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Reborn from Ashes Merely to Pass Away?

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Reborn from Ashes Merely to Pass Away?

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Abstract

In this study, we seek to better understand the interest rate pass-through in five Central and Eastern European countries – the Czech Republic, Hungary, Poland, Slovakia and Slovenia, the CEE-5. Our pass-through estimates for several retail rates are generally lower than those reported in the literature, given the absence of cointegration between policy rates and long- or even short-term market rates. In addition, the pass-through has been declining over time in the CEE-5, and we argue that it is likely to decrease further in the future. Finally, the pass-through appears similar in the CEE-5 than in Spain and is higher than in core euro area countries. Hence, euro adoption by the CEE-5 would not further increase heterogeneity within the euro area with regard to the interest rate pass-through. However, substantially more research is needed to establish commonalities and differences between the CEE-5 and the euro area with respect to the reaction of prices and output to monetary policy action.

Keywords: interest rate pass-through, monetary transmission mechanism, transition economies, Central and Eastern Europe, Austria, Germany, Spain.

JEL: E43, E50, E52, C22, G21, O52

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1 Introduction

In order to ensure price stability, it is essential for central banks to have a genuine and precise understanding of how fast and to what extent a change in their interest instrument modifies inflation. In particular, it is crucial to assess whether or not the pass-through from monetary policy rates to long-term market and retail rates is complete, as this is the first building block for the monetary transmission mechanism. If the interest rate pass-through is not complete, the impact of monetary policy actions through the credit, interest rate or exchange rate channels will be considerably attenuated. Against this backdrop, a large amount of research has been dedicated to the interest rate pass-through in industrialized countries: it is generally found to be incomplete and to react sluggishly to changes in the policy rate[1].

The interest rate pass-through is of particular interest in transition economies because retail rates started to be governed by market forces only after the introduction of two-tier banking systems in the late 1980s and early 1990s and became increasingly market driven with advances in financial market reforms. As a consequence, and not surprisingly, the pass-through in those economies is generally found to become stronger over time[2]. In this paper, we contribute to this subject for the CEE-5 by not only looking at the relationship between monetary policy rate, on the one hand, and market and retail rates[3], on the other hand, but also by studying the whole chain of transmission running from the policy rate via market rates to bank retail (deposit and lending) rates in a multivariate Vector Autoregression (VAR) setting.

Our results indicate that the interest rate pass-through is generally lower in transition economies than suggested by previous research. Yet it is higher than in core euro area countries (such as Austria and Germany), while being comparable to that observed in catching-up euro area countries such as Spain. With a view to the future adoption of the euro in the CEE-5, this finding has important implications: the euro area would not grow more inhomogeneous with respect to the monetary transmission mechanism. This is backed by the finding that the interest rate pass-through has been declining over time and - as we argue - is likely to continue to do so in the future.

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[1]See e.g. DeBondt (2005) and Sander and Kleimeier (2004a) for euro area results.

[2]See e.g. Horváth, Krekó and Naszódi (2004) for Hungary; Opiela (1999), Chmielewski (2003) and Wróbel and Pawlowska (2002) for Poland; Crespo-Cuaresma, Égert and Reininger (2004), Sander and Kleimeier (2004b) and Tieman (2004) for a number of CEE countries.

[3] We try to answer the questions whether pass-through from the monetary policy rate via market rates to retail rates is complete in the long-run, whether the pass-through is different in different segments of the same economy (households vs. non-financial corporate sector or short term vs. long term), whether there evidence of convergence/divergence across countries and over time and whether the direction of a change in the monetary policy rate (increase or decrease) have an impact on the short-term adjustment?

The remainder of this paper is structured as follows: Section 2 deals with theoretical and empirical issues related to the interest rate pass-through. Section 3 describes the dataset, Section 4 outlines the estimation techniques and Section 5 presents the results and compares them with those reported in earlier studies. Section 6 analyzes possible future changes in the pass-through. Finally, Section 7 gives some concluding remarks and draws policy conclusions.

2 Interest Rate Pass-Through

2.1 The Two Stages

The interest rate pass-through can be decomposed into two stages. The first stage measures how changes in the monetary policy rate are transmitted to short- and long-term market rates, while the second stage describes how changes in the market rates influence bank deposit and lending rates.

The first stage is to a large extent influenced by the stability of the yield curve: If the term structure, whatever its form may be (negative or positive sloping), remains stable over time, the pass-through from policy rates to market rates is said to be proportionate.[4] However, any twist in the yield curve can change the size of the pass-through.[5]

The *cost of funds approach* (DeBondt, 2005*)* is the best way to describe the second stage of the interest rate pass-through, i.e. the connection between market rates on the one hand, and bank deposit and lending rates of comparable maturity on the other hand.

In general, several factors make sure that market rates are passed onto retail rates. For loan rates, the link to market rates is secured by the fact that banks rely on the money market to fund (short-term) lending. This is in the same vein that deposit rates, which represent the cost of loans, should be reflected in loan rates.[6] At the same time, yields on government securities can be viewed as opportunity costs for banks. This helps maintain the link between, for instance, government bond yields and loan rates of longer maturity.

The connection between market rates and deposit rates is warranted by the possibility that households and the non-financial corporate sector can hold their financial assets not only in

[4] In this case, changes in the policy rate will lead to a shift in the yield curve.
[5] The form of the yield curve may be determined by four factors: a.) a liquidity premium implies for long-term rates. b.) Second, market segmentation of short-term and long-term interest rates. c.) expectation: long-term interest rates can be computed as the average of expected future short-term interest rates d.) expectations of future exchange rate, in particular with strong participation of foreign portfolio investors varying across the maturity segments.
[6] Provided that the volatility of the credit risk premium embedded in loan rates is stable over time.

bank deposits, but also in government securities of comparable maturity. In addition, banks can rely on the money market instead of deposits for funding loans, which can also lead to an equalization of deposit and money market rates.

The assumption of a stable yield curve makes it possible to take a shortcut by looking directly at the relationship between policy rates and retail (deposit and loan) rates. This approach is referred to as the *monetary policy approach* (Sander and Kleimeier, 2004a).

The alternative transmission routes from policy rates to retail rates and the ensuing empirically testable relationships are shown in table 1 below.

Table 1: Testable Relationships

Monetary Policy Approach
Policy rate → short-term/long-term deposit rate
Policy rate → short-term/long-term lending rate
Cost of Funds Approach
1st stage: yield curve
policy rate → 1m MMR → 12m MMR/T-bill rate → G-bond rate
2nd stage: cost of funds
a) 1m MMR / 12m T-bill/MMR → short-term deposit rate → short-term loans (long- term loan rate)
b) 1m MMR / 12m T-bill/MMR → short-term loan rate (long-term loan rate)
c) GB rate → long-term deposit rate → long-term loan rate
d) GB rate → long-term loan rate

2.2 Reasons for Incomplete Interest Rate Pass-Through

The pass-through from market rates to retail rates is, however, not necessarily proportionate. If the elasticity of demand for deposits and for loans to the deposit and the lending rate, respectively, is lower than 1, the pass-through may become disproportionate. Imperfect substitution between bank deposits and other money market instruments of the same maturity (e.g. money market funds or T-bills) and between bank lending and other types of external finance (equity or bond markets) may cause demand elasticity to be lower than unity. Weak competition within the banking sector (i.e. among banks) and in the financial sector (i.e. between banks and non-bank financial intermediaries) reduces the sensitivity of the demand

for deposits and loans to the interest rate.[7] High switching costs may also lead to lower demand elasticity.[8]

Macroeconomic conditions influence the size of the pass-through, too. It is generally observed that during periods of rapid economic growth, it is easier for banks to pass on changes in the interest rate to their lending and deposit rates faster. Higher inflation rates also favor more complete and more rapid interest rate pass-through, given that prices may be adjusted more frequently in a double-digit or high inflation environment. By contrast, higher interest rate volatility (mirroring higher macroeconomic instability and uncertainty) weakens the interest rate pass-through, given that banks wait longer before changing their rates.

