial development, for all the AC3, conditional on a monetary shock, macroeconomic variables display standard behaviour. In all the impulse responses recovered, following an increase in interest rates, industrial production declines and the exchange rate tends to appreciate. The price level declines when the second part of the 1990s is used as a sample period for estimation, while we get a significant price puzzle when we use the entire sample. This last result applies to the Czech Republic and Hungary, but not to Poland. Results for Poland are robust across sample periods as well as across identification schemes.

3.1.1 *Czech Republic*

For the Czech Republic three lags seem enough to capture the dynamics of the system. Using the entire sample (1993:01-2002:01) it is difficult to get a clear-cut dynamic response with a recursive or a non-recursive identification scheme. In particular, while industrial production and the exchange rate move in the expected direction (at a 68 per cent significance level) money does not move significantly and we get a counter-intuitive change in prices (see Figure 4). The increase in the price level following a contractionary monetary policy shock is called “price puzzle” in the literature. In this case, however, there might be an explanation. In the first part of the 1990s the price system in the Czech Republic was mostly based on administrative controls; those controls only gradually were removed and the price formation mechanism started to work as in a market economy. By the second part of the 1990s and the beginning of 2000, the Czech Republic had done most of the way to become a fully fledged market economy. Indeed, if we use the second part of the 1990s as a sample period (1997:07-2002:01, floating exchange rate regime), with the recursive identification scheme we get a very different picture from the one obtained using the entire sample. All variables move in the expected direction and almost all of them at a 95 per cent significance level (Figure 5).

After roughly a year industrial production reaches its negative peak, the nominal exchange rate appreciates at impact and the price puzzle disappears. The price level follows closely the movement of the monetary aggregate and both variables decrease significantly and reach a negative peak with only few months delay with respect to industrial production. The Czech Republic is the only country for which we were not able to recover clear-cut dynamic responses using the non-recursive identification scheme and therefore the impulse responses are not shown. In this experiment the exclusion of money from the variables in the VAR does not change the results significantly (see Figure 6). However caution is needed when estimating a system without a monetary aggregate since if we do not control for money we may find it difficult to disentangle the effects of a money supply shock from the effects of a money demand shock. Only the former should be interpreted as a monetary policy shock. We also tried to change the position of the last two variables in order to allow interest rates to be set by monetary authorities taking exchange rate movements into account (this identification may be motivated by the so called "fear of floating", see Calvo and Reinhart 2002) and results did not change significantly. The quick and sizeable response of the exchange rate (an appreciation close to 2 per cent during the first two quarters after the shock) may be due to the high elasticity of portfolio investment. Since we are dealing with a small open economy we assume that the shock has no impact on world export quantities. Therefore, two channels are operating at the same time: the interest rate channel (and through it the credit channel) and the exchange rate channel. An increase in the interest rate should depress economic activity through tighter credit conditions (limited participation model), while the increased interest rate attracts foreign funds and appreciates the currency. The nominal appreciation of the currency may depress the economy even more if, due to some stickiness, it affects the relative price of domestic and foreign goods. Overall, the shape of the dynamic responses of the Czech Republic, since the end of the 1990s, are strikingly similar to what we observed in more advanced economies such as the G-7.

3.1.2 *Hungary*

For Hungary four lags seem sufficient to capture the dynamics of the system. Point estimates are surrounded by considerable uncertainty, which enlarges confidence bands. When we use the entire sample the 95 per cent confidence bands easily include the zero line. If we look at the 68 per cent significance level we are confronted with more reasonable dynamics. At

impact, money and the exchange rate decrease, with both effects very short-lived; industrial production decreases (at 95 per cent significance level) and prices do not move (see Figure 7). Using the non-recursive identification scheme the results do not change drastically: all variables move (not significantly) in the correct direction (see Figure 8). In this case too, when using a subperiod that excludes the very first years of transition (1995:04-2002:01, a crawling peg exchange rate regime with few months with different regimes) we get much more clear-cut dynamic responses (see Figure 9). All variables move in the expected direction and besides money all movements are significant at every considered significance level. The effects on industrial production and the exchange rate are particularly strong: the former variable displays a negative peak of roughly 2.5 per cent, the latter appreciates by around 3.5 per cent. Prices and money decline significantly. Our results are independent of the identification scheme adopted (see Figure10) and excluding money do not impact on the signs of the responses (see Figure 11). However, when we exclude money we save some degrees of freedom and, with such a short time series, even this small increase in the degrees of freedom affects the precision of the estimates; in this case excluding money from the system reduces uncertainty. For Hungary as well we can conclude that is possible to recover standard responses when we exclude the first half of the 1990s.

3.1.3 *Poland*

For Poland we were not able to estimate an equation without serial correlation until we included the fifth lag. The impulse responses for Poland are surprisingly stable. Using the entire sample we get clear-cut dynamics, conditional on a monetary shock, for all variables (see Figure 12). Results are robust across identification schemes (see fig.13). Excluding money does not affect results (see fig.14). We estimate the system using different years as starting point (1993, 1994, 1995,1996) and results do not change significantly. While the responses are strikingly stable, the real effect of a monetary shock is small, i.e. industrial production declines significantly but the negative peak is around 1/4 and 1/3 of one percentage point. An explanation for this result is suggested by Bednarski and Osinski (2002). They argue that the weak transmission is due to two peculiarities of Poland's banking system: excess liquidity and unwillingness to cut credit when monetary policy is tightened. Excess liquidity is defined as high level of banks' holdings of central bank debt. The strong capital inflow made the commercial banks less dependent on the central bank. The unwillingness to

cut credit is mainly reflected in the utilization of securities as buffer stock. Due to the large holdings of securities, banks can reduce their accumulation instead of cutting credit following a contractionary monetary shock.

Table 9 shows the variance decomposition for the four main European economies, as estimated by Kim (1999), together with our estimates for the three AC countries. The table suggests that the contribution of the domestic monetary shock to output fluctuation, in the AC countries considered is in line with the four largest EU economies. The largest contribution is found in Hungary. The fact that the responses of the AC3 display a similarity with EU members is important because this signals the absence of a particularly strong asymmetry in the effects of monetary policy. Once those countries adopt the euro they will give up their monetary sovereignty and the exchange rate channel will weaken significantly. The optimum currency area literature suggests that the cost of giving up those instruments should be lower the higher the symmetry in response to a common shock. Since no strong evidence of asymmetry emerges in our exercise this would suggest that the cost of entering may be relatively low. A similar conclusion is reached in Frenkel and Nickel (2002), who analyse the differences in the effects of demand and supply shocks on EMU and AC countries.

4. Conclusions

The financial accounts of the three countries considered provide a picture of a private non-financial sector that is, not surprisingly, financially less mature than the EU average. The business sector covers a large portion of its financing needs with non-market instruments, such as trade credits and non-exchange-traded shares. In addition, a number of factors - probably related to both cost and availability - induce the business sector to denominate in foreign currency a large portion of the bank loans it receives, thus bearing a non-negligible exchange rate risk. Moreover the household sector is less sophisticated than its EU counterpart: the composition of its financial assets is tilted in favour of bank deposits whereas financial liabilities, such as consumer credit and mortgage loans, are still relatively small. Despite the lack of financial development, the econometric results suggest that the co-movement of macroeconomic variables in each of the AC countries, conditional on a domestic monetary shock, is not different from the standard behaviour we would expect, at least when we exclude the first years of the transition. In these three countries the impact of monetary policy on the exchange rate is always the expected one. Presumably this is due to a high elasticity of

portfolio investment to the interest rate differential. We find no evidence of counter-intuitive effects of a monetary policy shock in the AC3 economies. Following a 1 per cent increase in interest rates, in all the three countries considered industrial production declines persistently and significantly. The main caveat of our analysis is that the number of observations in our time series is very small and there might be a measurement error issue. We decided not to account explicitly for a measurement error because in our view from 1993 on the data quality for those countries should be more reliable, if not comparable with those of advanced economies. Even if some caution is required in interpreting our results, it is possible to argue that in the AC3 the contribution of monetary policy to business cycle fluctuations does not differ too much from that observed in current EU members.

