Exchange Rates and Long-Term Interest Rates in Central Europe:
How Do Monetary and Fiscal Policy Affect Them?[1])

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1 Introduction

Against the background of the future integration of Central and Eastern European accession countries into the euro area (which includes membership in ERM II), the issue of the consistency of monetary and fiscal policies in an environment of increasingly liberalized capital flows will play an ever more important role. However, in order to pursue such consistent policies, macroeconomic policymakers require information about the likely impact of their actions on financial as well as real variables. By analyzing the impact of monetary and fiscal policy impulses in the Czech Republic, Hungary and Poland under floating exchange rate regimes as well as under crawling peg/band regimes, this paper attempts to provide such information.

After a review of empirical investigations of monetary and fiscal policy which apply vector autoregression (VAR) techniques in section 2, section 3 provides on overview of the macroeconomic framework in the three Central European accession countries (CEEC-3) covered by this study. In section 4, three country-specific unrestricted VAR models are estimated and used to examine the impact of central government budget balances and money market interest rate differences between CEECs and a reference country/currency basket on exchange rates (gross official reserves for the exchange rate peg case) and yield differences for five-year bonds. For the Czech Republic and Poland, the most recent monthly data since the introduction of the direct inflation targeting/ floating rate regime were used. The Hungarian estimates are based on the May 1997 to April 2001 interval from the crawling peg/narrow band era. Finally, the concluding section summarizes the results and draws conclusions.

2 Literature Review

The empirical vector autoregression (VAR) literature on the measurement of the impact of monetary and fiscal policy on macroeconomic and financial variables is fairly extensive for developed market economies, but very limited for emerging market and transition economies. Generally, empirical investigations for developed market economies focus on the effects of either monetary policy or fiscal policy, but mostly do not address both policies in more detail.

VAR analyses of monetary policy in the closed economy context have been successful in resolving a number of empirical puzzles and have produced consistent empirical results, which are now confronted with existing theories of the monetary transmission mechanism. The open economy literature, however, has so far been unable to produce generally accepted solutions to a number of empirical puzzles.

In closed economy analyses, the "liquidity puzzle" (the positive reaction of interest rates to an expansionary shock to monetary aggregates) and the "price puzzle" (the positive reaction of the price level to a contractionary monetary

policy shock) have been explained and solved by focusing on the market for bank reserves rather than on broader monetary aggregates to extract monetary policy shocks, and by the inclusion of the commodity price index as a leading indicator of inflation in VAR models.

In the open economy literature, the emergence of the "forward discount premium puzzle" for the United States (i.e. following a restrictive monetary policy move in the United States, the U.S. dollar persistently appreciates and the response of the U.S. interest rate is persistently higher than that of the foreign interest rate) and of the "exchange rate puzzle" (i.e. a restrictive monetary policy shock in countries other than the U.S.A. causes the foreign currency to depreciate against the U.S. dollar) has not yet found a generally accepted explanation.

McCallum (1994) suggests that some of these puzzles could be due to the incapability of VAR models to distinguish exogenous monetary policy shocks from the endogenous reaction of monetary authorities to changes in exchange rates in open economies. This comment stimulated the production of a number of papers that attempt to overcome the potential identification problem in structural VAR monetary policy models that would arise from the simultaneous feedback between interest rates and the exchange rate. Notable examples include Kim and Roubini (2000) and Smets (1996, 1997).

While these papers were able to resolve the empirical puzzles mentioned above, Bagliano, Favero and Franco (1999) criticize Kim and Roubini's (2000) approach for potential parameter instability arising from different monetary policy regimes in the sample and for reintroducing broad monetary aggregates in their model. A drawback in Smets' (1996, 1997) work is seen in the neglect of the commodity price index. In Bagliano, Favero and Franco's (1999) model, the identification problem is solved by using information extracted from financial markets independently from the VAR to measure monetary policy shocks, but the authors conclude that the potential simultaneity between exchange rates and interest rates is not an empirically relevant problem in the case of Germany. As these results suggest that the simultaneity between interest rates and exchange rates may be a less serious econometric issue than thought, this paper does not address that issue explicitly. Moreover, I did not consider the alternative of imposing too much structure on a transition economy by means of identification procedures very appealing.

The VAR literature that deals with fiscal policy shocks in developed market economies generally aims at investigating the impact of fiscal shocks on GDP or particular aggregated demand components. For this purpose, quarterly or annual data are employed. Recent examples include Blanchard and Perotti (1999), Mountford and Uhlig (2002) or Fatas and Mihov (2001). Van Aarle, Garretsen and Gobbin (2002) provide one of the rare examples from among the VAR literature that integrates the empirical analysis of monetary and fiscal policy shocks.

This paper deviates from the VAR literature for developed market economies in a number of ways. First, it aims at investigating the impact of monetary and fiscal policy on exchange rates and bond yields, i.e. it differs from the majority of studies mentioned above because of its consideration of both policies. Moreover, the impact on financial variables (exchange rates and bond

yields) is analyzed, rather than the resulting impact on the real economy. Next, it employs monthly data, which is partly dictated by the constraints of data availability for transition economies, but has a number of advantages for the aim of this paper. As economic agents are able to form expectations regarding the outcome of annual or quarterly budget results well ahead of the release of new data, the timing of the impact of these data on exchange rates and bond yields is highly uncertain. Monthly budget data are more likely to have an immediate impact on financial variables, as their information content is probably higher. Moreover, the problem of endogenous interest rate reactions by central banks in response to changes in the exchange rate is presumably less relevant for monthly data, as central banks that do not have an explicit exchange rate target are unlikely to react immediately to short-term fluctuations in exchange rates.