The pass-through can be not only incomplete in the long run, but also sluggish in the short run. The reasons for this are manifold: First, adjustment or menu costs can cause banks to react sluggishly to changes in the market rates. Second, the maturity mismatch of banks' loan and deposit portfolio influences the way in which they adjusts their lending rates.[9] The more long-term loans are covered by long-term deposits, the less pressure banks feel to adjust their lending rates, given that their liabilities are less sensitive to market rates (Weth, 2002). Finally, given the long-term relationships of banks (especially universal banks) with their customers, they may want to smooth interest rate changes.

4 Estimation Techniques

4.1 Single Equation Approach

The empirical literature concerned with analyzing the interest rate pass-through usually relies on generalizations of the following bivariate error correction model:

$$\Delta i_t^R = \mu + \rho(i_{t-1}^R - \mu - \beta i_{t-1}^P) + \delta \Delta i_t^P + \varepsilon_t \qquad (1)$$

where i_t^R and i_t^P are the retail (or market) rate and the monetary policy rate, respectively. β stands for the long-run pass-through. Instead of a simple OLS, we use two alternative

[7]The competition effect is more important for deposit rates than for lending rates, given that the former are less affected by asymmetric information problems (Sander and Kleimeier, 2004a).

[8] The pass-through can also be amplified , i.e. be higher than unity, if banks charge higher interest rates in an attempt to offset the higher risks resulting from asymmetric information (adverse selection and moral hazard) rather than reducing the supply of loans (DeBondt, 2005). An increase in the general interest rate level raises the average burden of interest payments and thus necessitates an upward adjustment of the risk premium for asymmetric information. The same argument applies to small banks: they find it more difficult to obtain external financing owing to asymmetric information problems. This is why they have to pay a risk premium on their deposit rates to attract sufficient amounts of deposits; consequently, they also require a premium on their lending rates (Gambacorta, 2004).

[9]Note that maturity in this context refers to the period of interest rate fixation (i.e. the interval between the adjustment dates of interest rates of a loan or deposit contract), not to the duration of the loan or deposit contract between initial payment and full repayment.

methods to estimate β: 1.) Dynamic Ordinary Least Squares (DOLS) as proposed by Stock and Watson (1993), which accounts for the potential endogeneity of the monetary policy rate by incorporating leads and lags in first differences of the regressor. 2.) A standard ARDL model as suggested by Wickens and Breusch (1988).

We assess the existence of cointegration of the monetary policy rate (i^P) with retail rates (i^R) by relying either on residual-based cointegration tests for DOLS (Engle and Granger, 1987) and on the bounds testing approach (Pesaran, Shin and Smith, 2001) for the error correction representation of the ARDL model.

We also look at the issue of asymmetry in the pass-through. One can hypothesize that a) the speed of adjustment (ρ) to the long-run relationship and b) the short-term dynamics are different depending on whether the monetary policy rate increases or decreases, which leads to the following specification:

$$\begin{aligned}\Delta i_t^R = {} & I(\Delta i_{t-1}^P < 0)\left[\mu_1 + \rho_1(i_{t-1}^R - \mu - \beta i_{t-1}^P) + \sum_{j=0}^{l}\delta_j \Delta i_{t-j}^P + \sum_{j=1}^{m}\phi_j \Delta i_{t-j}^R\right] + \\ & + [1 - I(\Delta i_{t-1}^P < 0)]\left[\mu_2 + \rho_2(i_{t-1}^R - \mu - \beta i_{t-1}^P) + \sum_{j=0}^{l}\psi_j \Delta i_{t-j}^P + \sum_{j=1}^{m}\zeta_j \Delta i_{t-j}^R\right] + \varepsilon_t.\end{aligned} \tag{2}$$

where $I(\bullet)$ is an indicator function taking value 1 if the argument is true and zero otherwise. A simple test for symmetry is then given by the F-test for the following restrictions: $\rho_1 = \rho_2; \delta_j = \psi_j; \phi_j = \zeta_j$ for all j. A rejection of the null indicates that there is asymmetry in the speed of adjustment and/or in short-term dynamics depending on the direction of the change in the policy rate. We test both separately and jointly for the two types of asymmetries.[10]

4.2 Multivariate Approach

The interest rate pass-through can be viewed as a chain of pairwise links: policy rate – 1m MMR; 1m MMR – 12m T-bill/MMR rate;12m T-bill/MMR rate – Government bond yield – long-term deposit rate – long-term lending rate (see table 1). Using a cointegrated VAR framework (Johansen, 1995) makes it possible to analyze the many pairwise relationships in a

[10]Whether the asymmetric behavior of the market rate is attributable to the deviation from the long-run equilibrium or to the direction of change in the policy rate depends on the definition of asymmetry one wants to test for. In line with the *cost of funds* approach (DeBondt 2005), we interpret changes in the policy rate as cost shocks to private banks. Thus, it is, inter alia, the degree of competition among banks which determines whether a change in costs can be passed on to the corresponding price (the retail interest rate) and whether or not that response will be symmetric with respect to the direction of the change in the policy rate. The latter (i.e. the existence of a negative or positive cost shock) seems to be the relevant variable for this interpretation, since the deviation from the long-run equilibrium need not be a valid proxy for *cost of funds*-related shocks.

single system. Fully-fledged transmission from policy to retail rates would imply that there would be 4 cointegration relationships in the presence of 5 interest rate series, so that

$$\begin{array}{c} \\ i^P \\ i^{MS} \\ i^{ML} \\ i^D \\ i^L \\ const \end{array} \begin{array}{c} \begin{array}{cccc} i^{MS} & i^{ML} & i^D & i^L \end{array} \\ \left[\begin{array}{cccc} \beta_1 & 0 & 0 & 0 \\ 1 & \beta_2 & 0 & 0 \\ 0 & 1 & \beta_3 & 0 \\ 0 & 0 & 1 & \beta_4 \\ 0 & 0 & 0 & 1 \\ c_1 & c_2 & c_3 & c_4 \end{array}\right] \end{array} \quad implying \quad \begin{array}{l} i^{MS} = c_1 + \beta_1 i^P + \varepsilon \\ i^{ML} = c_2 + \beta_2 i^{MS} + \varepsilon \\ i^D = c_3 + \beta_3 i^{ML} + \varepsilon \\ i^L = c_4 + \beta_4 i^D + \varepsilon \end{array} \qquad (3)$$

In other words, i^P would be connected to i^L via the four pairwise long-term cointegration relationships. However, whether or not there is a proportionate pass-through from i^P to i^L largely depends on the size of the long-term beta coefficients ($pass-through = \beta_1 \cdot \beta_2 \cdot \beta_3 \cdot \beta_4$).

In practice, the pass-through may be incomplete in system (3), because the pass-through from the long-term market rate to retail rates may be ineffective if the yield curve is not stable and/or because the funding of bank lending relies on shorter-term market rates[11] instead of bank deposits/long-term market rates. For instance, if we find 3 cointegrating vectors instead of the 4 required for full pass-through, we estimate a system in which the following cointegrating vectors are assumed $(i^P, i^{MS}); (i^{MS}, i^D); (i^D, i^L)$. If the relationship between deposit and lending rates is not robust, we assume that both deposit and lending rates are connected to short-term market rates: $(i^P, i^{MS}); (i^{MS}, i^D); (i^{MS}, i^L)$.

5 Results

5.1 Cointegration Results

The fact that all interest rate series turn out to be well-represented by I(1) processes for the periods under review[12] justifies the use of the cointegration techniques to determine the size of, and the mechanism underlying, the interest rate pass-through.