Appendix: Data description

Financial accounts and currency composition of assets and liabilities

Data on (non-consolidated) financial assets and liabilities of each sector, which were used in Figures 1, 2 and 3 and Tables 1, 2, 5 and 6, were downloaded from the Cronos database of Eurostat. The data are stocks outstanding at end-2000 for Hungary and Poland, end-1999 for the Czech Republic. The EU average is calculated with 12 countries, i.e. all members as of 2003 except for Greece, Ireland and Luxembourg.

The currency composition of assets and liabilities of banks, households and firms (Tables 3, 4 and 7) was calculated by combining national sources and BIS data.

Czech Republic: website of the Czech National Bank, statistical database, table "*Monthly asset and liability statement - commercial banks*"

Hungary: website of the central bank, statistical database, Table S.122 "*Aggregate balance-sheet of other monetary financial institutions*"

Poland: National Bank of Poland, "*Summary evaluation of the financial situation of Polish banks - First half 2002*", Table 14.

BIS data are published in the "BIS Quarterly Review", Tables 6A "*External positions of reporting banks vis-à-vis individual countries; vis-à-vis all sectors*" and 6B "*External positions of reporting banks vis-à-vis individual countries; vis-à-vis non-banks*"

Most data series used for the econometric estimates were obtained from the IMF's *International financial statistics*, as follows:

Industrial Production

Czech Republic: 935..66; Hungary: 944..66; Poland; POIPTOT.H (*Datastream*)

Consumer Prices

Czech Republic: 935..64; Hungary: 944..64; Poland: 964..64

Interest Rate

Czech Republic: 935..60b; Hungary: 944..60; Poland: 964..60b

Monetary aggregates

Czech Republic: 93535..; Hungary: HNM3....A; Poland: 96435..

Exchange Rate

Czech Republic: 935..rf; Hungary: 944..rf; Poland: 964..rf

World export commodity price

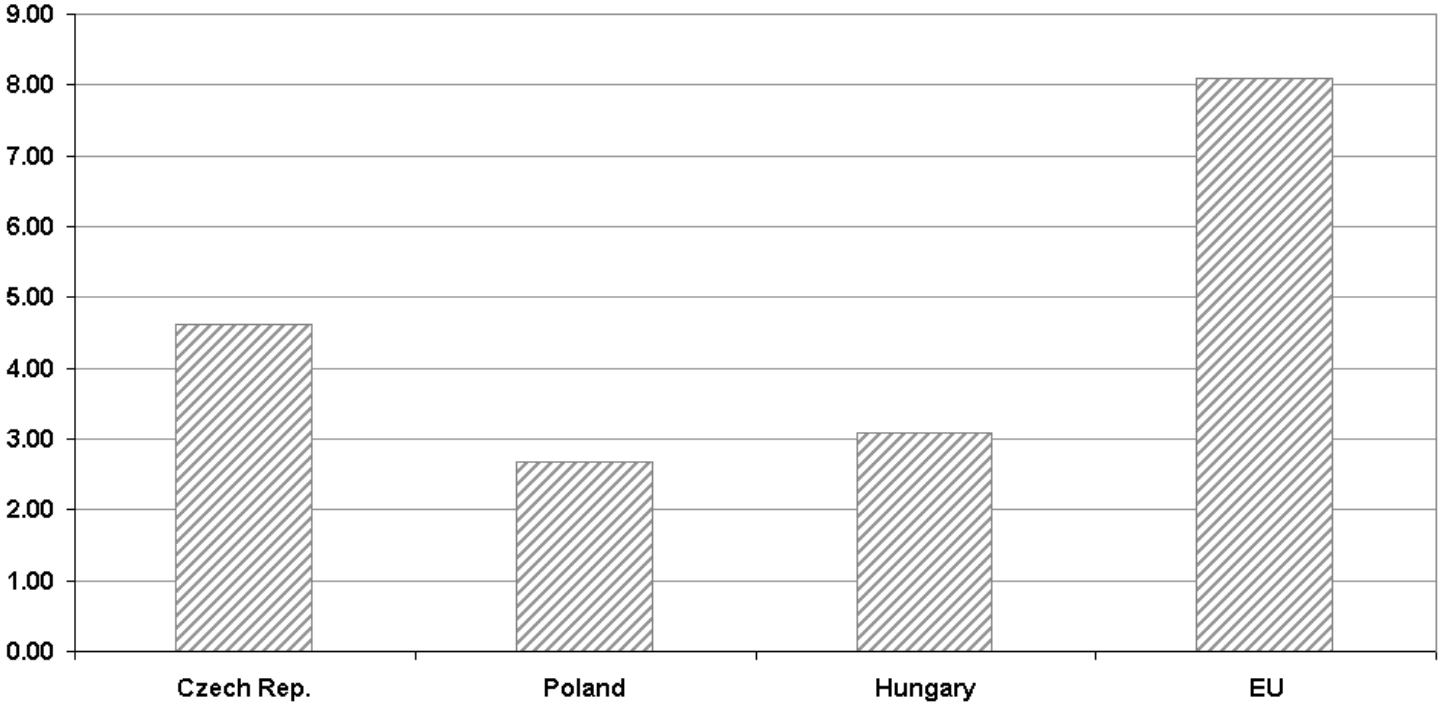
00176axd

World export commodity price in terms of domestic currency

This variable is constructed by multiplying the exchange rate (defined as the amount of domestic currency needed per U.S. dollar) and the world commodity price in U.S. dollars.

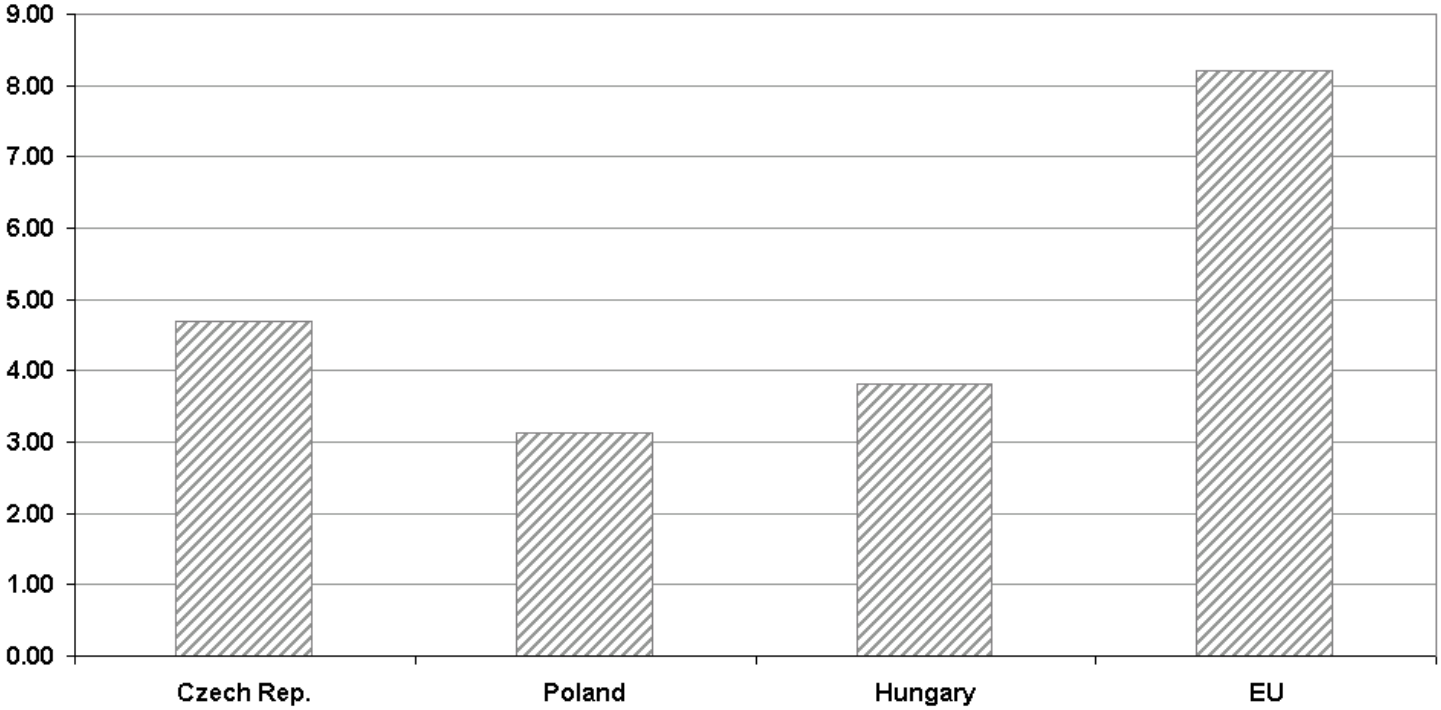
Figures and tables

Figure 1.1: Ratio of financial assets to GDP in 2000 (1)