For a small, open economy in a catching-up process, the impact of fiscal and monetary policy impulses is of particular relevance for preserving macroeconomic stability. In an environment of high capital import needs and rather high sensitivity of the economy with respect to exchange rate fluctuations, inconsistencies in the macroeconomic policy mix are likely to have strong effects. Agenor, McDermott and Ucer (1997) analyze the interaction of fiscal imbalances, capital inflows and the real exchange rate for the Turkish case. Their findings challenge the view that capital inflows "cause" the real exchange rate to appreciate. Rather, capital inflows and movements in the real exchange rate seem to respond endogenously to macroeconomic equilibrium conditions and the overall policy stance. The aim of this paper is closely related to that in the study cited above, as it also investigates the impact of macroeconomic policies on financial variables.

3 The Macroeconomic Policy Framework

3.1 Exchange Rate Policy

The monetary policy framework in all three countries underwent considerable changes in the course of economic transition (see table 1). Backé (1999) provides an excellent review of the evolution of exchange rate regimes in Central and Eastern Europe in the course of transition and the run-up to EMU. As a general trend, the CEEC-3 opted for exchange rate-based stabilization policies in the early phase of transition, but recently switched to a direct inflation targeting/managed float framework. Against the backgound of increasingly liberalized capital flows, CEEC-3 central banks felt they were in a better position to achieve their disinflation goals with a greater degree of monetary autonomy and exchange rate flexibility.

However, country-specific factors determined the changes in the exchange rate policy strategy to a large degree. After having widened the fluctuation band for the koruna in 1996 under the Czech koruna's fixed peg versus a DEM/USD basket, the central bank had to abandon the koruna's fixed peg altogether in 1997, when the currency came under severe pressure in the course of the Asian crisis. Thus, the search for a new nominal anchor was the main motivation for the new monetary regime in the Czech Republic (see Ettl and Krzak, 1999, for more details on this subject). By now, the Czech Republic has gained the longest experience with a floating exchange rate system. At the beginning of 2002, a change in the conduct of exchange rate policy of relevance for the empirical

Table 1

Exchange Rate Regimes in the CEEC-3, 1995–2002

Date	Regime	Band %	Monthly Devaluation	Basket
Czech Republic				
Since January 1993	Fixed	±0.5	no	DEM 65, USD 35
February 1996	Fixed	±7.5	no	–
May 27, 1997	Floating	no	no	no
Poland				
Since May 1995	Crawling band	±7	1.20	USD 45, DEM 35, GBP 10, FRF 5, CHF %
December 1995	6% revaluation	–	–	–
January 1996	–	–	1.00	–
February 26, 1998	–	±10	0.80	–
July 17, 1998	–	–	0.65	–
September 10, 1998	–	–	0.50	–
October 28, 1998	–	±12.5	–	–
January 1, 1999	–	–	–	EUR 55, USD 45
March 25, 1999	–	±15	0.30	–
April 12, 2000	Floating	no	no	no
Hungary				
Since March 16, 1995	Crawling peg	±2.25	1.90	USD 30, ECU 70
June 29, 1995	–	–	1.30	–
January 2, 1996	–	–	1.20	–
January 1, 1997	–	–	–	USD 30, DEM 70
April 1, 1997	–	–	1.10	–
August 15, 1997	–	–	1.00	–
January 1, 1998	–	–	0.90	–
June 15, 1998	–	–	0.80	–
October 1, 1998	–	–	0.70	–
January 1, 1999	–	–	0.60	USD 30, EUR 70
July 1, 1999	–	–	0.50	–
October 1, 1999	–	–	0.40	–
January 1, 2000	–	–	–	EUR 100
April 1, 2000	–	–	0.30	–
April 1, 2001	–	–	0.20	–
May 13, 2001	Crawling band	±15	0.20	–
October 1, 2001	Floating	–	no	–

Source: Habib (2002), Magyar Nemzeti Bank.

analysis took effect: The government agreed with the central bank that the central bank would buy the (very large) privatization proceeds directly in exchange for koruna, increasing the central bank's foreign exchange reserves as a result, instead of using the foreign exchange market, which contributed to the marked appreciation of the Czech koruna versus the euro.

From May 1995 Poland had a crawling band regime vis-à-vis a USD/DEM/GBP/FRF/CHF basket with a relatively wide fluctuation band (±7%). Subsequently, the monthly devaluation rate was gradually reduced and the fluctuation band was widened even further. Moreover, at the beginning of 1999 the Polish zloty's basket was streamlined to a 55% EUR/45% USD composition.

As of April 2000, Poland moved to a floating regime without target bands and to a monthly devaluation rate. Beside the standard argument that under fully liberalized capital movements the control of both interest rates and the exchange rate is contradictory, the NBP, the National Bank of Poland (2001), presented two additional arguments in favor of the move to a full flotation of the zloty: First, the NBP argued that the determination of the external value of the zloty by market forces would be helpful in discovering the correct equilibrium exchange rate versus the euro when Poland enters the euro area. Second, the NBP cited the association of currency crises with attempts to

control the exchange rate. As this decision was taken at a time when the zloty's target band was already as wide as ±15% and the crawling band as low as 0.3% per month, the complete abolition of exchange rate targets had no clearly discernible impact on the zloty's exchange rate. Thus, in order to obtain at least a minimum number of observations for empirical investigations, this study uses data as of the beginning of the second quarter 1999.