In a first step, all market and retail interest rate series are regressed on the monetary policy rate for the whole period and for two subperiods.[13] The first subperiod ends in 2000:12 and

[11] E.g. as a result of interest rate swaps.

[12] Standard unit root and stationarity tests, such as the augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and the Elliott-Rothenberg-Stock (ERS) point optimal unit root tests as well as the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test, are employed for level data and for first and second differences. While most test results show unanimously that the series are I(1) processes, some tests provide conflicting results for level data. However, since they never indicate unambiguously that the series are stationary in level, we conclude that these series are I(1). The test results are available from the authors upon request.

the second subperiod starts in 2001:01[14] The rationale behind splitting the sample into subsamples is to check for major changes in the pass-through over time.[15]

We carry out four cointegration tests: two residual-based tests for the OLS/DOLS estimates[16], one residual-based test and the bounds testing approach for the long-term relationship obtained with the ARDL model. If at least three of the four test statistics support the presence of cointegration, we will consider the cointegration between the policy rate and any given interest rate series to be robust.[17]

The most remarkable feature of the results is the absence of cointegration for a large number of interest rate series. The difficulty of establishing cointegrating relationships is also supported by estimation results obtained for the IFS dataset.[18]

Addressing asymmetries in the adjustment to the long-run relationship and in short-run dynamics is only meaningful when cointegration is detected. The results summarized in tables 2a and 2b indicate some common features. First, asymmetry is most often detected for the 1-month MMR. Second, more asymmetries are observed in the second subperiod. Third, asymmetry is usually present both for the adjustment to the long-run relationship and in short-run dynamics.

5.2 Size of the Pass-Through

In the analysis of the size of the interest rate pass-through, we consider the long-run pass-through coefficient (β) for cases when cointegration could be established with confidence. In

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[13]We use the Schwarz information criterion to select the lag length in the DOLS and ARDL approaches, setting the maximum number of lags to 6.

[14]We split the sample period in 2000:12 and 2001:01, because interest rate series disaggregated by sectors (households, non-financial corporate sector) for the Czech Republic are available from 2001:01. Dividing the series at the same point in time for the other countries secures a higher level of cross-country comparability.

[15]At first glance, the subperiods might seem too short for cointegration analysis. However, contrary e.g. to business cycle analysis (which requires data spanning at least 10 years to cover the whole cycle), interest rate data adjustment in the pass-through context tends to take place much faster. We have 50–60 observations for the subperiods; from an econometric viewpoint, 100–120 observations would be required. Still, the fact that we could not establish cointegration does not necessarily reflect the low power of the tests. Instead, it suggests that such cointegrating vectors are actually absent, given that it is sometimes difficult to find cointegration even for the whole sample. One may also argue that the non-cointegration finding could be mitigated by the use of nonlinear cointegration techniques. However, the term nonlinear cointegration is somewhat misleading given that it refers to nonlinear/asymmetric short-term adjustments rather than to a nonlinear long-term relationship. An alternative approach in these cases would be to use panel cointegration. Even though these tests might have some advantages over time series analysis, they are clearly inappropriate to study the cross-country differences in the interest rate pass-through we are interested in.

[16]Stationarity of the residuals is checked for the long-run coefficients obtained from a simple OLS regression and from DOLS estimations.

[17]These results are not explicitly reported in the paper owing to space constraints. However, they are available from the authors upon request. The shaded cells in tables 2a and 2b indicate the presence of cointegration, while white cells show that the tests failed to establish cointegration.

[18]These results are not reported here, but are available from the authors upon request.

these cases, the size of the pass-through is obtained using the DOLS and ARDL models. Otherwise, we used coefficient estimates from a simple OLS run for first-differenced variables (see tables 2a and 2b). It turns out that, even though the cointegration tests failed to detect long-run relationships between the policy rate and a number of interest rates, the coefficient estimates obtained for series taken in first differences provided us with an opportunity to estimate the pass-through coefficient after all, as they are very often significant and have the expected positive sign.

Let us start with the connection between the policy rate and short- to long-term market rates. It comes as no real surprise that the pass-through from the policy rate to 1m MMR is not significantly different from 1 for practically all countries and periods.

The pass-through to the long-term market rate (government bonds) drops from high levels in the first subperiod to between 40% and 50% in the second subperiod in the Czech Republic and Hungary and becomes insignificant for Poland. For transition economies, this is to be expected since the yield curve at the longer end changed considerably for these economies owing to successful attempts to decrease in inflation rates[19].

With regard to deposit rates, our results demonstrate that the pass-through for overnight (O/N) deposit rates ranges from 10% in Hungary to between 15% and 25% in the Czech Republic, Austria, Germany and Spain, while coming to between 35% and 55% in Poland and Slovakia in the second subperiod. In those countries where sectoral data for O/N deposit rates are available (the Czech Republic and Poland), a major difference is found only in Poland (higher pass-through for households).

These figures for the O/N deposit rates are considerably lower than the pass-through coefficients of short- to long-term deposit rates in all countries, except for Slovakia and Slovenia, where the pass-through coefficients for the latter are not significantly different from zero. In addition, and not astonishingly, changes in the policy rate feed into new deposit rates to a larger extent than into the rates on outstanding deposits (Hungary). Deposit rates for large amounts are more responsive to policy rates than those for small amounts (Germany). The pass-through remained fairly stable over time for most countries, with the notable exceptions

[19]For countries which embarked on a prolonged period of disinflation (e.g. Hungary and Poland), the long-term market rates declined below the level of short-term rates once the market participants were convinced of the steady decrease in inflation rates. However, the negative slope of the yield curve decreased substantially toward the end of disinflation, given the limited room for large drops in future inflation rates. Thus, further cuts in monetary policy rates could not cause long-term market rates to drop to the same extent. As inflation rates stabilized, with disinflation reaching an end, the yield curve eventually flattened out or its slope even became positive.

of Hungary and Poland, where the pass-through increased for O/N deposit rates (both countries) and for household rates (Poland).

Table 2a: Interest Rate Pass-Through – Market Rates[20]

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
CEE-5										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	MMR	1.08**	1.07**		1.11**	1.08**		1.01**	1.01**	C
	MMR 12	0.95**	0.91**	C	0.89**	0.82**	C	1.01**	0.95**	C
	G-bond	0.78**	0.64**	C	0.65**	0.55**		0.43**		
Hungary		1995:9 / 1997:3 – 2005:12			1995:9 / 1997:3 – 2000:12			2001:1 – 2005:12		
	MMR	0.99**	1.01**	C	1.01**	1.01**		1.03**	1.04**	C
	T-bill	0.99**	0.95**	C	1.01***			0.88**	0.85**	
	G-bond	0.61***			0.84**	0.97**	C	0.48***		
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	MMR	1.05**	1.05**	C	1.06**	1.06**	B	1.02**	1.02**	C
	T-bill	0.93**	0.90**		0.66***			0.40***		
	G-bond	0.37***			0.46**			0.15		
Slovakia		1994:1 – 2002:12			1998:7 – 2004:12			2001:1 – 2004:12		
	MMR	0.04			0.02			0.84**	0.89**	C
	MMR 12	0.28			-0.14			0.95**	0.94**	C

Notes: Shaded cells refer to the existence of cointegrating relationships and contain the estimated long-run elasticities (DOLS and ARDL). Non-shaded cells in the "DOLS/1st d" column report the coefficients obtained from first-differenced specifications. The column "AS" shows the type of asymmetry. A: asymmetry in the adjustment to the long-run equilibrium, B: asymmetry in short-run dynamics, C: both A and B. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. NA=data not available for the period under review.