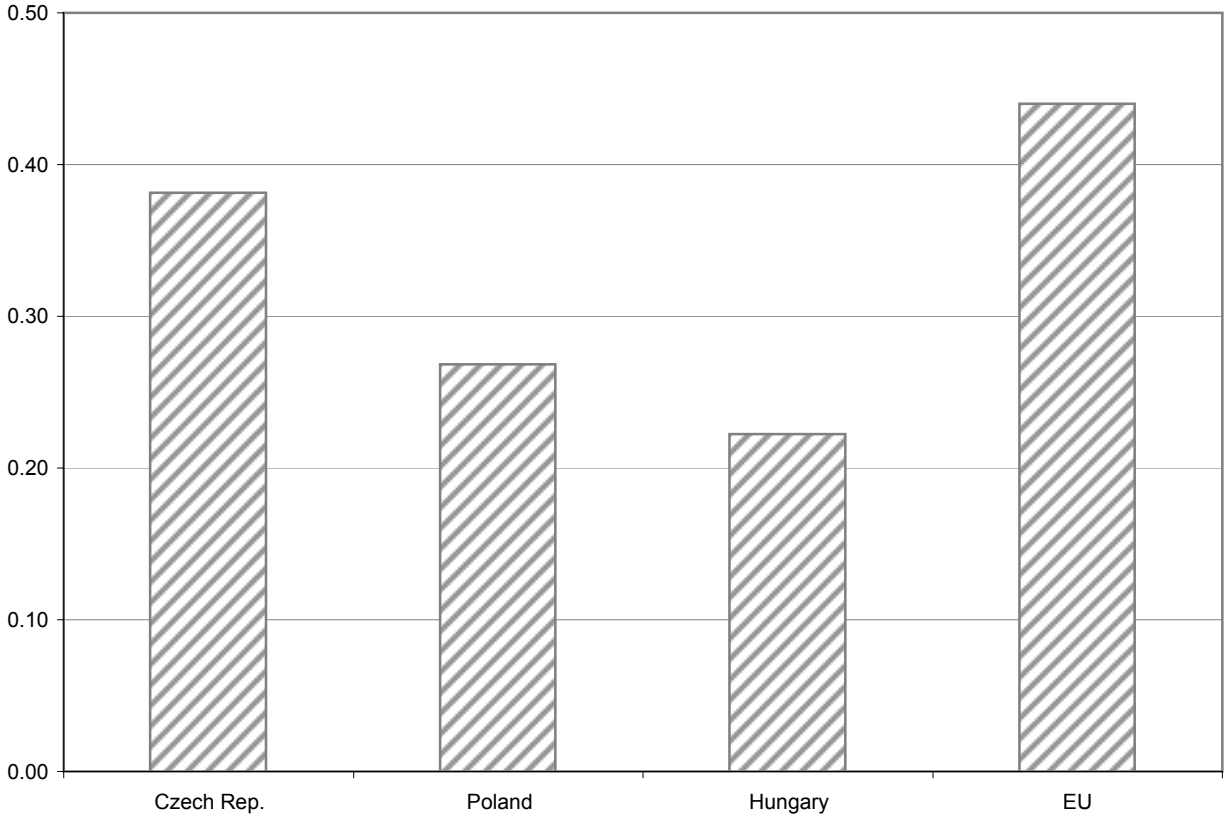
Source: Eurostat. (1) For the Czech Republic, data refer to 1999.

Figure 1.2: Ratio of financial liabilities to GDP in 2000 (1)



Source: Eurostat. (1) For the Czech Republic, data refer to 1999.

Figure 2: Financial intermediation ratio in 2000[(1)]



Source: Eurostat. (1) Ratio of financial assets held by monetary financial institutions to financial assets held by all non-financial sectors and the rest of the world. For the Czech Republic, data refer to 1999.

Figure 3.1: Ratio of foreign assets to GDP in 2000[1]

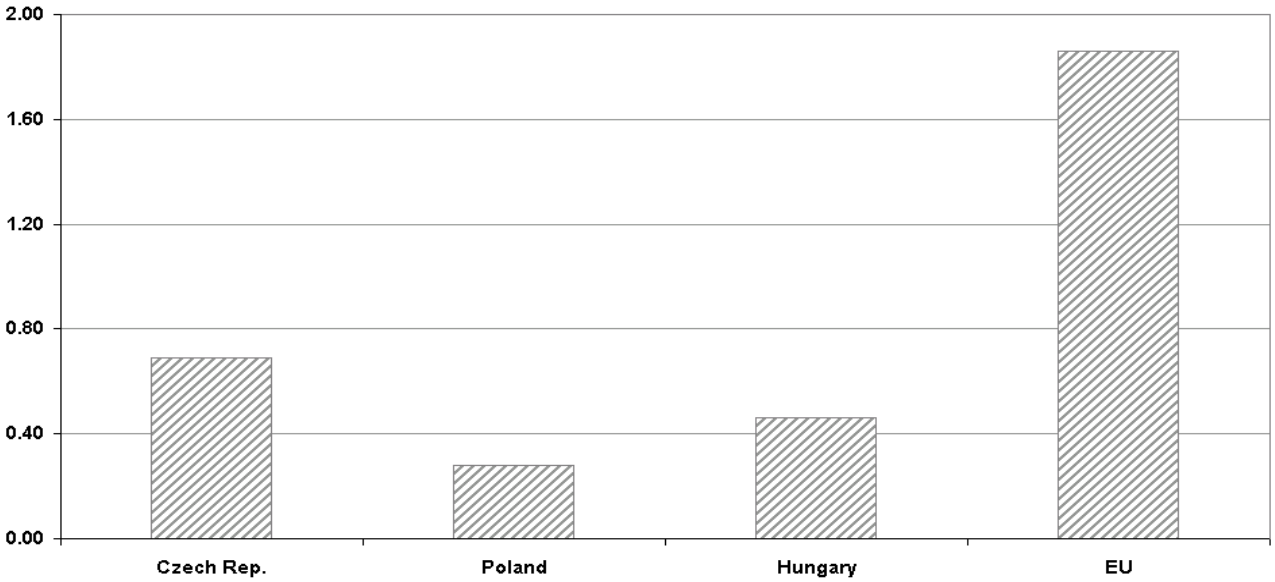


Figure 3.2: Ratio of foreign liabilities to GDP in 2000[1]

