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Transparency and Credibility of Monetary Policy in Transition Countries: The Case of the Czech Republic

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Abstract: This paper studies as to what asset price can tell us about the evolving credibility of the monetary policy of the Czech National Bank (CNB). The focus of our analysis is to examine the effect of changes in the two-week repo rate (the official interest rate) on short and long–maturity market interest rates. Argument relies on information asymmetry and the existence of a stationary stochastic equilibrium with full knowledge of authorities reaction function.

JEL Classification: E44, E52

Key words: Direct inflation targeting (DIT), Interest rate, Repo operations, Short maturity yield

Introduction

This is a study of what asset price can tell us about the evolving credibility of the monetary policy of the Czech National Bank (CNB). From the beginning of the 1990s, several market economies adopted direct inflation targeting (DIT). The first country was New Zealand (1989), followed by Canada (1991), the United Kingdom (1992), Finland (1993), Sweden (1993), Australia (1994), Israel (1994), followed later in the decade by Eastern European Countries; the Czech Republic (1998) and Poland (1998). The change in the monetary strategy at the beginning of the 1990s often followed the abandonment of either a fixed exchange rate regime as a nominal anchor (the United Kingdom, Sweden) or a monetary aggregate as an intermediate

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target (New Zealand, Canada). Since DIT has become the prevailing monetary strategy in many countries, there has been a flood of studies analysing the pros and cons of DIT. Some empirical studies have shown that in countries applying DIT, the transparency and credibility of monetary policy has increased (Svensson, 1995).

However, there has been little analysis, to date, of the impact of DIT in transition economies. The paper asks whether the introduction of DIT has increased the transparency and credibility of the Czech National Bank's (CNB) monetary policy. One could look at this question in many ways. The focus of our analysis is to examine the effect of changes in the two-week repo rate (the official interest rate) on short and long–maturity market interest rates. Such an analysis allows us to test the two hypotheses about monetary policy transparency and credibility discussed in Haldane and Read (2000), Chadha and Ganley (1998), Muller and Zelmer (1999). Haldane and Read (2000) show that movements at the short–end of the yield curve in response to changes in official rates reflect the markets' degree of uncertainty about the central bank's monetary policy reaction function, while movements at the long–end of the yield curve reflect market assessment of the central bank's credibility. The argument relies on information asymmetry and the existence of a stationary stochastic equilibrium with full knowledge of the authorities' reaction function. Only then will the market reaction be insignificant.

Our methodological approach is based on several recent studies that measure the effect of announcements of interest rate changes on interest rates along the yield curve (Haldane and Read (2000), Muller and Zelmer (1999), Hardy (1998)).

DIT in Transitional Economies

The appropriateness of DIT in transition economies is often questioned. There is no consensus about which framework of monetary policy is most appropriate. Economic research suggests that DIT might be the right choice in an environment of disinflation. For example, Orlowski (2000) argues that DIT might be appropriate for the leading transition countries (i.e., Czech Republic, Poland, Hungary). Also, DIT might be appropriate in order to help to reduce inflation levels elsewhere in the EU. But there are questions about whether the necessary preconditions for a DIT framework can be met. First, there should be no fiscal dominance, i.e., monetary policy should not be subordinated to accommodate a dominate fiscal policy. Second, there should be no other nominal monetary anchors (Krzak and Ettl, 1999). This unequivocal condition holds true only in the strict version of inflation strategy. Nevertheless, the fiscal condition can be difficult to fulfil in transition economies. If there is a lack of fiscal discipline, the inflationary pressure arising from the fiscal side might jeopardise the achievement of the inflation target. As for additional policy targets, Svensson (1996),

argues that inflation targeting is not consistent with a fixed exchange rate regime, but it is compatible for example with a target for full employment and financial stability.

The are several common features in the transitional trajectories of post-command economies. First of all, at the beginning of transformation process[2], all countries had to cope with high inflation. In many cases inflation was the result of price liberalisation, the lifting of administrated prices, the introduction of VAT and new tax policies. All these factors were instantly mirrored in changes of price levels. In other words, at least initially, there was a weak link between monetary policy and prices.