Burdened with relatively high amounts of foreign debt, Hungary pursued an exchange rate policy that attached a strong weight to the preservation of international competitiveness while aiming for gradual disinflation. Between March 1995 and May 2001 Hungary operated a crawling peg system with a narrow band versus a basket with a strong weighting of euro predecessor currencies and – since January 2000 – with a 100% euro orientation. Since May 2001 Hungary has observed a wide ±15% fluctuation band versus the euro, and the monthly devaluation rate was cut to zero soon afterwards. As a result, Hungary's short experience with a wide fluctuation band precludes any econometric analysis of the impact of fiscal and monetary impulses on exchange rates and bond yields under the new exchange rate regime. Conversely, Hungary's comparatively long history of an exchange rate-based monetary strategy provides a very interesting point of reference for the Czech Republic and Poland as "floating rate countries."

3.2 Fiscal Policy

Analyzing the development of the CEEC-3's fiscal stance is somewhat difficult, as the central government budget only represents a relatively small portion of the general government budget. In the Czech Republic budget balances have been strongly influenced by bank consolidation measures in recent years. Nevertheless, table 2 suggests that fiscal policy became more expansive between 1997 and 2002 despite the ongoing economic recovery.

Poland's general government deficit increased recently, too, but from higher levels at the end of the 1990s. As Poland's cyclical position is nearly diametri-

Table 2

Real GDP Growth and Fiscal Balances in the CEEC-3						
	1997	1998	1999	2000	2001	2002
Czech Republic						
Real GDP, % change	−0.8	−1.0	0.5	3.3	3.3	3.2
Central government budget, % of GDP	−0.9	−1.6	−1.6	−2.3	−3.1	−2.0
General government balance, % of GDP	−2.0	−2.4	−3.5	−4.5	−5.3	−9.1
General government balance, % of GDP, adjusted for grants to transformation institutions	−1.6	−1.4	−3.1	−3.5	−2.9	−5.0
Poland						
Real GDP, % change	6.8	4.8	4.1	4.0	1.0	1.4
Central government budget, % of GDP	−2.6	−2.4	−2.0	−2.2	−4.5	−5.0
General government balance, % of GDP	−3.2	−3.3	−3.4	−3.1	−5.3	−5.7
Economic balance, % of GDP, commitments basis[1]	–	–	−3.0	−2.6	−4.8	−4.5
Hungary						
Real GDP, % change	4.6	4.9	4.2	5.2	3.8	3.5
Central government budget, % of GDP						
General government balance, % of GDP	−4.8	−4.8	−3.7	−3.7	−3.3	−3.2
General government balance, % of GDP, SNA basis, adjustments for off-budget spending	–	–	−6.0	−3.5	−4.9	−5.7

Source: IMF (2001a, 2001b, 2001c, 2002a, 2002b, 2002c), 2001: CZ Statistical appendix.
[1] For 2001: cash basis.

cally opposed to that of the Czech Republic during this time period, the recent rise in Poland's general government deficit seems to be mainly attributable to the slowdown in economic growth.

Despite the blessing of consistently high economic growth in the 1997 to 2002 period, Hungary's general government deficit (inclusive of adjustments for off-budgetary expenditure) was mostly higher than in the two other CEECs. The changes in the general government balance appear to broadly track the economic cycle.

4 VAR Analysis

4.1 Data and Time Series Properties

Changes in exchange rate regimes (see the discussion in this section) and data availability determined the choice of monthly data for each individual CEEC. The sample for the Czech Republic covers the June 1997 to June 2002 period (61 observations). Estimates for Poland refer to the period May 1999 to July 2002 (39 observations), while the Hungarian estimates are based on the May 1997 to April 2001 interval (48 observations) from the crawling peg/narrow band era. In general, interest rate data and the JP Morgan bond index were obtained from Bloomberg, balance of payments data from central banks' websites, and the remaining time series were provided by The Vienna Institute for International Economic Studies' (WIIW) monthly database. Table 3 reports details. In some cases, the most recent observations were obtained from relevant country websites (statistical offices, ministries of finance, central banks).

The following variables were used in the country-specific VAR models: For the Czech Republic and Poland, the nominal exchange rates versus a reference currency was used as an endogenous variable. In the case of the Czech Republic (variable: czk_euro), this currency is the Deutsche mark and later the euro. Because of the greater relevance of the U.S. dollar for Poland, a specification with a 55% EUR/45% USD basket ("basket") was estimated in addition to the PLN/DEM (EUR) rate. Results for the alternative specifications for Poland did not differ much, but the basket-based specification was preferred on the basis of AIC (Akaike's Information Criterion) and Schwarz criteria. For Hungary, however, due to its tightly controlled exchange rate, an empirical analysis of the impact of monetary and fiscal variables on the exchange rate would not make sense. Thus in this case, pressures on the exchange rate will be reflected in changes in official reserves in euro terms exclusive of gold ("reserves").