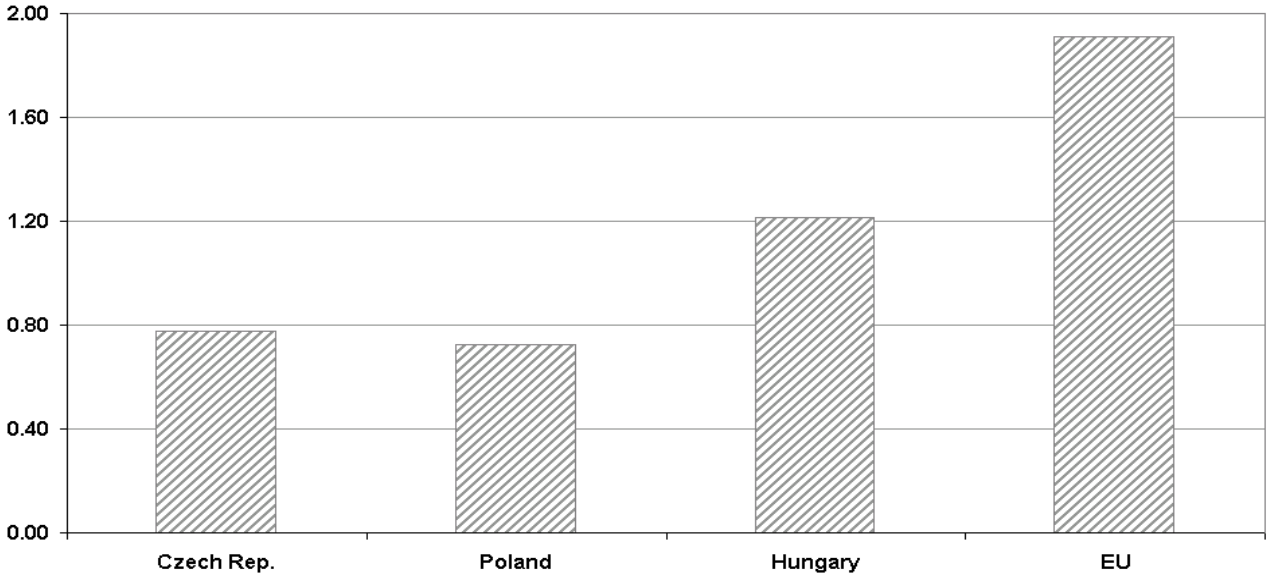
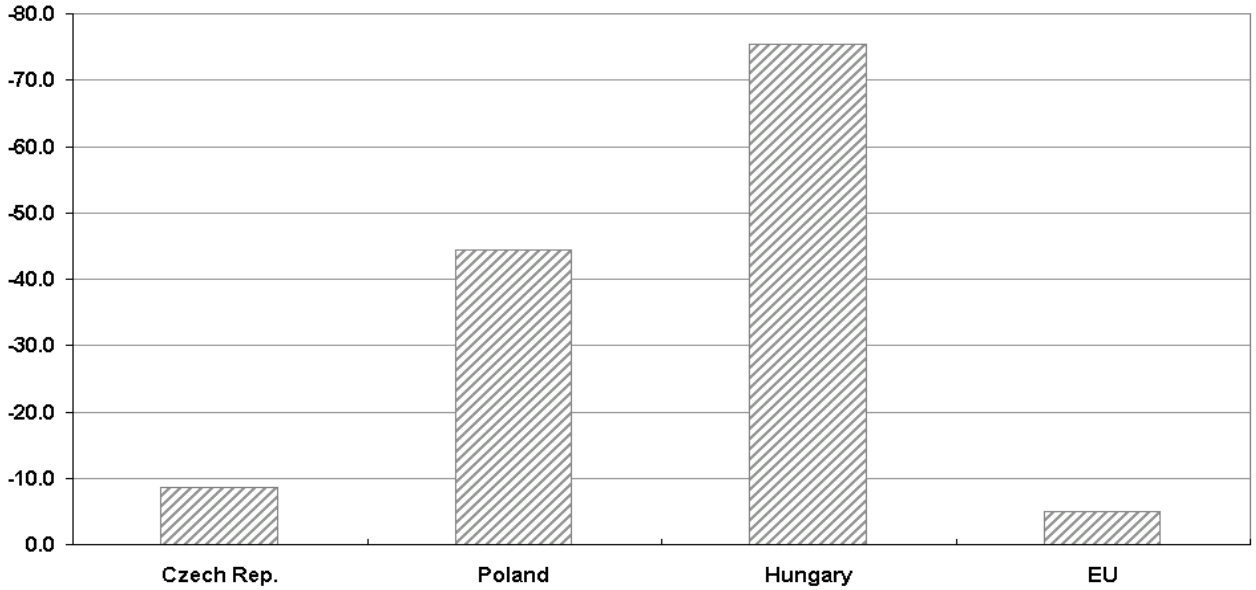


Figure 3.3: Net foreign assets as a percentage of GDP in 2000[1]



Source: Eurostat. (1) For the Czech Republic, data refer to 1999.

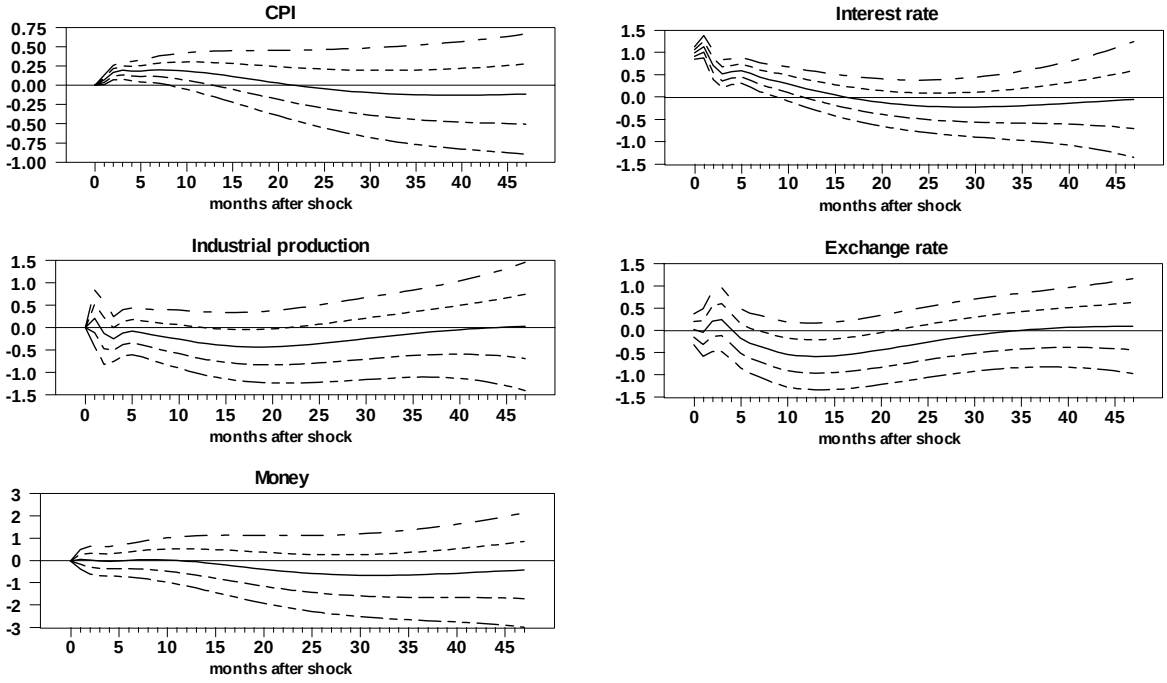


Figure 4: Recursive identification scheme, sample period 1993:01-2002:01.

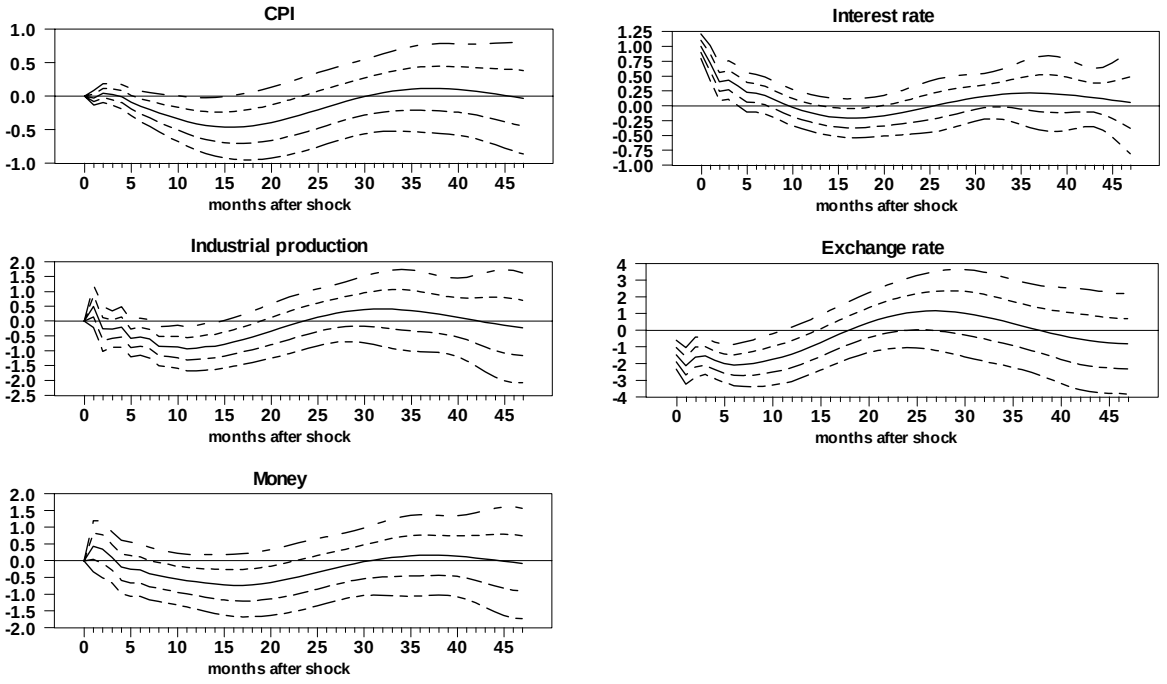


Figure 5: Recursive identification scheme, sample period 1997:07-2002:01.