Finally, it is worthwhile taking a closer look at lending rates, which seem to offer us a so far unseen colorful picture. In general, lending rates for households turn out to react less, if at all, to monetary policy rates as compared with lending rates for the corporate sector. No significant or economically meaningful pass-through could be detected for the interest rates on aggregate household lending in the Czech Republic and Slovakia, on consumer lending in Slovakia, on new long-term consumer loans and new housing loans in Hungary. The pass-through for rates on outstanding housing loans in Hungary is only around 20%. The

[20]The following abbreviations were used for market rates: mp= monetary policy rate, mmr= 1-month money market rate; T-bill= 12-month treasury bill rate, mmr12= 12-month money market rate if no T-bill rate is available, gbond= government bond rate.
The information on retail rates is composed of three main blocks (e.g. lhh_l1y_s). The first block indicates the type of interest rate: l= lending rate, d= deposit rate, f= non-financial corporate sector (firms) (lf or df), h= aggregate household loans (dh, lh), hh= housing loan to households, hc= consumer credit to households. The second block denotes the maturity of the series: on= overnight, l1y= less than one year, m1y= more than one year, 1m, 3m= one month, three months; 1y, 3y, 4y= one year, three years, four years, 1y5y= 1 to 5 years, st= short-term, lt= long-term (if the source does not specify the precise maturity). No indication of maturity means that the series covers all maturities. The third block covers two types of information: (1) It may be n or s (n= new loans or deposits; s= stock of deposits or loans). A missing n or s at the end of the label indicates aggregated data for new and old loans (deposits) or simply reflects the lack of specification by the data source. (2) For German deposit rates, a difference is made between interest rates for low-, medium- and high-amount deposits: la, ma, ha (e.g. d_1m_la, d_1m_ma, d_1m_ha). For Austria, a similar type of information is included in the second block: e.g. lf_l1y1M_n refers to the rates for corporate loans exceeding EUR 1 million, while lf_l1y_n stands for the same type of loan below or equal to EUR 1 million.

insensitivity of housing loan rates may reflect the impact of public subsidy schemes in Hungary. By contrast, the pass-through for housing loan rates in Slovenia is almost complete.

Table 2b: Interest Rate Pass-Through – Deposit Rates

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
Overall deposits										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	d_on_s	0			0			0.20***		
	d_l1y_s	0.79**	0.74**	C	0.74**	0.66**		0.80**	0.79**	C
	d_lt_s	0.71**	0.6**	C	0.68**	0.57**	C	0.59***		
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	d_on_n	0.39***			NA	NA	NA	0.40***		
Slovakia		1994:1 – 2002:12			1998:7 – 2004:12			2001:1 – 2004:12		
	d_on_s	NA	NA	NA	0.06			0.33**	0.33**	B
	d_l1y	0.14			0.22			0.3		
Slovenia		1994:1 – 2002:8			1998:7 – 2005:11			2001:1 – 2005:11		
	d_on_n	NA	NA	NA	0.00			0.00		
	d_l1y	2.32**	1.57*							
	d_m1y	NA	NA	NA	0.04			0.10		
Household deposits										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	dh_on_s	NA	NA	NA	NA	NA	NA	0.16***		
	dh_lt_s	NA	NA	NA	NA	NA	NA	0.50**	0.42**	C
Hungary		1995:1 – 2005:12			1995:1 – 2000:12			2001:1 / 2001:5 – 2005:12		
	dh_on_n	0.05			0.01			0.11**		
	dh_on_s	0.16***			0.08*			0.12**		
	dh_l1y_n	0.77**	0.81**	C	0.90**	0.85**		0.73***		
	dh_l1y_s	NA	NA	NA	NA	NA	NA	0.53***		
	dh_m1y_n	0.92**	0.91**	C	0.95**	0.93**		0.52***		
	dh_m2y_n	NA	NA	NA	NA	NA	NA	0.59***		
	dh_m2y_s	NA	NA	NA	NA	NA	NA	0.33***		
	dh_lt_n	0.78**	0.81**	C	0.90**	0.86**		0.72***		
	dh_lt_s	0.78**	0.81**	C	0.92**	0.86**		0.52***		
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	dh_on_s	0.34***			0.32***			0.57**	0.46**	C
	dh_1y_s	0.74***			0.70***			0.82**	0.77**	C
	dh_m1y_s	0.92**	0.92**		0.74***			0.77***		
	dh_lt_s	0.71***			0.70***			0.82**	0.77**	
Corporate deposits										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	df_on_s	NA	NA	NA	NA	NA	NA	0.15**		
	df_lt_s	NA	NA	NA	NA	NA	NA	0.61***		
Hungary		1995:1 – 2005:12			1995:1 – 2000:12			2001:1 / 2001:5 – 2005:12		
	df_l1y_n	0.81**	0.80**		0.89**	0.87**		0.95***		
	df_m1y_n	0.91**	0.90**	A	0.95**	0.92**		0.81**	0.81**	C
	df_lt_n	NA	NA	NA	NA	NA	NA	0.95***		
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	df_on_s	0.22***			0.17***			0.33***		
	df_1y_s	0.71***			0.72***			0.69***		
	df_m1y_s	0.89**	0.90**		0.62***			0.61***		
	df_lt_s	0.87**	0.87**	A	0.69***			0.88**	0.79**	

Note: See Table 2a.

The pass-through amounts to above 70% for consumer loan rates in Slovenia. In Hungary, it comes to almost 60% for new short-term consumer loans and to roughly 40% for the stock of these loans). This is in sharp contrast with the finding that the pass-through is zero for new

long-term consumer loans in Hungary. Only in Slovenia did the size of the coefficient increase.

Table 2c: Interest Rate Pass-Through – Lending Rates

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
Overall lending rates										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	l_l1y_s	–0.07**			–0.07			0.66***		
	l_1y5y_s	NA	NA	NA	NA	NA	NA	0.25		
Lending rates for household										
Czech Rep.	Lh_l1y_s	NA	NA	NA	NA	NA	NA	0.75		
	Lh_1y5y_s	NA	NA	NA	NA	NA	NA	0.07		
	Lh_m5y_s	NA	NA	NA	NA	NA	NA	0.08		
Hungary		1995:1 / 1997:1 – 2005:12			1995:1 / 1997:1 – 2000:12			2001:1 – 2005:12		
	lhc_l1y_n	0.42**	0.42**	C	0.55**	0.55**		0.57**	0.66**	C
	lhc_l1y_s	NA	NA	NA	NA	NA	NA	0.38***		
	lhc_m1y_n	0.24			0.60**	0.57**		0.29		
	lhc_m1y_s	NA	NA	NA	NA	NA	NA	0.24***		
	lhh_n	0.07			1.00**	1.11**		0.19		
	lhh_s	NA	NA	NA	NA	NA	NA	0.16**		
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	Lh_n	0.63***			NA	NA	NA	0.43***		
Slovakia		1994:1 – 2002:12			1998:7 – 2004:12			2001:1 – 2004:12		
	Lh_s	NA	NA	NA	–0.06**	–0.06		–0.03		
	Lh_n	NA	NA	NA	–0.57**	–0.60**		–0.55**	–0.57**	
	lhc_s	NA	NA	NA	–0.41			–0.53		
	lhc_n	NA	NA	NA	–0.29**	–0.24		–0.25*	–0.26	
	lhc	NA	NA	NA	–0.53			–1.39**	–1.50**	
Slovenia		1994:1 – 2002:8			1998:7 – 2005:11			2001:1 – 2005:11		
	lhc	0.92*			0.06			0.76**	0.72**	
	lhh	0.86*			0.19			1.14**	1.12**	B
Lending rates for the non-financial corporate sector										
Czech Rep.		1995:12 – 2005:12			1995:12 – 2000:12			2001:1 – 2005:12		
	lf_l1y_s	NA	NA	NA	NA	NA	NA	0.87**	0.86**	
	lf_1y5y_s	NA	NA	NA	NA	NA	NA	0.98**	1.02**	
	lf_m5y_s	NA	NA	NA	NA	NA	NA	0.25		
Hungary		1995:1 – 2005:12			1995:1 – 2000:12			2001:1 – 2005:12		
	lf_l1y_n	1.01**	1.00**	C	0.35***			0.96**	0.96**	C
	lf_m1y_n	1.01**	0.97**		1.09**	1.07**	A	0.72**	0.72**	
Poland		1996:12 / 1998:7 – 2005:12			1996:12 – 2000:12			2001:1 – 2005:12		
	lf_l1y_n	0.83***			NA	NA	NA	0.50***		
	lf_m1y_n	0.78***			NA	NA	NA	0.45***		
	lf_3y_s	0.74***			0.87***			0.47***		
	lf_n	0.79***			NA	NA	NA	0.54***		
Slovakia		1994:1 – 2002:12			1998:7 – 2004:12			2001:1 – 2004:12		
	lf_l1y	0.28			1.04**	0.93**		0.73**	0.82**	
	lf_m1y	0.49			0.92			0.99**	1.03**	B
	lf_s	NA	NA	NA	0.72**	0.89**		0.15		
	lf_n	NA	NA	NA	0.56			1.01**	1.03**	
Slovenia		1994:1 – 2002:8			1998:7 – 2005:11			2001:1 – 2005:11		
	lf_l1y	0.91*			0.13			0.15		
	lf_m1y	0.96*			0.25			1.27**	1.28**	