"Bospread" measures the yield difference between five-year bond yields in the particular CEEC and the reference currency, i.e. the euro or the respective currency basket for Poland and Hungary. For the short-term interest rate spread ("mmspread"), the interest rate difference for one-month interbank rates was used. As in the case of the bond spread variable, a weighting in line with currency baskets for Poland and Hungary was applied. The fiscal variable "budgetm" measures the gap (in percent of GDP) between seasonally adjusted monthly central government budget balances and a Hodrick-Prescott (HP) trend for the seasonally adjusted budget figures. While the need for a seasonal adjustment of monthly budget balances is obvious, the HP trend is intended to capture broadly the development of monthly balances that is due to the changes in annual budgets. Constructed in this way, "budgetm" should better reflect the

information content of monthly budget data that is not due to the information provided by annual budget targets. Finally, the month-on-month change in the consumer price index ("cpi_mom") is included as an endogenous variable.

Among exogenous variables, the monthly returns of JP Morgan's Global Composite Emerging Markets Bond Index ("jpm_ind") represents a measure of international investors' attitude towards emerging markets. Moreover, "fdi" stands for foreign direct investment (expressed as a percentage of GDP) and is intended to capture the effect of interest-insensitive capital flows. Finally, for the Czech Republic, privatization revenues in percentage-of-GDP terms ("priv") are used as an additional external variable. The use of this variable for the Czech Republic is motivated by two main reasons: First, monthly balance of payments data for foreign direct investment are not available for the Czech Republic. As privatizations during the sample period consisted mainly of sales to foreign strategic investors, this variable should capture a significant part of interest-insensitive foreign capital inflows in the Czech Republic. Secondly, privatization revenues represented an important source of financing for budget deficits. Thus, it may be interesting to investigate this direct link between public deficits and capital flows in more detail.

As reported in table 3, according to augmented Dickey-Fuller (ADF) test results, all short- and long-term interest spread time series are nonstationary, reflecting progress in disinflation, a reduction of risk premia and upward pressure on the exchange rate during the (fairly short) sample period. Similarly, exchange rates and reserves are nonstationary in levels, except in the case of Poland, where the ADF test does not provide as clear-cut an answer as for the Czech Republic and Hungary. As expected, budget balances, net foreign

Table 3

Unit Root Tests and Sources of Time Series

Variable	Short Description	Source	k	ADF Test Statistic
Czech Republic				
cpi_mom	Monthly CPI	CNB	0	−8.199009***
budgetm	Budget balance	WIIW, MoF	3	−4.869253***
bospread	Bond spread	CNB, Bloomberg	1	−0.357954
mmspread	Short-term interest spread	Bloomberg	2	−0.920568
czk_euro	CZK / EUR	CNB, WIIW	0	0.23487
jpm_ind	JPM em. markets bond index	Bloomberg	1	−6.732865***
priv	Privatization revenues	CNB	0	−8.161597***
Poland				
cpi_mom	Monthly CPI	WIIW	0	−5.563181***
budgetm	Budget balance	WIIW, MoF	0	−3.742303***
bospread	Bond spread	Bloomberg	0	−0.290309
mmspread	Short-term interest spread	Bloomberg	0	−0.006362
basket	PLN / EUR-USD basket	NBP, WIIW	1	−2.796835*
jpm_ind	JPM em. markets bond index	Bloomberg	1	−6.732865***
fdi	Net foreign direct investment	NBP	0	−6.245655***
Hungary				
cpi_mom	Monthly CPI	WIIW	4	−3.913898***
budgetm	Budget balance	WIIW, MoF	1	−4.393504***
bospread	Bond spread	MNB, Bloomberg	4	−0.498511
mmspread	Short-term interest spread	Bloomberg	0	−0.774334
reserves	Gross official reserves	MNB	0	−0.750128
jpm_ind	JPM em. markets bond index	Bloomberg	1	−6.732865***
fdi	Net foreign direct investment	MNB	0	−7.767846***

*** *Rejection of hypothesis of unit root at the 1% level.*
** *Rejection of hypothesis of unit root at the 5% level.*
* *Rejection of hypothesis of unit root at the 10% level.*

direct investment, CPI changes and bond index returns are stationary series. Thus, in order to address the nonstationarity of interest rates, exchange rates and reserves, these variables enter the country-specific VAR models in first differences. This transformation of variables is indicated in the variable name with the ending "f_1." Budget balances and monthly changes in the consumer price index enter the VAR models in levels. The models were estimated with two lags for the endogenous variables.

In order to identify the impulse responses, errors were orthogonalized by a Cholesky decomposition assuming the following order of variables: budget balance, short-term interest spreads, long-term interest spreads, exchange rates.