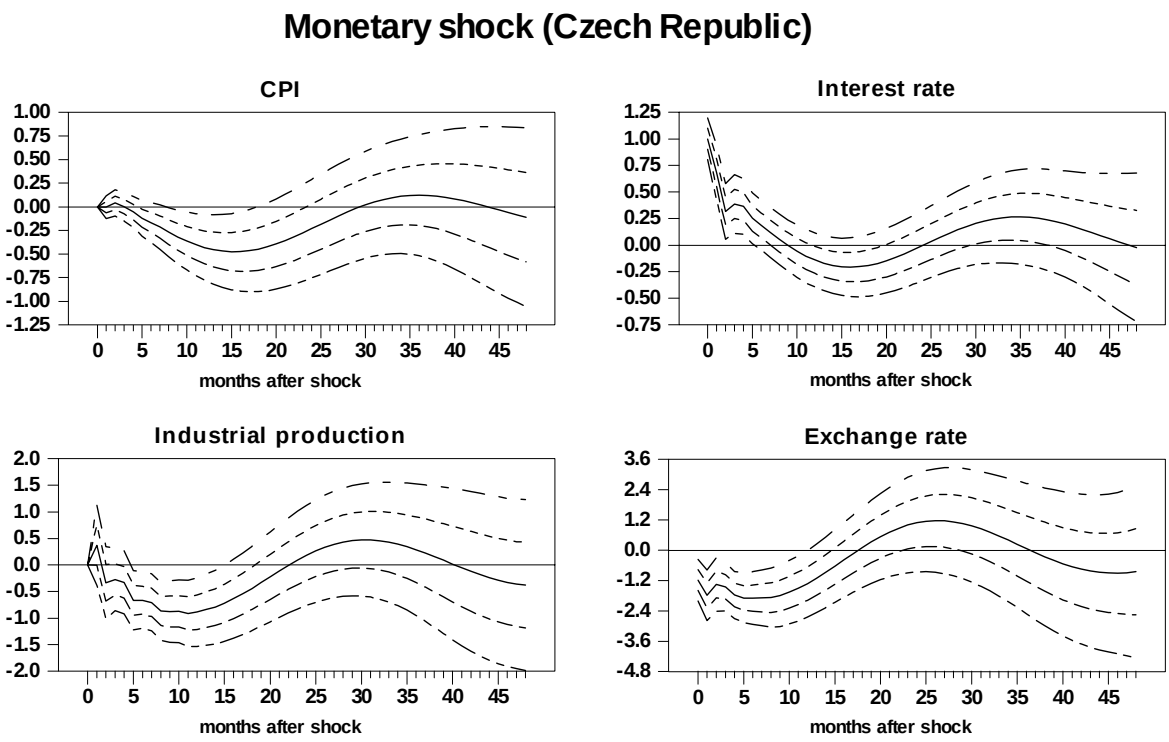


Figure 6: Recursive identification scheme, sample period 1997:07-2002:01, without money.

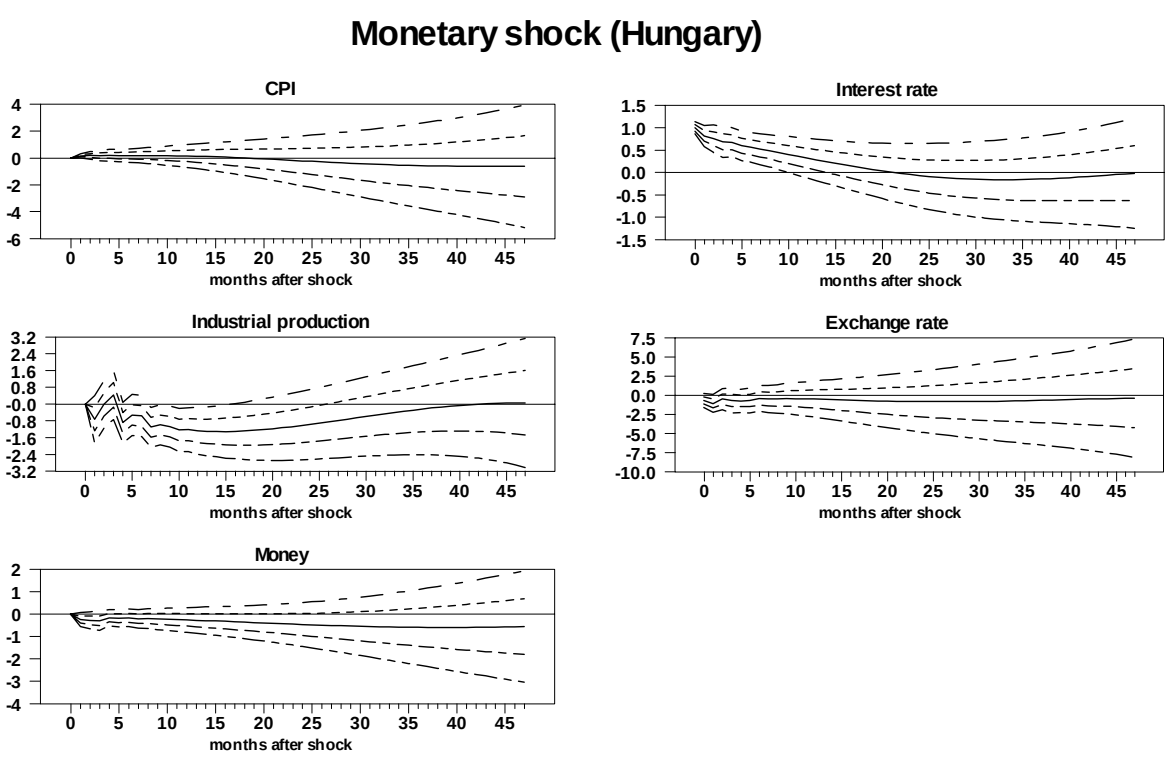


Figure 7: Recursive identification scheme, sample period 1993:01-2002:01.

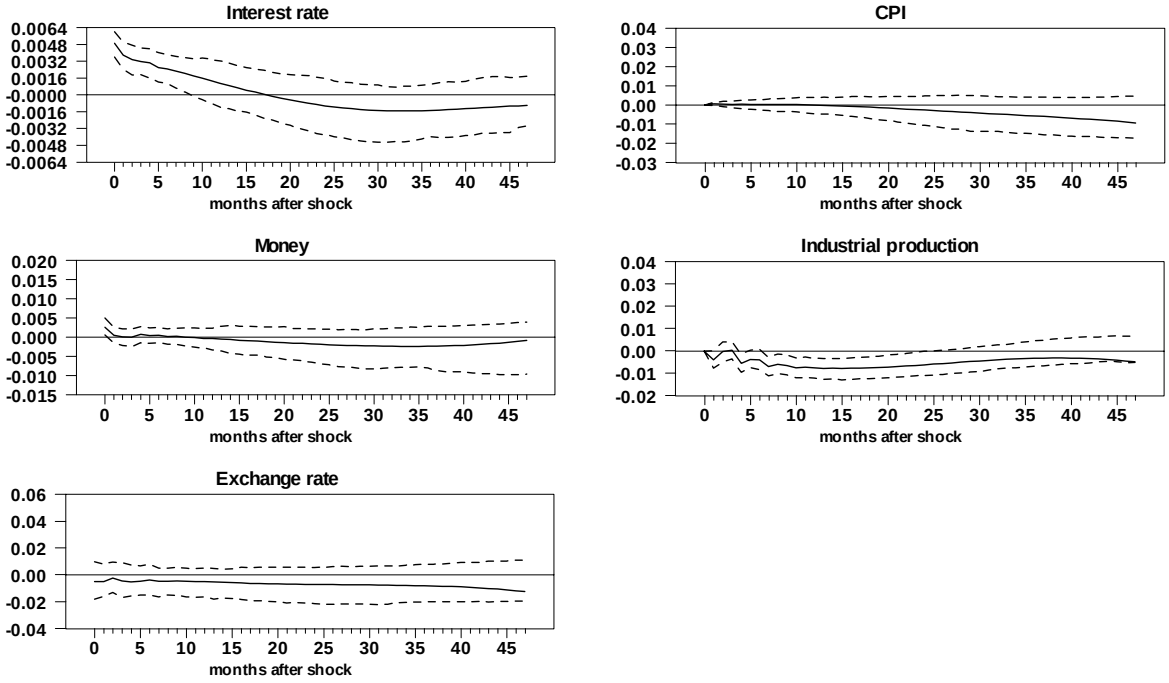


Figure 8: Non-recursive identification scheme, sample period 1993:01-2002:01.