Central banks in transition economies, in the initial phase of the economic transition, did not operate with a credibility that would have been a positive asset in their effort to bring down inflation expectations. One way of reducing inflationary expectations is to peg the domestic currency (fixed exchange rate regime). But a successful fixed exchange rate regime requires fiscal discipline and a sufficient volume of foreign reserves. This provides a challenge for many transition economies. Several countries have opted instead for currency boards (Estonia, Bulgaria, Bosnia and Herzegovina).

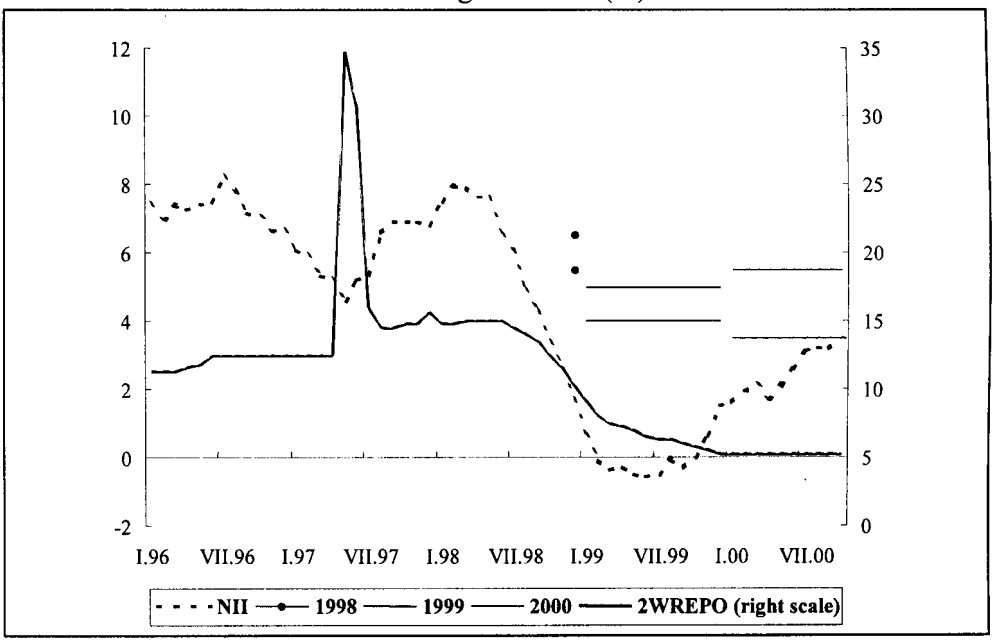
The Central Eastern European Countries (CEECs) have used a variety of monetary policies. After abolishing other nominal anchors, Poland and the Czech Republic adopted inflation targeting. Hungary, on the other hand, continues to rely on an exchange rate target, but controls on short-term capital flows provide room for discretionary policy in terms of interest rate changes.

The question remains whether DIT is an appropriate form of monetary policy under a flexible exchange rate in transition economies. Some economists have argued that DIT can bring down inflation and guarantee less inflation volatility more successfully than can targeting exchange rates (Swensson, 1997, Orlowski, 2000). In practice, it has been difficult for CEECs to forecast future inflation and to estimate the lags in the response of the economy to changes in monetary policy (due to data limitation). But theory predicts that DIT can increase both transparency and credibility in transition economies. In the following sections we try to test this statement.

Inflation Targeting in the Czech Republic

In January 1998 the CNB became the first central bank in a transition country to adopt inflation targeting. The shift to DIT was speeded up as a result of the forced abandonment of the fixed exchange rate regime in May 1997. As for the prerequisites of DIT that have already been mentioned, the fiscal position was broadly sound. In addition, the CNB had a relatively high degree of independence[3] and there were no explicit nominal anchors.