Note: See Table 2a.

Corporate loan rates are generally very responsive to monetary policy rate changes, with the pass-through estimate ranging from 50% for Poland to 100% for the Czech Republic, Hungary, Slovakia, Slovenia (with the exception of short-term rates). Nevertheless, these

results should be taken with some qualification. First, the pass-through for short-term corporate loan rates in Hungary seems to be more pronounced than for long-term corporate loan rates while the opposite holds true in Slovakia and to some extent also in the Czech Republic and in Slovenia. Second, while the pass-through is complete for the rates on new loans, it vanishes completely for the rates on the outstanding stock of loans in Slovakia. Finally, no clear-cut statement can be made about the temporal evolution of the pass-through for corporate rates. For instance, it diminished for long-term lending rates in Hungary and increased for short-term lending rates. In Slovakia and Slovenia, pass-through for long-term rates became significant in the second subperiod. By contrast, the pass-through coefficients of corporate lending rates (all maturities) in Poland were lower in the second period compared with the first and/or the whole period.

5.3 The Pass-Through to Retail Rates via Market Rates

For the multivariate cointegrated VAR setting, we select countries in accordance with a twofold criterion. First, at least 12m MMR/T-bill rates and retail rates should be connected to the policy rate through a cointegrating vector obtained from the single equation analysis. Second, both deposit and lending rates of comparable maturity should pass the cointegration criterion with positive and statistically significant coefficient estimates. The two countries which qualify in terms of these two criteria are the Czech Republic and Hungary.

For the Czech Republic, only the second subperiod is analyzed, given that cointegration for lending rates is found only in the period 2001–2005. The selected retail rates are lending rates for the non-financial corporate sector with a maturity of less than 1 year and 1–5 years and an aggregate deposit rate with a maturity of less than 1 year and household deposit rates for maturities longer than overnight. This leads us to build a system for short-term deposit and lending rates (mp→1mMMR→12mMMR→dep (d_l1y_s)→len(lf_l1y)) and for long-term deposit and lending rates (mp→ 1mMMR→ 12mMMR → gbond→ dep(dh_lt_s)→ len(lf_1y5y)).

For the short-term system[21], the trace statistics identifies four cointegration vectors. This indicates a fully-fledged pass-through from the monetary policy rate to deposit and lending rates. The long-term coefficient, shown in table 3, is close to unity for market rates (1.01 and 1.05). It is 0.73 for the relation 12m MMR – deposit rate, which is in line with the findings of the single-equation approach if accounting for the previous chains (0.75 vs.

[21]The lag length in the VAR is selected using the Schwarz information criterion by setting the maximum number of lags to 6 as in the single-equation approach.

1.01*1.05*0.73=0.77). The long-run coefficient between deposit and lending rates is as high as 1.16. Therefore we think that this coefficient does not capture the relationship between deposit and lending rates, but rather reflects the relative size of the pass-through from 12m MMR rates to those rates. Indeed, if we specify the fourth cointegration vector as linking 12m MMR rates to the lending rates, the estimated coefficient is 0.85, which is higher than the coefficient for the relation 12m MMR – deposit rate, thus confirming our earlier results from the direct monetary policy approach (0.86–0.87 vs. 1.01*1.05*0.85=0.90).

In the system of long-term rates with six variables, we detected four cointegration relationships. Given that one more variable is included (government bond rates), one chain link is not functional. Our earlier results from the single-equation approach implicitly indicate the absence of cointegration for the link 12m MMR – government bond yield.[22] The long-run coefficients of this system reported in table 3 confirm an almost one-to-one reaction of the lending rates to 12m MMR.

For Hungary, only a five-variable system excluding government bond rates is estimated since we did not find cointegration between the policy rate and government bond yields. The two systems estimated for consumer loan rates and corporate lending rates provide evidence of a fully-fledged transmission from the policy rate through 1m MMR and 12m T-bill rates to deposit rates (new long-term corporate deposit rates) and lending rates (new short-term consumer lending rates and new long-term corporate lending rates). The results furthermore confirm the findings of the single-equation estimations which show a very strong pass-through to long-term deposit rates and indicate that the pass-through is higher for (long-term) corporate loan rates than for (short-term) consumer loan rates, even though the former becomes weaker, while the latter rises slightly over time.

[22]The pass-through from the policy rate to the 12m MMR is almost complete, while no cointegration could be detected between the monetary policy rate and government bond yields for the second subperiod. This implies a lack of cointegration between 12m MMR and government bond yields.

Table 3: Multivariate Analysis - Results

	COINT	MP→1mMMR	1mMMR→12mMMR	12mMMR→GBOND	12mMMR→DEP	DEP→LEN	12mMMR→LEN
Czech Republic							
MP→1m MMR→12m MMR→DEP (D_L1Y_S)→LEN (LF_L1Y)							
2001:1 – 2005:12	4**	1.01**	1.05**		0.73**	1.16**	
K=1	4**	1.01**	1.05**		0.73**		0.85**
MP→1m MMR→12m MMR→GBOND→DEP (DH_LT_S)→LEN (LF_1Y5Y)							
2001:1 – 2005:12	4**	1.01**	0.92**	--	0.56**	1.84**	
K=1	4**	1.01**	0.92**	--	0.56**		1.03**
Hungary							
MP→1m MMR→12m TBILL→DEP (DF_M1Y_N)→LEN (LHC_L1Y_N)							
1997:3 – 2005:12	4**	1.02**	0.98**		0.93**	0.42**	
K=1	4**	1.01**	0.98**		0.93**		0.39**
2001:1 – 2005:12	4**	1.02**	0.85**		0.99**	0.72**	
K=1	4**	1.02**	0.85**		0.99**		0.72**
MP→1m MMR→12m TBILL→DEP (DF_M1Y_N)→LEN (LF_M1Y_N)							
1997:3 – 2005:12	4**	1.01**	0.98**		0.93**	1.06**	
K=2	4**	1.02**	0.98**		0.94**		0.99*
2001:1 – 2005:12	4**	1.02**	0.85**		0.99**	0.84**	
K=2	4**	1.02**	0.85**		0.99**		0.83**

Notes: k=1 or k=2 indicates the lag length chosen by the Schwarz information criterion. COINT shows the number of cointegrating vectors detected by the trace statistic. * and ** indicate statistical significance at the 10% and 5% levels, respectively.