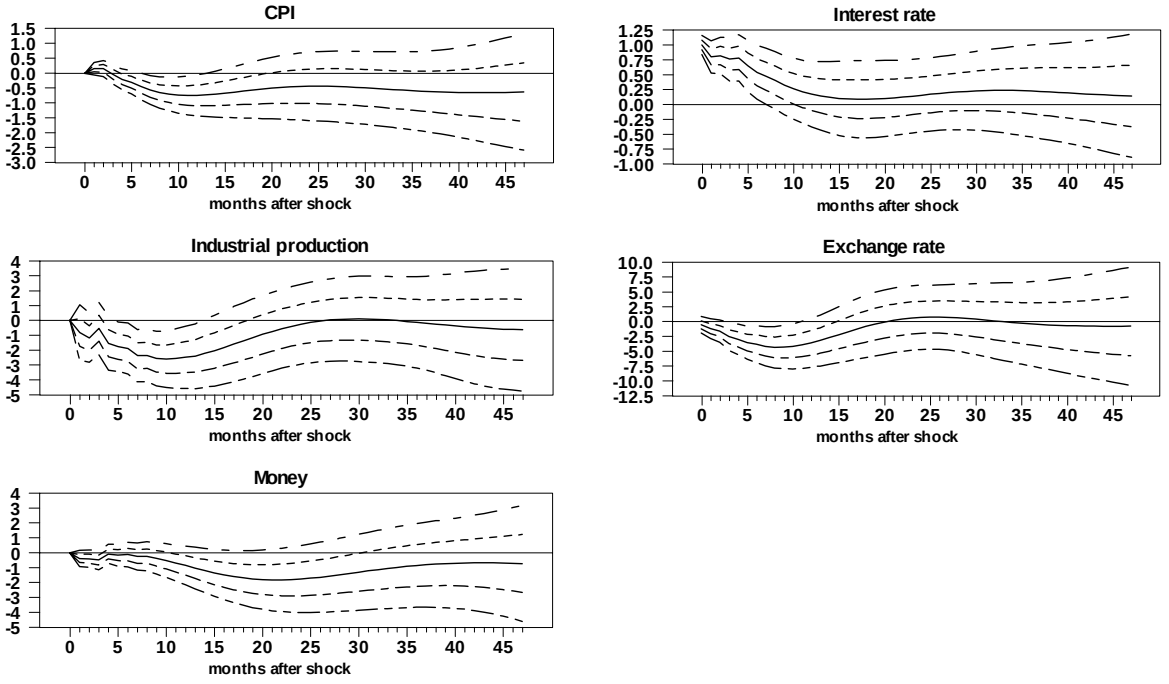


Figure 9: Recursive identification scheme, sample period 1995:04-2002:01.

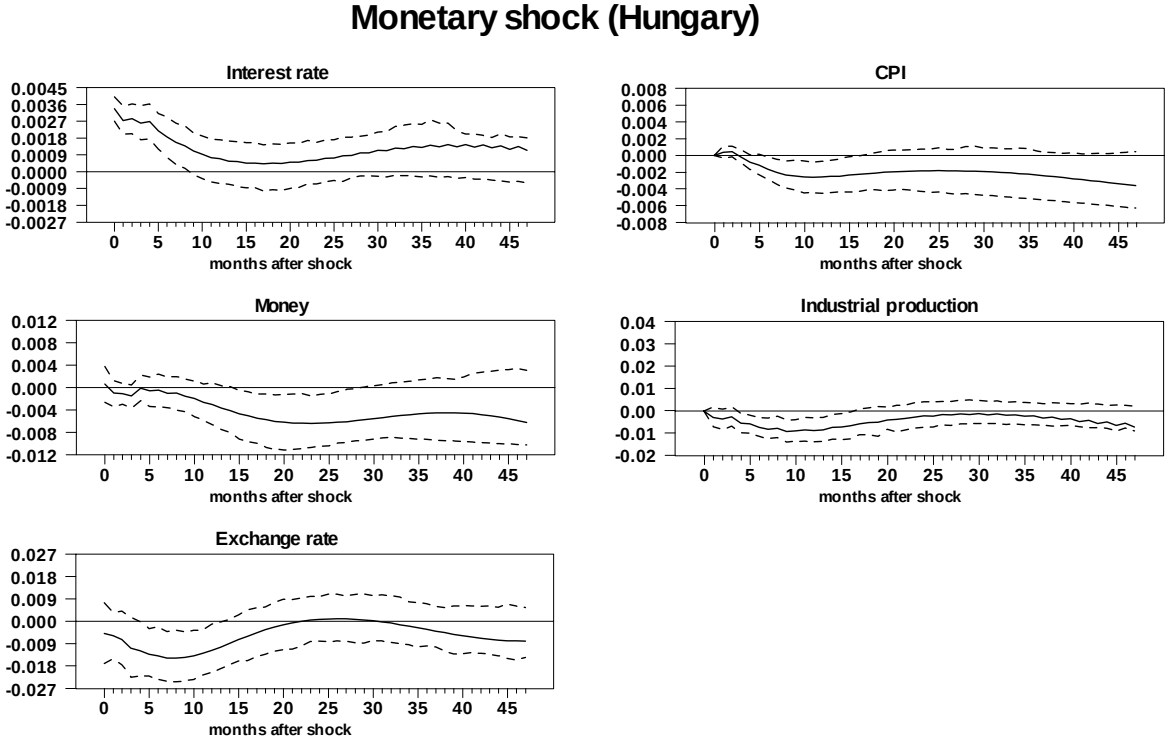


Figure 10: Non-recursive identification scheme, sample period 1995:04-2002:01.

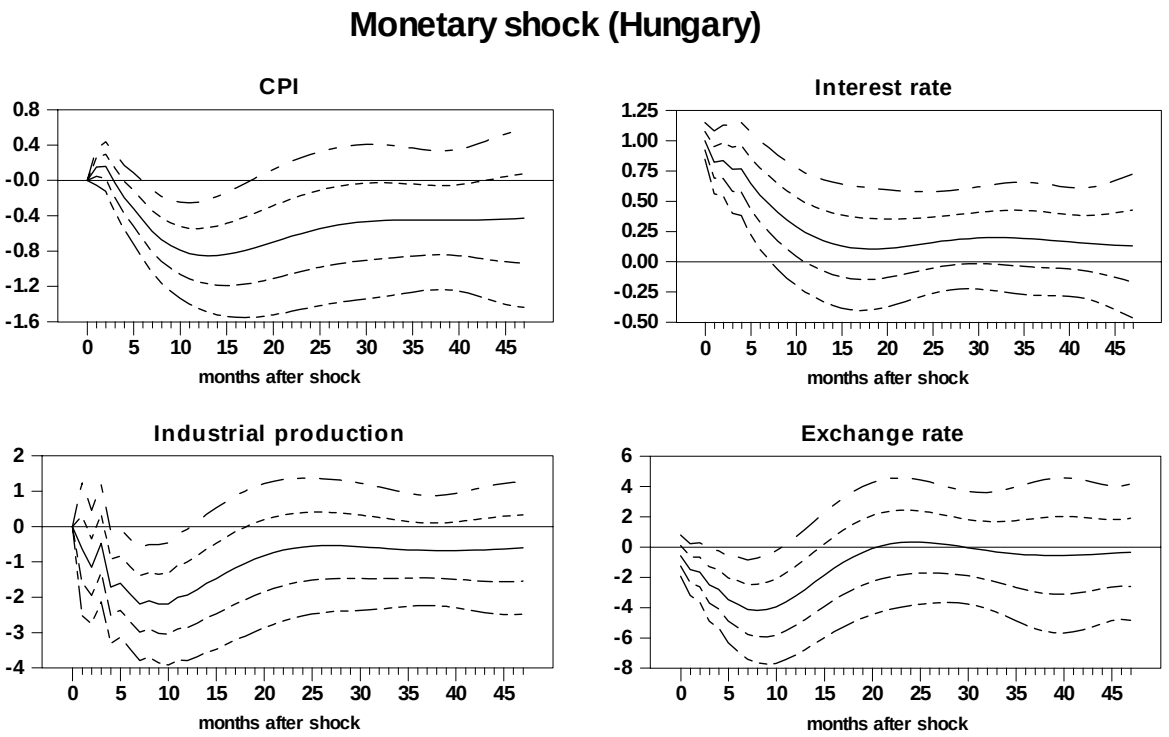


Figure 11: Recursive identification scheme, sample period 1993:01-2002:01, without money.