Chart 1: Net inflation index and the target corridor (%)



Source:CNB

Since the Czech economy is still in the process of price deregulation, the CNB has adopted a net inflation index (NII) as the target variable instead of the consumer price index (CPI). The NII is defined as the rate of increase in consumer prices, excluding administered and regulated prices and the impact of indirect taxes. The economic rationale behind this is that the CNB is only accountable for deregulated or market prices. At the end of 1999, the Czech CPI included prices of 754 items, 18 percent of which were regulated or administered.

Net inflation in the Czech Republic declined (see Chart 1) until the second quarter of 1997. However, it rose after the April/May 1997 crisis in the Czech capital markets, (which was induced by corporate governance and liquidity problems in the Czech financial sector). The financial crisis led to the decision to float the Czech currency. A strong initial depreciation of the Czech currency renewed inflationary expectations. Higher inflationary expectations persisted until the second quarter of 1998 and coincided with the financial crisis in emerging markets. The CNB responded to the currency attack by rising interest rates during 1997. It took approximately 15 months to bring down the official interest rate to pre-crisis level.

The CNB adopted an inflation target to show its commitment to reach low, sustainable inflation over the long term horizon. On December 22, 1997, the CNB set a 4.5 percent net inflation target for end 2000. The target for end 1998 was set at 6.0

percent with a 0.5 percentage point band on either side. On November 27, 1998, the CNB set a 4.5 percent target for end 1999. The band remained the same, i.e., plus or minus 50 basis points tolerance. The target for 2000 remains at 4.5 percent but there is a tolerance band of 100 basis points on either side.

The institutional framework of the CNB's inflation targeting regime has many of the characteristics deemed necessary to increase transparency (see Kuttner and Possen, 2000). For example, the CNB has a published numerical long-run goal for monetary policy (NII 2 per cent for 2005), publishes an Inflation Report, together with the Central Bank's forecast and an ex-post evaluation of monetary policy and the minutes of the banking board meetings)

Model Specification and Data sample

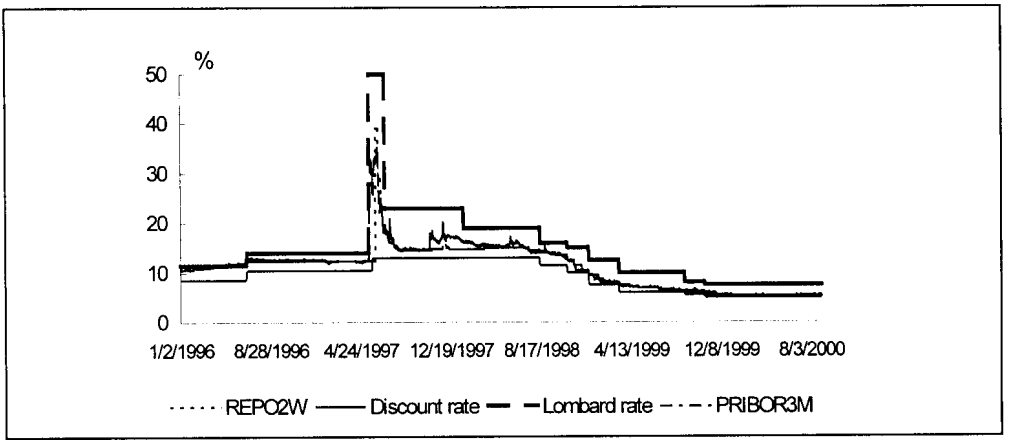
In order to test the transparency of monetary policy, one can analyse the effect of monetary policy decisions on financial markets. The focus of our paper is to investigate the effect of changes in the CNB's official interest rate (2wREPO) on short- and long-maturity interest rate contracts. This analysis allows us to examine hypotheses about the transparency of monetary policy transparency as discussed in Haldane and Read (2000). They proposed that in a transparent monetary policy regime, short term interest rates would anticipate to some degree changes in official rates. Also, in a credible monetary regime, a change in official (short term) rates would not lead to a change in long term rates, which rather reflect expectations about inflation over the longer term. (Indeed a rise in official (short term) rates may lead to a fall in long term rates if monetary policy results in lower expectations of inflation in the medium term). In other words, the argument relies on information asymmetry and the existence of a stationary stochastic equilibrium with full knowledge of the authority's reaction function. Only then will the market reaction be insignificant.