4.2 Results

The results reported in tables 4 to 6 show that exogenous variables, i.e. variables that are not under the direct control of fiscal and monetary authorities, are very relevant in explaining the development of exchange rates and bond yields. A change in the risk appetite of international investors, measured in terms of returns in the JP Morgan bond index, has a significant impact on the exchange rate of the Polish zloty, while in the Czech Republic and Hungary the biggest impact was on the yield difference for five-year government bonds. Regarding the impact of this variable on the exchange rates of the Czech and Polish currencies, the results in this paper are broadly in line with the findings of Habib (2002). However, Habib's (2002) methodology differs from that used in this paper in a number of ways. For instance, he used daily data and did not employ a "bond spread variable." Thus, the results are not fully comparable, which is particularly true for Hungary, as in this case the dependent variable is a different one.
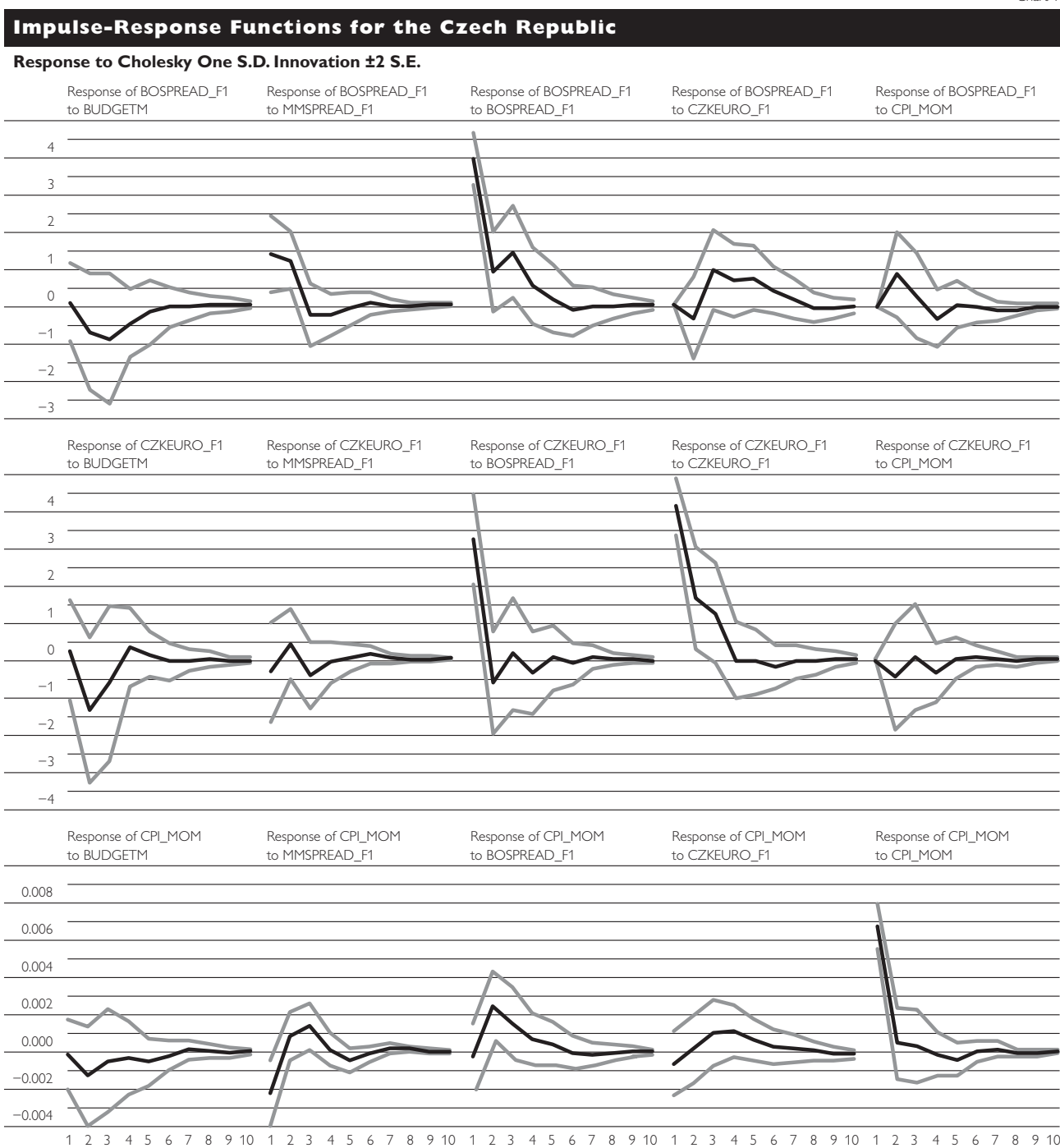
An increase in FDI inflows[1]) causes a (statistically significant) rise of gross official reserves in Hungary and a decline in bond spreads in Poland. For the Czech Republic, where FDI data on a monthly basis are not available, privatization inflows with a lag of two seem to exert appreciation pressure on the exchange rate, although the coefficient is not significant. However, for a sample that does not include the last five months in the sample, i.e. the time after the introduction of the agreement between the central bank and the government to restrict the crown's appreciation, the privatization revenue variable is significant at the 10% level with lag zero and at the 5% level with lag two. Thus, there is some empirical support for the relevance of this variable as well as for the effectiveness of this agreement.

Consistently with the inflation targeting regime, bond spreads in the Czech Republic and Poland react to CPI changes, although the response for the Czech Republic is just above the 5% level of significance. In the case of Hungary, *ceteris paribus,* a higher monthly CPI increase results in an increase in official exchange reserves. Given Hungary's exchange rate target, higher inflation probably signals that interest rates will remain high, thereby attracting inflows.