5.4 Comparison with Previous Estimates and with the Euro Area

Our results confirm earlier findings in the literature that the pass-through is generally very low for overnight deposit rates, but becomes substantially higher for short- to long-term deposit rates. At the same time, corporate lending rates are much more responsive to changes in the policy rate than deposit or household loan rates.

However, several prominent differences between our results and the existing estimates catch one's eyes.[23] First, our estimates indicate a lower pass-through for overnight and long-term household deposit rates in Hungary, a moderately lower pass-through for all kinds of deposit rates in Poland, a moderately lower pass-through for long-term corporate loan rates in Hungary and for short-term and long-term corporate loan rates in Poland. Second, our estimations fail to establish any significant relationship between monetary policy rates on the one hand, and deposit rates in Slovakia, as well as aggregate household loan rates (and consumer loan rates) in the Czech Republic and Slovakia, on the other hand.

One key reason for these differences is that most of the existing literature estimates error correction models without checking the existence of a valid cointegration relationship. However, a number of series are not cointegrated with policy rates. The estimated coefficients we derived by using regressions applied to first differenced series tend to be lower than those

[23] Égert and MacDonald (2006) provide an overview on interest rate pass-through estimates in transition economies.

resulting from the cointegration analysis (which was inappropriate in the given context). Another possible explanation for our lower estimates is a possible decrease in the pass-through over time, given that our data sample covers more recent periods.

While other papers identify no major asymmetries for the CEE-5, our results indicate that the reaction of retail and market rates becomes increasingly asymmetric depending on the direction of changes in the policy rate. However, it was not possible to make out a general pattern for this asymmetric behavior for specific interest rates (except, perhaps, for short-term money market rates).

Our results obtained for selected euro area countries, namely Austria, Germany and Spain[24][25] are partly in line with earlier findings as the pass-through appears to be lower in Austria and in Germany than in the CEE-5. Nevertheless, the interest rate pass-through in the CEE-5 are more comparable with those in Spain than with those in the other euro area countries.

6 Future Evolution of the Interest Rate Pass-Through

A number of researchers have attempted to identify the factors affecting the size and speed of the pass-through in transition economies. This literature suggests that banking sector characteristics have an important role to play in the size of the pass-through. In particular, higher concentration of the banking sector, if it proxies lower competition, higher profitability and higher capitalization of banks typically make banks less receptive to adjusting their retail rates to market or policy rates, and hence dampen the interest rate pass-through. At the same time, the ownership structure, especially the involvement of foreigners in the banking sector, may enhance the interest rate pass-through. These findings are contradictory given that foreign participation usually leads to higher concentration and that foreign-owned banks tend to be more profitable and better capitalized. However, this contradiction could be explained by the argument that foreign participation increased efficiency and competition during the early stages of privatization while it led to a consolidation of the banking sector during the late 1990s and the early 2000s. In addition, (foreign) banks in the CEE-5 tended to fund their lending activity by domestic savings in the 1990s, whereas they were increasingly relying on foreign funds during the last 5 years or so, which diminished their sensitivity to changes in domestic policy rates.

[24] Austria, Germany and Spain represent small open economies, large core countries and catching-up countries, respectively.
[25] These results are reported in Appendix B.

The empirical evidence is thus far mixed regarding the role of macroeconomic conditions in the pass-through. For instance, GDP growth and financial deepening do not seem to affect the pass-through, while lower inflation and higher money market volatility are found to decrease the pass-through.

Against this backdrop, we can draw some speculative conclusions about the future evolution of the pass-through from the possible development of the factors driving the pass-through. From a macro-perspective, money market volatility is bound to fall to euro area levels after euro adoption, and financial depth is likely to rise in the years to come. At the same time, inflation rates will tend to close the gap to the inflation rate of the euro area, and long-run GDP growth may slow down as real convergence progresses. The first two factors will work toward an increase in the pass-through while the other two factors could dampen it. Looking at the structure of the banking sector, Poland and Slovenia have fewer foreign investors, partly because of slower banking sector reform. Poland and Slovenia are also the countries with the highest burden of nonperforming loans, and Slovenia has the lowest capital adequacy ratio, albeit still comparable to that of the euro area. All this is admittedly detrimental to the pass-through. So, by making efforts on the front of banking reforms, these countries would be able to enhance the interest rate pass-through. However, market concentration has recently been on the rise in most of these countries. Concentration measured by the Herfindahl index is well above the euro area level in Slovenia, but also in Slovakia, while concentration is considerably lower in Hungary and Poland. Given that market concentration is still on the rise, the interest rate pass-through may slow down and become less complete in the future in these countries if increasing concentration will be associated with less competition.

Table 4. Factors amplifying or attenuating the interest rate pass-through

	CZ	HU	PL	SK	SI
MACROECONOMY (2004)					
Inflation (%)	2.6	6.8	3.6	7.5	3.7
Money market volatility	0.75	1.92	1.88	1.37	1.23
GDP growth (%)	4.4	4.6	5.3	5.5	4.2
Financial depth: Private credit to GDP[a]	0.30	0.38	0.28	0.35	0.39
BANKING SECTOR					
Concentration - Herfindahl index	1103	795	692	1154	1425
- 5 largest banks (in total assets%)	64.0	52.7	50.2	66.5	64.1
Foreign banks - Change in number 1995-2003	3	8	28	-2	0
- % in total assets in 2003	96.0	83.3	67.8	96.3	36.0
State ownership (% in total) 1995	17.6	49	71.7	61.2	41.7
2003	3.0	7.4	25.7	1.5	12.8
Bad loans (% in total) 1995	26.6	na	23.9	41.3	9.3
2003	5.0	3.8	25.1	9.1	9.4

Note: In the euro area, the Herfindahl index was 966 in the year 2004.
Source: Inflation and GDP growth: Eurostat/NewCronos, money market volatility is based on the relative standard deviation of monthly observations for 1-month money market interest rates from 2002 to 2004. Private credit to GDP: World Bank Development Indicators (WDI) 2005, banking sector concentration: ECB (2005): EU Banking Structures, October, WDI 2005. Data on foreign banks, state ownership and bad loans are obtained from the EBRD Transition Report (2004).

7 Concluding Remarks

In this study, we analyzed the size of the interest rate pass-through for five CEE countries. Our results confirm earlier findings in the literature that the pass-through is generally very low for overnight deposit rates, but becomes substantially higher for short- to long-term deposit rates and corporate lending rates are much more responsive to changes in the policy rate than deposit or household loan rates. Our findings also support the view that the pass-through is on average higher in the CEE-5 than in core euro area countries, like Austria and Germany.

At the same time, our results enrich our understanding of the interest rate pass-through in various ways. First, our pass-through estimates for the CEE-5 tend to be lower for a number of retail rates than those of previous estimates. This is primarily attributable to the fact that while previous studies have chiefly relied on error correction models without explicitly checking the presence of cointegrating relationships between the policy and retail rates, we found it difficult to establish cointegration and pass-through estimates obtained for first differenced stationary series are lower than for data in level. In addition, we failed to detect significant pass-through effects in a number of cases, in particular in Slovakia and Slovenia.

Second, we found little empirical support for a functioning pass-through to long-term market rates, presumably owing to the instability of the yield curve at the longer end of the maturity spectrum. Instead, the effect of changes in the key policy rate even transits through money market and T-bill rates to long-term deposit and lending rates.

The interest rate pass-through improved substantially from the beginning of transition until around the early 2000s mostly because of the impressive development of the financial and banking sectors in these countries. However, our results indicate a reversal of this trend. Our lower pass-through estimates suggest that pass-through is declining over time, as our data is from a more recent period. This is also backed by direct econometric evidence. Elements of an explanation for the weakening of the pass-through could be the substantial slowdown in inflation rates on the macro side and less competition among banks and more reliance on foreign funds for lending activity on the micro side.