CNB's Monetary Instruments

The CNB uses several monetary tools that impact on the financial market. The two-week repo rate set up by the CNB is the most important policy interest rate of the CNB. Repo operations are used to withdraw liquidity from the market. Other official interest rates, such as the Lombard and discount facilities, have, we believe, only a 'psychological' role. Their spread is to some extent only a corridor for the short-maturity yield (see Chart 2). An additional powerful monetary instrument – compulsory reserves – has recently been significantly reduced and has now only a

marginal role.[5] We therefore study the impact of the two-week repo rate on short- and long-maturity interest rates.

Chart 2: Movement of official interest rates



Source: CNB

Methodological approach and asset price data

In our study, we follow the method used by Haldane and Read (2000) taking into account the specific characteristics of the Czech financial markets. We estimate the following regressions:

$$\Delta i_{t,j} = C + \beta_j(L)\Delta i_{t,j} + \beta_4 \Delta i_t^c + \varepsilon_t \qquad (1)$$

Where j and t represent indices for the maturity of market interest rates and date respectively. The dependent variable $\Delta i_{t,j}$ is the daily change in market interest rates, is β_j a polynomial in the lag operator (L). These lagged dependent variables are applied in order to deal with autocorrelation.

The independent variable Δi_t^c is the daily differences of the official interest rate, which is closely watched by the market. Thus, the coefficient β_4 measures the market reaction to changes in the official interest rate. If changes in the official interest rate are perfectly anticipated, then the coefficient β_4 would be equal to zero. This would be consistent with a transparent monetary policy. We apply equation (1) to Prague interbank offer rates (PRIBOR) of one to twelve months maturity. The CNB announces any change to the official interest rate at around 1:00 p.m. on the day

before the rate becomes effective. PRIBOR is quoted on the same day at 11:a.m. and therefore cannot react on the day of an announcement.

A different equation must be used to test the reaction of long maturity interest rates to monetary policy announcements since they are quoted at close of business. Long maturity interest rates can react to announcements of a change in the official rate on the same date. This is because this market remains open after the CNB announces the change in the official rate. In order to capture this market feature, the coefficient β_4 in regression 1 must be lagged 1-day, i.e., the day when the change is announced but not yet effective to test for the reaction of long term interest rates to official rate changes.

$$\Delta i_{t,j} = C + \beta_j (L) \Delta i_{t,j} + \beta_4 \Delta i^c_{t-1} + \varepsilon_t \qquad (2)$$

We analyse the following dependent variables: daily differences in swap interest rates of one to ten years maturity (Swap1Y to Swap10Y); and daily differences in government benchmark bonds of 2 and 5 years maturity (GB2Y and GB5Y). Because of a lack of data for swap interest rates from January 1996 to August 1997, we use the bond price indices (GBPI and GMPI) constructed by *Ceska sporitelna* (the Czech savings bank). These indices were launched to track price movements in the government and corporate markets respectively. They serve as benchmarks for highly liquid instruments. We also test the reactions of the daily changes of the exchange rate CZK/EUR to the official interest rate.

We use the Newey-West method for estimating equations, while gives standard errors adjusted for autocorrelation and heteroscedasticity.

Data Sample

Our sample consists of daily data on short-maturity yields from 2nd January 1996 to 31st August 2000, i.e., 1046 observations.

We have a complete data sample for the short-maturity yield, i.e., 1, 3, 6, and 12 months PRIBOR, and also for the exchange rate, GBPI and GMPI. The swap interest rates data series start on 25th September 1996; the government bond data start on 8th October 1997. This still gives us a large number of observations.