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1   *While FDI and privatization inflows are treated as exogenous variables in the model, they may not be fully external from an economic point of view: Privatization inflows as well as privatization-related FDI flows serve as a source of financing for public deficits and are under the authorities' control.*

Despite rather high budget deficits in all CEEC-3, bond spreads do not seem to be influenced by central government budget balances (compare charts 1 to 3). Thus, no evidence of crowding-out effects that would run via the interest rate channel was detected. As central government budgets represent just a part of total public sector balances, this result has to be qualified somewhat. On the other hand, on a monthly basis, central government balances should track the dynamics of total public sector balances quite well.

Chart 1

Impulse-Response Functions for the Czech Republic

Response to Cholesky One S.D. Innovation ±2 S.E.

While no relationship between budget balances and bond spreads was detected, there are strong hints of a link between exchange rates and fiscal policy: In the Czech Republic, privatization revenues (which are a significant source of finance for public deficits) were found to influence exchange rates. Thus, interest-insensitive capital imports seem to push up exchange rates, while bond spreads remain unaffected.

When evaluating the influence of policy variables on the exchange rate, one should take the dynamics of the exchange rate into account: in the Czech Republic and in Poland, changes in the exchange rate with lag one have a significant impact on the change in the exchange rate at time t. Thus, policy impulses may be magnified because of the overshooting behavior of the exchange rate.

In all three countries long-term interest spreads respond swiftly to short-term interest rate impulses, but interestingly, long-term spreads in Poland react negatively to short-term spread impulses. Thus, monetary authorities in the Czech Republic and Hungary are able to exert an influence on the longer end of the yield curve that goes in the same direction as the short end, whereas

Chart 2

Impulse-Response Functions for Poland

**Response to Cholesky One S.D. Innovation ±2 S.E.**
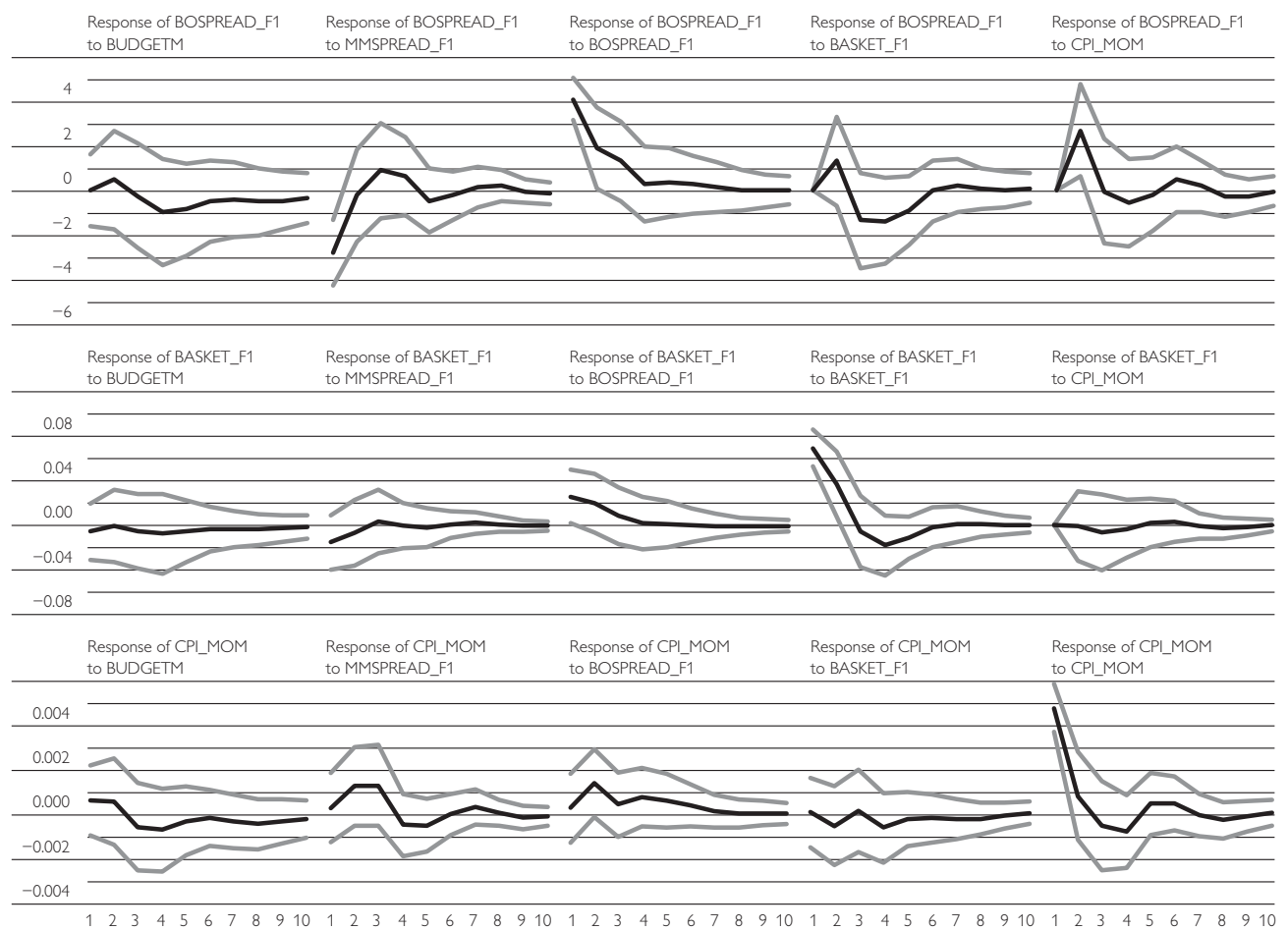
monetary policy impulses in Poland seem to be weakened by the movement in the opposite direction of long-term rates.