We argued that the slowdown in the pass-through might continue in the future given that a progressive slowdown in economic growth as real convergence advances and, perhaps more importantly, increasingly concentrated banking sectors will cause the pass-through to slow down even though bringing to an end banking sector privatization and liberalization in some of the countries (Poland and Slovenia) could enhance the pass-through for some time.

Although the interest rate pass-through in the CEE-5 is higher than in core euro area countries, it is fairly comparable with that in Spain. The possible future decrease in the pass-through in the CEE-5 further underpins the view that the euro area will presumably not become more heterogeneous with respect to the interest rate pass-through once the CEE-5 will have adopted the euro in the longer run.

In the shorter run, however, asymmetries may prevail. This question is of particular relevance for Slovenia, which will become a full member of the euro area on January 1, 2007. In Slovenia, the interest rate pass-through shows a rather fuzzy pattern given that no tangible pass-through could be detected for deposit rates and long-term corporate loans, while a very strong pass-through emerges for household loan and short-term corporate loan rates. This could imply not only that changes in the ECB's policy rate will have asymmetric effects on deposit and loans within Slovenia, but also that these effects will be different than in the rest of the euro area.

However good and reassuring the news about a possible longer-run convergence in the size of the pass-through across Eastern and Western Europe might be, it gives barely any clue regarding a possible convergence or similarities in the second stage of the monetary transmission mechanism (including the money, credit, asset price and exchange rate channels), i.e. whether monetary policy steps would achieve similar impact on prices and output in the euro area than in the CEE-5 in the event that they would introduce the euro. The

literature dealing with this question is still in its infancy and substantially more work will be needed to answer these issues.

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Appendix A – Data Definitions

Our dataset covers the CEE-5 (the Czech Republic, Hungary, Poland, Slovakia and Slovenia) and three euro area countries (Austria, Germany and Spain). The monthly data series include short-term market rates, i.e. (annualized) 1-month money market rates (MMR), and 12-month T-bill rates (if not available, 12-month MMR), long-term market rates, i.e. 3- to 5-year government bond yields, as well as economy-wide and sectoral retail rates (households and non-financial corporate sector) of different maturity (overnight rates, short- and long-term rates). For the Czech Republic, Hungary, Poland, Austria and Germany, these data are primarily obtained from the national central banks and the ministries of finance. For Slovakia, Slovenia and Spain, the main data source is NewCronos (Eurostat). Some of the market rates are drawn from Datastream and Bloomberg, if not available from national sources or from Eurostat. Whenever possible, the lending rate series for households are split into housing and consumer loans. The time series start in January 1994 at the earliest for the CEE-5 and usually end in end-2005.

Furthermore, we distinguished between retail rates on the stock of deposits/loans and those applied to newly collected deposits/newly extended loans. This is important because the (weighted) average interest rates on outstanding deposits and loans (which include contracts with fixed rates and contracts with variable rates that are adjusted at a later stage) may react more slowly than the interest rates of new deposits and loans. The maturity of the series is another important issue. In conventional interest rate statistics, maturity refers to the duration of the loan or deposit contract, not to the period of interest rate fixation. In the new harmonized interest statistics developed in the euro area and in new EU Member States, however, maturity refers to the period of interest rate fixation. However, most of those series start as late as 2003, with the exception of the lending rate time series for Austria.

We constructed another database that includes interest rate series obtained from the International Monetary Fund's International Financial Statistics (IFS): discount rates (line 60), money market rates (line 60b), T-bill rates (line 60c), deposit rates (line 60l), lending rates (line 60p) and government bond yields (line 61). The series usually cover the period 1991–2005. They are constructed using data series compiled on the basis of different methodologies (which explains their length for transition economies) and do not distinguish

between different maturities.[26] Hence, it is interesting to see whether or not the results differ for our two datasets.

Czech Republic: Data series are obtained from the Czech National Bank if not indicated otherwise (in parentheses).

1995:12 – 2005:12 mp (2-week repo rate), mmr (Datastream 1995:12-96:12, Bloomberg thereafter), mmr12 (Datastream, PRIBK1Y), d_on_s, d_lt_s, d_l1y_s, l_l1y_s

1997:2-2005:12 gbond (Bloomberg)

2001:1 – 2005:12 dh_on_s, dh_lt_s, df_on_s, df_lt_s, l_1y5y_s, lh_l1y_s, lh_1y5y_s, lh_m5y_s, lf_l1y_s, lf_1y5y_s, lf_m5y_s.

Hungary: Data series are obtained from the National Bank of Hungary if not indicated otherwise (in parentheses).

1995:1- 2005:12 mp (active overnight repo rate until 1995:12, passive 1-month repo rate from 1996:12 to 1999:2, 2-week deposit rate thereafter), dh_on_n, dh_on_s, dh_lt_n, dh_lt_s, dh_l1y_n, dh_m1y_n, df_l1y_n, df_m1y_n, lhh_n, lf_l1y_n, lf_m1y_n

1995:9 – 2005:12 mmr (Datastream 1995:9–1996:7, Bloomberg thereafter)

1997:1 – 2005:12 lhc_l1y_n, lhc_m1y_n

1997:3 – 2005:12 tbill, gbond

2000:1 – 2005:12 df_lt_n, lhc_l1y_s, lhc_m1y_s, lhh_s

2001:5 – 2005:12 dh_l1y_s, dh_m2y_n, dh_m2y_s

Poland: Data series are obtained from the National Bank of Poland if not indicated otherwise (in parentheses).

1994:2 – 2005:11 mp (1994:2–1994:3 rediscount rate; thereafter short-term NBP bills: "intervention rate"), mmr (Datastream 1994:2–1996:8, Bloomberg thereafter), tbill (Ministry of Finance), gbond (Ministry of Finance, Bloomberg thereafter)

1996:12 – 2005:11 dh_on_s, dh_lt_s, dh_1y_s, dh_m1y_s, df_on_s, df_lt_s, df_1y_s, df_m1y_s, lf_3y_s

Data series are obtained from NewCronos/Eurostat:

1998:07 – 2005:11 lh_n, lf_l1y_n, lf_m1y_n, lf_n, d_on_n

Slovakia: The data series are obtained from NewCronos/Eurostat if not indicated otherwise (in parentheses).

1994:1 – 2005:12 mp (NewCronos: other official rates until 2000:1; official refinancing operation rate thereafter; cross-checked with National Bank of Slovakia data), mmr (National Bank of Slovakia via Datastream: SXIBK1M; cross-checked with NewCronos data)

1994:9 – 2005:12 mmr12 (National Bank of Slovakia via Datastream: SXIBK1Y)

1994:1 – 2002:12 d_l1y, d_m1y, lf_l1y, lf_m1y

1998:7 – 2004:12 lf_l1y_s, lf_l1y_n, lf_m1y_s, lf_s, lf_n, lhc_s, lhc_n, lhc, lh_s, lh_n, d_on_s

Slovenia: The data series are obtained from NewCronos/Eurostat if not indicated otherwise (in parentheses).

1994:1 – 2005:11 mp (NewCronos: official lending rate)

1994:1 – 2002:08 lf_l1y, lf_m1y, lhc, lhh, d_l1y,

1998:7 – 2005:11 lf_l1y_n, lf_m1y_n. lhc_n. lhh_n. d_on_n. d_m1y.

Germany: The data series are obtained from the Deutsche Bundesbank if not indicated otherwise (in parentheses).