Because of high volatility in the dependent variables (see Table 1), caused by both transitional effects and exogenous factors we divide the sample into three sub–samples. The first period includes data from 2nd January 1996 to 31st March 1997 which is the period predating the financial crises. The second period, from 1st April 1997 to 31st December 1997 then covers an interval of financial turbulence that the Czech financial markets had to withstand. This sub–sample contains 250 observations. From April 1997 to December 1997 there were 30 changes in the

official repo rate. The high number of changes may reflect the authorities' concern to ensure a 'soft landing' for the economy while preventing another speculative attack on the Czech koruna (see Dedek 2000). The third period, the period of DIT, includes data from 1st November 1998 to 31st August 2000. The number of observations is 448 and there were nineteen changes in the official interest rate.

Table 1: Average volatility (standard deviation) of PRIBOR

	Pribor 1M	Pribor 3M	Pribor 6M	Pribor 12M
Pre-crisis	0.017	0.023	0.025	0.027
Crisis	0.85	0.566	0.42	0.32
DIT	0.048	0.0475	0.053	0.05

Asset price reactions to changes in the CNB's official interest rate

The effect of Official Interest Rate Changes in the pre-crisis period

First, we estimated the regressions for the period before DIT and the financial crises, from 1st January 1996 to 31st March 1997. During this period, the CNB used a monetary aggregate as an intermediate target, and the exchange rate as a nominal anchor. The CNB changed its official interest rate only five times during this period. Table 2 shows that the coefficients for changes in the CNB's official repo rate have large values of about 1, and are significant at the 1 percent level for money market interest rates (PRIBOR) with maturities of 1 to 12 months. This strong reaction in short-term market interest rates of 104 percent to 122 percent of the change in the official interest rate is consistent with the hypothesis of a low level of transparency in the Czech National Bank's monetary policy reaction function.

Table 2: The Effect of official interest rate changes on short interest rates (January 1996– March 1997)

Maturity	β_4 .	R2	D-W
PRIBOR1M	1.04**	0.67	1.70
PRIBOR3M	1.18**	0.59	1.65
PRIBOR6M	1.19**	0.54	1.63
PRIBOR12M	1.218**	0.48	1.62

** indicates significance at 1 per cent,
*indicates significance at 5 per cent,
+ indicates significance at 10 per cent

Data on bond yields and swap interest rate are not available in this period and we therefore study instead the reactions of log-differences in a price index of government bonds (GBPI) and of a price index of corporate bonds (CBPI), constructed by the Czech savings bank[6]. The results are shown in Table 3. The estimated coefficient β_4 for the impact of changes in the official repo rate are negative[7] and close to zero for both bond price indices. For the government bond price index, the coefficient β_4 is statistically significant at the 1 percent level.

We also investigated the effect of changes in the official repo rate on log-differences of the exchange rate. The estimated coefficient is low and not significant in this first period, i.e. changes in the official repo rate had only a marginal effect on the exchange rate. This is likely to reflect the fact that this period was characterised by a fixed exchange rate regime with a narrow band of ±7.5 per cent

Table 3: Asset price reactions to changes in the official repo rate (January 1996–March 1997)

Maturity	β_4	R2	D-W
GBPI	-0.013**	0.188	2.05
CBPI	-0.015	0.13	2.06
CZK/EUR	-0.002	0.006	1.98

** indicates significance at 1 per cent,
*indicates significance at 5 per cent,
+ indicates significance at 10 per cent

The effect of official interest rate changes in the period of turbulence

In the turbulent period of the financial market crisis from April 1997 to December 1997, the coefficients for changes in the official interest rate at the short-maturity contracts are not significant, and their magnitude is lower than in the previous period, as Table 4 shows.