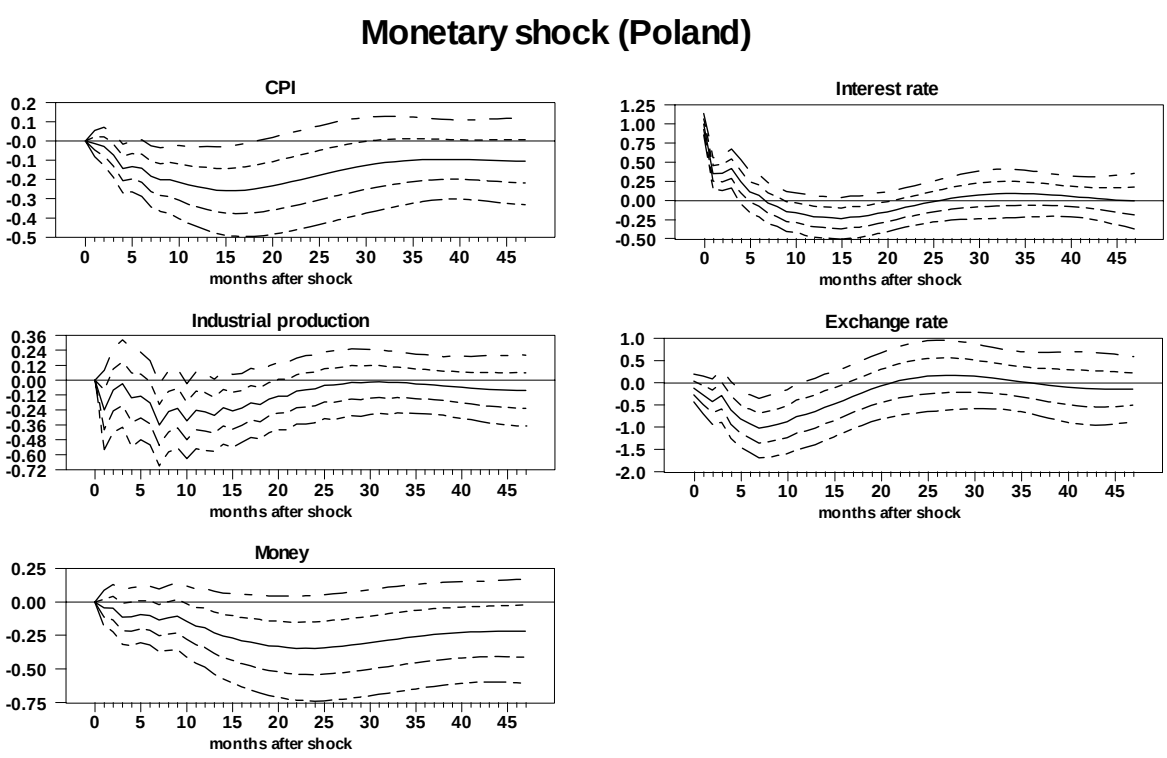


Figure 12: Recursive identification scheme, sample period 1993:01-2002:01.

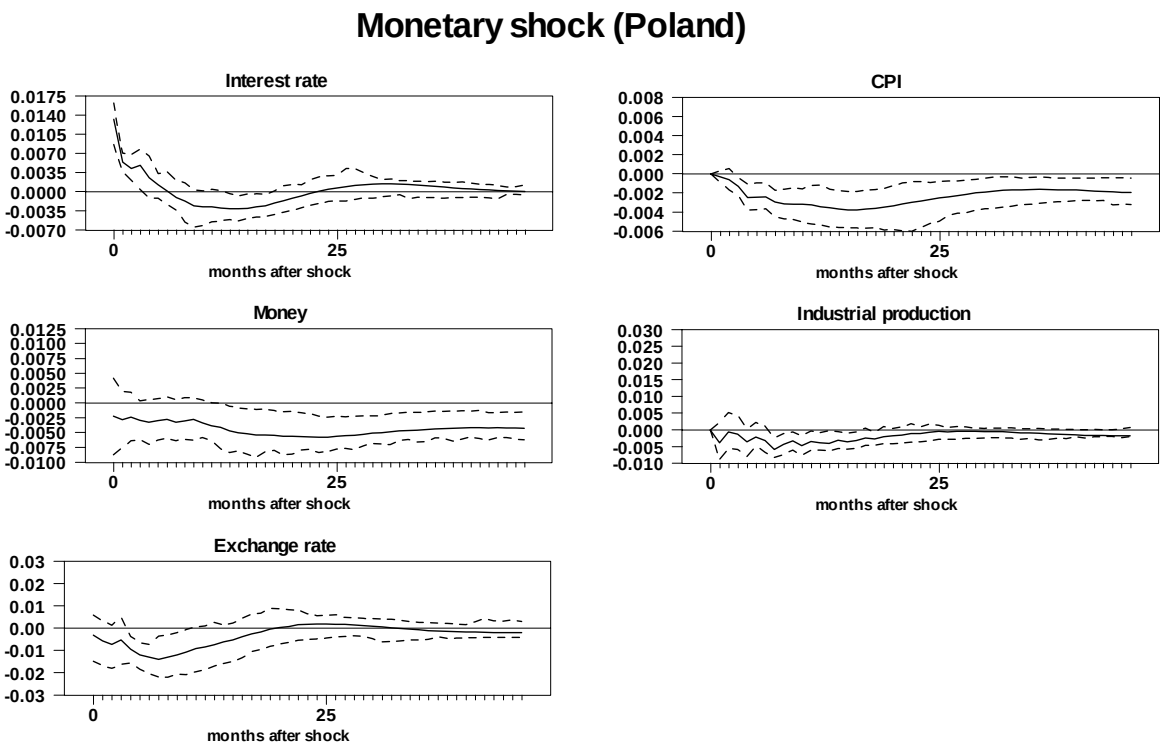


Figure 13: Non-recursive identification scheme, sample period 1993:01-2002:01.