The direct influence of monetary policy (as measured by short-term interest rate spreads) on exchange rates differs across the CEEC-3. In line with Hungary's exchange rate peg, a shock to short-term interest rate spreads results in an increase in exchange reserves. In Poland, the exchange rate appreciates in response to a shock to short-term interest rate spreads, but this reaction is not significant at the 5% level. The Czech koruna does not seem to react to impulses to short-term interest rate spreads at all.

Long-term interest rates, however, have an influence on exchange rates in all three country cases. The empirical evidence for the relatively greater importance of long-term interest rates than of short-term interest rates for exchange

Chart 3

Impulse-Response Functions for Hungary

Response to Cholesky One S.D. Innovation ±2 S.E.
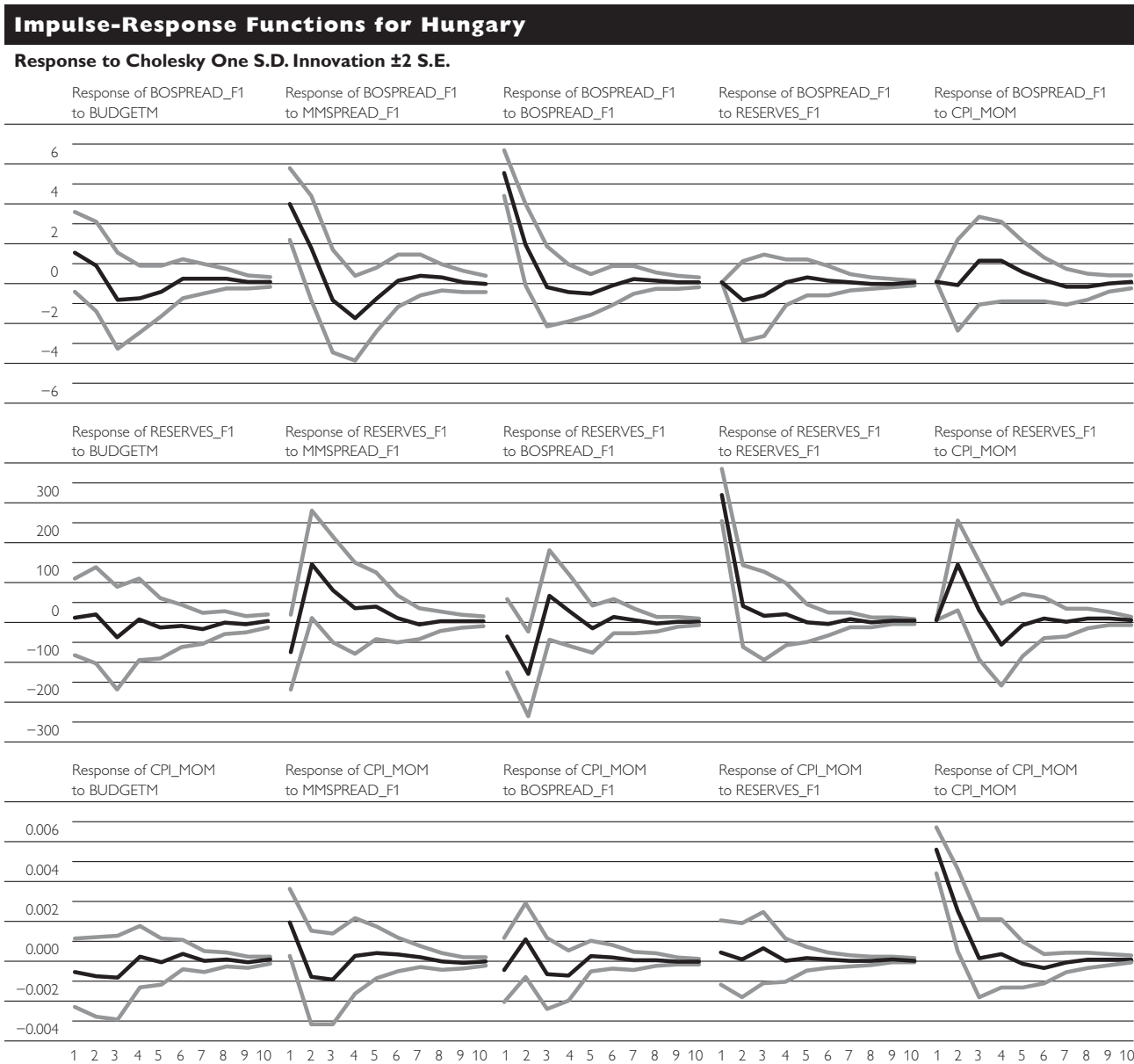
rates is in line with Derviz's (2002) theoretical and empirical analysis. A positive shock to long-term interest rate spreads is associated with downward pressure on the exchange rate in the floating rate countries and a decrease of reserves in Hungary.

According to the results reported in chart 1 to 3, consumer price changes seem to be little affected by interest rates. In the Czech Republic and in Hungary, monthly CPI changes respond significantly to short-term interest rate impulses, but the reaction time is implausibly short. There is also a significant response of changes in the CPI to long-term bond spreads in the Czech Republic, but the reaction time is also too short in this case. In Poland, monthly changes in the CPI hardly seem to react to interest rate impulses at all. However, the methodology employed in this paper is not well suited to capturing the long and possibly changing lags in the impact of changes in interest rates on the inflation rate. Thus, this does not necessarily mean that interest rate policy is totally ineffective in influencing inflation.