Table 4: The effect of official interest rate changes on short-term interest rates (April 1997-December 1997)

Maturity	β_4	R2	D-W
PRIBOR1M	-0.13	0.05	0.05
PRIBOR3M	0.07	0.15	2.05
PRIBOR6M	0.027	0.16	2.01
PRIBOR12M	-0.006	0.19	1.98

* indicates significance at 1 per cent,
**indicates significance at 5 per cent,
+ indicates significance at 10 per cent

For this period we also estimate the effect of official interest rate changes on the long maturity bond and swap rates. The magnitudes of coefficients are low and not statistically significant, except for the 2 year government bond yield (see table 5).

Table 5: Asset price reactions to changes in the official repo rate (April 1997-December 1997)

Maturity	β_4	R2	D-W
SWAP1Y	0.008	0.049	2.03
SWAP2Y	0.015*	0.02	1.73
SWAP5Y	0.005	0.018	1.92
SWAP10Y	0.004	0.06	1.85
GB2Y	-0.05	0.04	2.14
GB5Y	0.002	0.026	2.02
CZK/EUR	-0.002	0.06	2.00

** indicates significance at 1 per cent,
*indicates significance at 5 per cent,
+ indicates significance at 10 per cent

The DIT Period

DIT has been in operation since 1st January 1998. Our third period runs from then until August 31, 2000. The coefficients of the official interest rate for PRIBOR rates are lower than in the first period (see Table 6), and all are statistically significant at the 1 percent level. These results for the short-end of the yield curve are consistent with the hypothesis that there was an increase in the transparency of CNB monetary policy compared with pre-DIT and the pre-crisis period.

Table 6: The effect of official interest rate changes on short-term interest rates (January 1998-August 2000)

Maturity	β_4	R2	D-W
PRIBOR1M	0.45**	0.51	2.04
PRIBOR3M	0.26**	0.31	2.05
PRIBOR6M	0.21**	0.4	2.04
PRIBOR12M	0.16**	0.16	1.99

** indicates significance at 1 per cent
* indicates significance at 5 per cent
+ indicates significance at 10 per cent

Results for the reaction of bond yields and interest rate swaps to changes in official rates are presented in Table 7. The coefficients are positive and statistically significant at the 5 percent level for swap rates of one and two years maturity. None of the other coefficients is statistically significant.

e 7: Asset price reactions to changes in the official interest rates (January 1998-August 2000)

Maturity	β_4	R2	D-W
SWAP1Y	0.06*	0.11	2.01
SWAP2Y	0.10*	0.03	2.07
SWAP5Y	0.08	0.04	2.02
SWAP10Y	0.05	0.02	2.02
GB2Y	0.02	0.003	2.02
GB5Y	0.07+	0.06	2.01
CZK/EUR	-0.15*	0.01	2.00

** indicates significance at 1 per cent,
* indicates significance at 5 per cent,
+ indicates significance at 10 per cent

Changes in the official interest rate have a statistically significant effect at the 5 percent level on the exchange rate and the coefficient is negative. The reaction is significant at the 5 percent level.

Interpretation and comparison of results in the different periods

At short maturities, the coefficients for changes in the official repo rate are lower in the DIT period than in pre-crisis period. Table 8 and Chart 3 show the 95 per cent confidence intervals for the coefficients in each period for maturities of one to twelve months. As we can see, the confidence intervals do not overlap. The results are significant at the 5 per cent level. This implies that the hypothesis of no increase in the transparency of monetary policy with the introduction of DIT can be rejected at the 5 percent level.

Table 8: Confidence intervals of coefficients for official interest rate decisions before and during DIT