1992:11 – 2005:12 mp (NewCronos: official refinancing operation rates, Deutsche Bundesbank until 1998:12, European Central Bank after 1999:1), mmr, mmr12, gbond (4-5-year government bond)

1991:1 – 2003:6 lh_lt, lhh_5y, lhh_10y, lhh, lhc, lhh, lf_st_5, lf_st_25, lf_2y, lf_l1y, d_1m_la, _1m_ma, d_1m_ha, d_4y, d_l1y,

[26]The IFS manual remains very vague about the exact definition of the series e.g. regarding maturity.

1996:11 – 2003:6 lf_st_1, lh_st, lf_m1y, dh_on, d_3m, lf_la, lf_ha, lh_st

Spain: The data series are obtained from NewCronos/Eurostat if not indicated otherwise (in parentheses).

1992:11 – 2003:6 mp (NewCronos: official refinancing operation rates, Bank of Spain until 1998:12, European Central Bank after 1999:1), mmr (Datastream: ESMIB1M), mmr12 (Datastream: ESMIB1Y), gbond (5-year swap, Datastream: ICESP5Y), lf_l1y, lf_m1y, lh, lhh, d_on, d_l1y, d_other,

Austria: The data series are obtained from the Oesterreichische Nationalbank if not indicated otherwise (in parentheses).

1995:12 – 2005:11 mp (NewCronos: official refinancing operation rates, Oesterreichische Nationalbank until 1998:12, European Central Bank after 1999:1), mmr (Bloomberg), mmr12 (Bloomberg), gbond (Bloomberg), dh_on_s, dh_l1y_n, dh_m2y_n, df_on_s, df_l1y_n, df_m2y_n, lhh_l1y_n, lhh_1y5y_n

1999:6 – 2005:11 lf_l1y_n, lf_1y5y_n, lf_l1y1M_n, lhc_l1y_n, lhc_1y5y_n

Appendix B - Estimation Results for Selected Euro Area Countries

Table B1: Interest Rate Pass-Through – Market Rates

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
Austria		1996:6 – 2005:11						1999:1 / 1999:6 – 2005:11		
	MMR	0.66***			NA	NA	NA	1.01**	0.99**	C
	MMR 12	0.44***			NA	NA	NA	0.36***		
	G-bond	0.20*			NA	NA	NA	0.14		
Germany		1992:11 – 2003:6			1992:11 – 1998:12			1999:1 – 2003:6		
	MMR	1.01**	1.00**		1.00**	1.00**	C	1.00**	0.98**	C
	MMR 12	0.49***			0.68***			0.35***		
	G-bond	0.18*			0.31*			0.07		
Spain		1992:11 – 2003:6			1992:11 – 1998:6			1999:1 – 2003:6		
	MMR	1.03**	1.02**	C	1.04**	1.01**	C	0.98**	0.96**	
	MMR 12	0.38***			0.35**			0.31*		
	Swap 5y	0.31**			0.29*			0.07		

Notes: Shaded cells refer to the existence of cointegrating relationships and contain the estimated long-run elasticities (DOLS and ARDL). Non-shaded cells in the "DOLS/1st d" column report the coefficients obtained from first-differenced specifications. The AS column shows the type of asymmetry. A: asymmetry in the adjustment to the long-run equilibrium, B: asymmetry in short-run dynamics, C: both A and B. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. NA=data not available for the period under review.

Table B2: Interest Rate Pass-Through – Deposit Rates

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
Overall deposits										
Germany		1992:11 – 2003:6			1992:11 – 1998:12			1999:1 – 2003:6		
	d_1m_la	0.42***			0.75**	0.73**		0.43***		
	d_1m_ma	0.46***			0.81**	0.80**		0.80**	0.79**	C
	d_1m_ha	0.90**	0.91**	C	0.90**	0.89**	B	0.88**	0.87**	
	d_3m	NA	NA	NA	NA	NA	NA	0.46***		
	d_l1y	0.83**	0.83**	C	0.83**	0.83**		0.46***		
	d_4y	0.29***			0.27**			0.29***		
Spain		1992:11 – 2003:6			1992:11 – 1998:6			1999:1 – 2003:6		
	d_on	0.14**			0.09**			0.20***		
	d_l1y	0.97**	0.91**		0.32***			0.41***		
	d_other	0.74**	0.69**	C	0.75**	0.77**	C	0.32***		
Household deposits										
Austria		1996:6 – 2005:11						1999:1/ 1999:6 – 2005:11		
	dh_on_s	0.13***			NA	NA	NA	0.23**	0.21**	
	dh_l1y_n	0.33***			NA	NA	NA	0.36***		
	dh_m2y_n	0.30***			NA	NA	NA	0.58**	0.61**	
Germany		1992:11 – 2003:6			1992:11 – 1998:12			1999:1 – 2003:6		
	dh_on	NA	NA	NA	NA	NA	NA	0.22***		
Corporate deposits										
Austria		1996:6 – 2005:11						1999:1/ 1999:6 – 2005:11		
	df_on_s	0.15***			NA	NA	NA	0.25**	0.22**	
	df_l1y_n	0.23***			NA	NA	NA	0.24***		
	df_m2y_n	0.42**	0.43**		NA	NA	NA	0.39**	0.39**	

Note: See Table 2a.

Table B3: Interest Rate Pass-Through – Lending Rates

		Whole period			1st subperiod			2nd subperiod		
		DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS	DOLS/1st d	ARDL	AS
Lending rates for household										
Austria		1996:6 – 2005:11						1999:1 / 1999:6 – 2005:11		
	lhc_l1y_n	NA	NA	NA	NA	NA	NA	0.25***		
	lhc_1y5y_n	NA	NA	NA	NA	NA	NA	1.02**	1.04**	
	lhh_l1y_n	0.20***			NA	NA	NA	0.19***		
	lhh_5yn	0.20***			NA	NA	NA	0.20***		
Germany		1992:11 – 2003:6			1992:11 – 1998:12			1999:1 – 2003:6		
	lh_st	NA	NA	NA	NA	NA	NA	0.18***		
	lh_lt	0.19***			0.19***			0.14***		
	lhc	0.19***			0.19***			0.14***		
	lhh	0.18**			0.22			0.14		
	lhh_5y	0.18**			0.22			0.14		
	lhh_10y	0.07			0.02			0.06		
Spain		1992:11 – 2003:6			1992:11 – 1998:6			1999:1 – 2003:6		
	lh	1.24**	1.19**		1.29**	1.26**		0.60**	0.60**	
	lhh	1.19**	0.95**		1.24**	1.41**		0.65**	0.68**	C
Lending rates for the non-financial corporate sector										
	lf_m1y	0.96*			0.25			1.27**	1.28**	
Austria		1996:6 – 2005:11						1999:1 / 1999:6 – 2005:11		
	lf_l1y_n	NA	NA	NA	NA	NA	NA	0.42***		
	lf_1y5y_n	NA	NA	NA	NA	NA	NA	0.27**		
	lf_l1y1M_n	NA	NA	NA	NA	NA	NA	0.55***		
Germany		1992:11 – 2003:6			1992:11 – 1998:12			1999:1 – 2003:6		
	lf_la	NA	NA	NA	NA	NA	NA	0.14		
	lf_ha	NA	NA	NA	NA	NA	NA	0.13		
	lf_st_1	NA	NA	NA	NA	NA	NA	0.19***		
	lf_st_5	0.28***			0.27***			0.24***		
	lf_st_25	0.28***			0.33***			0.20***		
	lf_l1y	0.28***			0.33***			0.20***		
	lf_2y	0.30***			0.39***			0.22**		
	lf_m1y	NA	NA	NA	NA	NA	NA	0.13		
Spain		1992:11 – 2003:6			1992:11 – 1998:6			1999:1 – 2003:6		
	lf_l1y	0.68***			0.70***			0.88**	0.76**	C
	lf_m1y	0.37***			0.36***			0.73**	0.70**	C

Note: See Table 2a.

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