The responses of CPI changes to exchange rate impulses appear more plausible: in the Czech Republic, the response of the change in the CPI to an exchange rate shock reaches a maximum after three to four months and is close to the 5% significance level. Conversely, inflation in Poland appears to be unaffected by exchange rate changes. Given Poland's larger size relative to the Czech Republic, this result is in line with expectations.

5 Conclusions

This paper investigated the impact of fiscal and monetary policy impulses on long-term interest rate spreads and exchange rates (gross official reserves) for the Czech Republic, Poland and Hungary. While the most recent monthly data available were used to conduct an (unrestricted) VAR analysis for the Czech Republic and Poland under the direct inflation targeting/floating rate regime currently in place in these countries, the Hungarian sample for the period May 1997 to April 2001 served as an example for an exchange rate-based monetary regime (narrow-band crawling peg). Some caveats apply because of the relatively small number of observations available for the empirical analysis, which seems to be particularly relevant for Poland.

Exogenous variables (JP Morgan's emerging markets bond index returns, FDI, privatization revenues and inflation) were found to be very important in explaining exchange rate pressures and bond spreads for five-year bonds in all three country cases. In line with theoretical expectations, the impact of monetary and fiscal policy variables is more distinctly discernible under an exchange rate targeting regime.

Bond yields were found to be unaffected by fiscal policy, reflecting a sufficient absorption capacity of domestic bond markets, good access to international financing sources and the absence of public finance sustainability concerns. However, there seems to be a link between fiscal policy and exchange rates. In the case of the Czech Republic (which operates a floating exchange rate regime), privatization revenues were found to exert upward pressure on the exchange rate. Thus, by utilizing ample sources of interest-insensitive financing from abroad, budget deficits indirectly seem to affect exchange rates rather than bond spreads. Therefore, despite prevailing benign financing conditions, macro-

economic stability could be further strengthened by a reduction of budget deficits. In the case of Hungary and Poland, no statistically significant impact of the fiscal variable on exchange rates (reserves) and bond spreads was found. However, the limitations of this analysis (use of monthly data, coverage of the central government only) and in particular the smaller sample size than in case of the Czech Republic have to be considered when evaluating this result.

Monetary policy in the Czech Republic and Hungary is able to influence the long end of the yield curve as well, thereby enhancing the effectiveness of monetary policy in these countries. In Poland, monetary policy seems to be less powerful, as changes in long-term interest rate spreads are negatively related to short-term spreads.

No meaningful links between interest rate spreads and inflation could be detected, which seems to suggest that the interest rate channel of monetary policy is not (yet) very well developed in these countries. However, lag structures for the relationship between interest rate spreads and inflation were not explored in more detail. As a result, serious caveats apply with respect to this result.

The possibilities of influencing exchange rates by means of interest rate policy seem to be weak under a floating rate regime, making the exchange rate channel of monetary policy highly unpredictable. At the same time, inflation seems to be influenced by exchange rate changes in the Czech Republic, while no such link could be detected for Poland. Thus, monetary policymakers in the Czech Republic have to devote more attention to exchange rate developments than their peers in Poland.

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Annex A

Table 4

Czech Republic – Exogenous Variables

	BUDGETM	MMSPREAD_F1	BOSPREAD_F1	CZKEURO_F1	CPI_MOM
JPM_IND	−0.139973	−3.697128	−5.611612	−3.916571	−0.014521
	[−0.82485]	[−1.07329]	[−3.47082]	[−1.92336]	[−0.52066]
PRIV(−2)	−0.027149	1.109993	0.279264	−3.317547	0.016509
	[−0.15155]	[0.30523]	[0.16361]	[−1.54320]	[0.56072]
Adj. R-squared	−0.056340	0.585409	0.338879	0.141890	0.195878

Table 5

Poland – Exogenous Variables

	BUDGETM	MMSPREAD_F1	BOSPREAD_F1	BASKET_F1	CPI_MOM
DLOG(JPM_INDEX)	−0.106393	14.21649	−3.293361	−1.509647	0.090362
	[−0.48343]	[2.34283]	[−0.75210]	[−2.23152]	[2.11215]
FDI(−1)	0.084843	0.604450	−5.648361	−0.505220	−0.002000
	[0.77678]	[0.20071]	[−2.59910]	[−1.50476]	[−0.09419]
Adj. R-squared	0.351270	0.242974	0.287951	0.323501	0.180100

Table 6

Hungary – Exogenous Variables

	BUDGETM	MMSPREAD_F1	BOSPREAD_F1	RESERVES_F1	CPI_MOM
DLOG(JPM_INDEX)	0.022140	−1.504167	−8.805691	−269.5242	0.031058
	[0.12504]	[−1.00953]	[−3.02750]	[−0.19785]	[1.24986]
FDI(−1)	0.321261	−1.285022	−3.902110	5488.133	0.015175
	[1.56259]	[−0.74273]	[−1.15536]	[3.46943]	[0.52592]
Adj. R-squared	0.005589	0.285984	0.229636	0.341493	0.077232