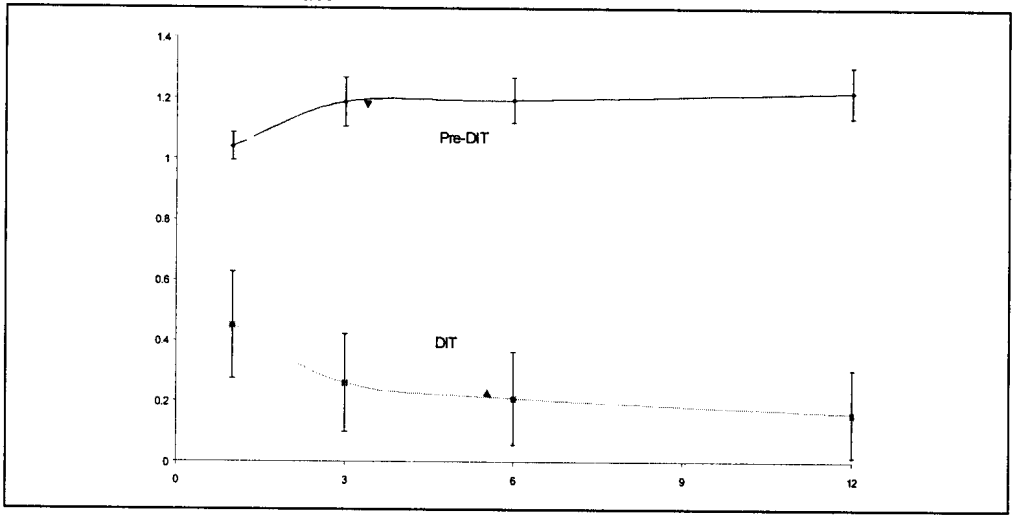
	January 1996 to March 1997	January 1998 – August 2000
1-month PRIBOR	[0.995,1.084]	[0.274, 0.625]
3-month PRIBOR	[1.106, 1.267]	[0.099, 0.420]
6-month PRIBOR	[1.267,1.118]	[0.057,0.362]
12-month PRIBOR	[1.135, 1.304]	[0.015, 0.304]

During the period of financial market crisis, we found that short-term interest rates did not react significantly to changes in the official repo rate. The absence of a significant response to official interest rate decisions on the day of the change in rates is consistent with the hypothesis that these changes were anticipated by the market, and thus that monetary policy was transparent during that period. However, since short-term market interest rates were very volatile in the financial crisis period (as shown in Table 1), an alternative explanation is that the properties of the time series of interest rates (e.g. heteroscedasticity) might lead to greater problems in the econometric estimation during that period, and perhaps a bias in the estimated coefficients and their standard errors. It is also possible that short-term interest rates exhibited a delayed reaction to monetary policy decisions, or that they were affected to a greater extent by other factors, which might have become more important in the financial market crisis.

We found that bond yields and interest rate swap of maturities of 5 years and more did not react significantly (at the 5 per cent-level) to official interest rate decisions in the DIT period. The price index for government bonds considered here showed a small reaction (with a coefficient of –0.013) in the pre-DIT and pre-crisis period[8]. This is consistent with the hypothesis that monetary policy was credible both before and after introduction of DIT. But the absence of a significant reaction of long-maturity yields on the day of the changes in official interest rates might also be due to other factors. In particular, there might be a delayed transmission of changes in official interest rates along the yield curve.

Also the expectation theory of the yield curve might not yet hold in the short term, so that there is no immediate reaction to official interest rate changes (see Haldane and Read, 2000). Moreover, properties of the time series of yield changes, including heteroscedasticity, might prevent an accurate estimation of the coefficients and standard errors. Also, factors other than interest rate expectations might have a distorting effect given the low liquidity of the market.

Chart 3: Short term interest rates (PRIBOR) responses to the 1 per cent change in official interest rate



NOTES

[1] The author is deeply indebted to Peter Sinclair, Richhild Moessner, and Lucjan Orlowski. The views expressed in the paper are those of the author and not those of the Czech National Bank.

[2] For most Central European Countries, the transitional period started in the late 80's and the early 90's.

[3] Recently Parliament approved a new Act that has reduced significantly CNB's independence.

[4] The Czech National Bank reduced reserves from 11.5 percent to 2 percent. See Table A1.

[5] Both bond price indices were established by the Czech savings bank (Ceska Sporiteln) in January 1994, as described in the Section 3.2.

[6] Note that a fall in the price indices corresponds to an increase in yields.

[7] But note that this is a coefficient for log-differences in a price index, rather than a yield.

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