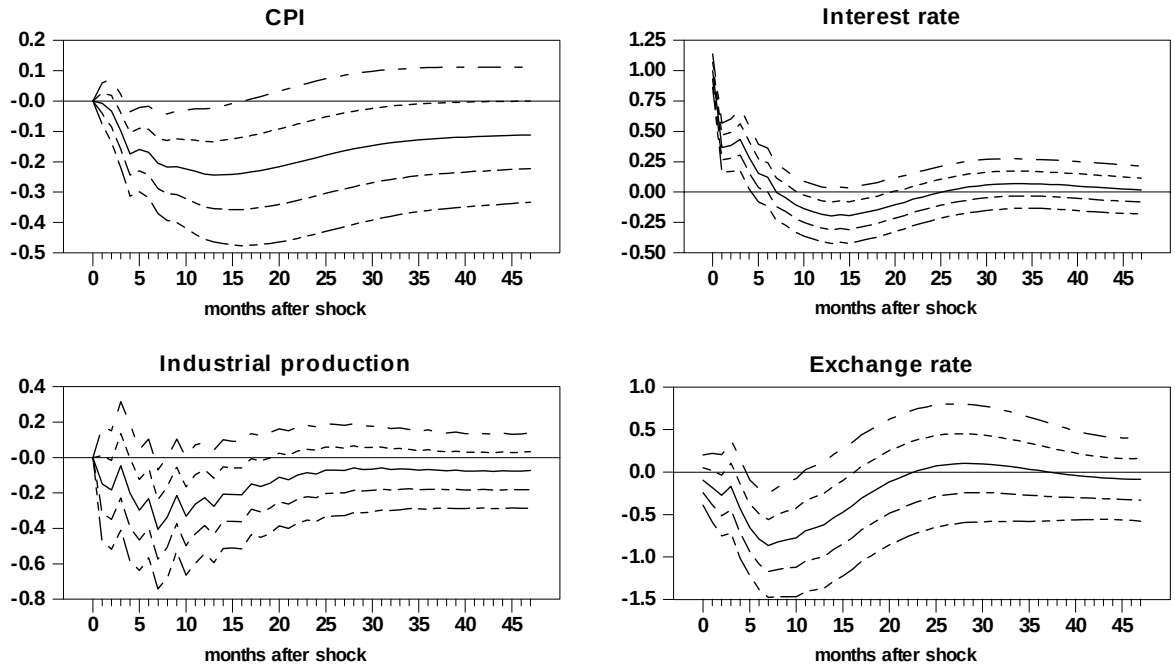


Figure 14: Recursive identification scheme, sample period 1993:01-2002:01, without money.

Table 1: Breakdown of corporate financial liabilities by instrument [(1)] (end 2000)

	Czech Rep.	Poland	Hungary	EU
Securities	1.9	2.5	0.4	3.8
Loans	27.2	19.2	34.0	24.8
Shares	39.5	42.9	56.1	60.6
Corporate pension funds	0.0	0.0	0.0	1.1
Other accounts	31.5	35.4	9.5	9.6
Total	100.0	100.0	100.0	100.0

Source: Eurostat.
(1) For the Czech Republic, data refer to 1999.

Table 2: Corporate liabilities as a percentage of GDP [(1)] (end 2000)

	Czech Rep.	Poland	Hungary	EU
Securities (A)	4.3	4.0	0.7	80
Loans (B)	62.5	30.9	62.4	
Shares and other equity (C)	90.9	69.1	102.7	160
Financial leverage (ratio of A+B to C)	0.73	0.51	0.60	0.50

Source: Eurostat.
(1) For the Czech Republic, data refer to 1999.

Table 3.1: Corporate exposure to exchange rate risk [1]
(percentage share of foreign currency deposits and loans; end 2002)

	Share of FX deposits	Share of FX loans
Czech Rep.	n.a.	27.2%
Hungary	25.3%	56.0%
Poland	28.2%	50.6%

Source: Own calculations on Central banks statistics.
(1) The share of FX deposits and loans is calculated taking into account also deposits and loans with non resident banks, reported by the BIS. For Poland, end June.

Table 3.2: Corporate net foreign currency position as a ratio to GDP [1] (end 2002)

	Net FX position
Czech Rep. (2)	-11.2%
Hungary	-16.6%
Poland	-9.2%

Source: Own calculations on Central banks statistics.

(1) The net foreign currency position is calculated as a difference between foreign exchange assets and liabilities. Assets/liabilities held abroad are taken from the BIS. For Poland, data refer to end June 2002.
(2) Data on foreign currency assets held domestically were not available.

Table 4.1: Currency mismatch of banks in 2002 (1)
(percentage shares of foreign currency assets and loans)

	Share of FX assets	Share of FX liabilities
Czech Rep.	16.1%	15.2%
Hungary	29.0%	26.8%
Poland (2)	24.6%	18.8%

Sources: Own calculations based on Central bank statistics; BIS
(1) For Poland, end June 2002.
(2) Foreign currency assets and liabilities of banks in Poland were calculated by adding up data from the central bank with those published by the BIS on international bankig.

Table 4.2: Banks' net external position (1) as a ratio to GDP
(September 2002)

	Net external position
Czech Rep.	+ 6%
Hungary	- 9%
Poland	+ 3%

Source: BIS Quarterly Review, March 2002.
(1) Difference between claims and liabilities vis-à-vis non resident banks (only these reporting to the BIS).

Table 5: Households' financial assets [1]
(end 2000; as a percentage share of total and, in bold, of GDP)

	Czech Rep.		Poland		Hungary		EU	
Deposits	59.7	***50***	61.0	***33***	44.8	***31***	26.2	***61***
Securities	0.3	***0***	0.9	***1***	9.3	***7***	6.7	***16***
Loans	0.0	***0***	0.0	***0***	0.0	***0***	0.2	***1***
Shares and mutual funds	24.9	***21***	24.1	***13***	34.9	***24***	33.5	***78***
Insurance reserves	7.8	***6***	6.2	***3***	9.4	***7***	31.4	***73***
Other Accounts	7.3	***6***	7.8	***4***	1.5	***1***	2.0	***5***
Total	100.0	***83***	100.0	***55***	100.0	***70***	100.0	***232***

Source: Eurostat.
(1) For the Czech Republic, data refer to 1999.

Table 6: Households' liabilities [1]
(end 2000; as a percentage share of total and, in bold, of GDP)

	Czech Rep.		Poland		Hungary		EU	
Loans	43.9	***8***	86.2	***8***	99.6	***6***	91.7	***60***
Short t.	3.6	***1***	28.9	***3***	13.0	***1***	-	-
Medium to long t.	40.3	***7***	57.4	***5***	86.6	***5***	-	-
Other accounts	56.1	***10***	13.5	***1***	0.2	***0***	7.6	***n.a***
Residual items	0.0	***0***	0.2	***0***	0.2	***0***	0.7	***n.a***
Total	100.0	***18***	100.0	***9***	100.0	***6***	100.0	***n.a***

Source: Eurostat.
(1) For the Czech Republic, data refer to 1999.

Table 7.1: Households exposure to exchange rate risk in 2002
(percentage share of foreign currency deposits and loans)

	Share of FX deposits	Share of FX loans/mortgages
Czech Rep.	10.3%	n.a.
Hungary	15.7%	2.5%
Poland	19.5%	29.0%

Source: Own calculations on Central banks statistics.

Table 7.2: Households net foreign currency position as a ratio to GDP [(1)]
(September 2002)

	Net FX position
Czech Rep. (2)	+7.6%
Hungary	+5.1%
Poland	+5.7%

Source: Own calculations on Central banks statistics.

(1) The net foreign currency position is calculated as a difference between foreign exchange assets and liabilities. Assets/liabilities held abroad are taken from the BIS.
(2) Data on foreign currency liabilities were not available.

Table 8: Chronology of exchange rate regimes

Czech Rep.	1993:01-1997:05 Fixed
	1997:06-2002:01 Floating
Hungary	1993:01-1995:03 Adjustable peg
	1995:04-2001:04 Crawling peg (± 2.25)
	2001:05-2001:09 Crawling band
	2001:10-2002:01 Fixed (± 15)
Poland	1995:05-2000:03 Crawling band
	2000:04-2002:01 Floating

Table 9: Variance decomposition of industrial production due to monetary policy shocks [(1)]

Step	Ger.	U.K.	Fr.	It.	Cz.Rep.	Hun.	Pol.
6	9.3 (4.0)	10.1 (3.9)	6.2 (3.3)	4.3 (3.0)	10.9 (6.1)	3.4 (5.3)	5.7 (4.8)
12	17.9 (6.6)	15.3 (6.1)	13.9 (6.6)	7.1 (4.4)	12.6 (6.7)	10.1 (10.0)	6.2 (5.2)
24	23.1 (8.5)	11.6 (6.3)	17.7 (9.9)	8.9 (5.2)	12.4 (7.8)	18.7 (14.0)	5.8 (5.6)
36	22.5 (8.6)	9.8 (5.5)	5.6 (9.4)	8.6 (4.8)	11.9 (8.5)	21.7 (14.8)	5.7 (5.9)
48	20.4 (8.0)	10.1 (5.9)	14 (8.9)	8.6 (4.8)	10.8 (9.0)	22.3 (14.7)	5.7 (6.2)

(1) The numbers in brackets are standard errors. For the four largest European economies estimates are borrowed from Kim (1999), for the AC3 we use the period 1997:07-2002:01 for Czech Republic; the period 1995:04-2002:01 for Hungary; the period 1993:01-2002:01 for Poland. Significance levels are obtained by Montecarlo simulation.

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