Institut für Makroökonomie
und Konjunkturforschung
Macroeconomic Policy Institute

Working Paper

12/2011

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Dominik Bernhofer
Vienna University of Economics and Business Administration

Till van Treeck
Macroeconomic Policy Institute (IMK), Düsseldorf

October 4, 2011

Hans-Böckler-Straße 39
D-40476 Düsseldorf
Germany
Phone: +49-211-7778-331
IMK@boeckler.de
http://www.imk-boeckler.de

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Abstract

We analyse the bank interest rate pass-through in the euro area for the period 1999:1 - 2009:11, relating market interest rates to bank retail rates of comparable maturities. We first estimate single equation error correction models for seven interest rate categories and ten euro area countries and find that the interest rate pass-through displays substantial heterogeneity especially in the short run, but also in the long run. We then apply the pooled mean group estimator (PMGE) advanced by Pesaran et al. (1999), allowing for country-specific interest rate pass-through in the short run, while constraining the long-run pass-through to be homogeneous across countries. We find significant evidence of substantial heterogeneity in the short-run pass-through. Finally, we conduct sub-sample analysis and conclude that the degree of heterogeneity and the overall efficiency of the interest rate pass-through have not improved in the second half of the existence of the European Monetary Union.

Keywords: Interest rate pass-through, European Monetary Union, European financial integration, cointegration analysis, panel data analysis

JEL Classifications: E43, G21, F36

*Address for correspondence: Till van Treeck, Macroeconomic Policy Institute (IMK), Hans-Böckler-Straße 39, 40476 Düsseldorf, Germany. Email: Till-van-Treeck@boeckler.de. We thank Matthew Greenwood-Nimmo and Sven Schreiber for helpful comments. The usual disclaimer applies.

1 Introduction

Since the introduction of the single currency in 1999, the interest rate pass-through in the euro area has received much attention amongst central bankers and academics. If banks pass-through changes in market rates to their lending and deposit rates in a sluggish and/or incomplete way, and if pass-through patterns differ across countries and interest rate categories, then the monetary transmission mechanism in the monetary union will likely be sub-optimal. In effect, it has been noted that the pass-through from market to bank retail rates has continued to be heterogeneous both across countries and interest rate categories (e.g. Sander and Kleimeier 2004, Kleimeier and Sander 2006, Sorensen et al. 2006). Some authors have, however, concluded that the interest rate pass-through has become more efficient since the introduction of the euro and that increasing competition as a result of the single market was likely to further increase the efficiency and homogeneity of interest rate tranmission (e.g. Sander and Kleimeier 2004, de Bondt 2005, van Leuvensteijn et al. 2008).

In this paper, we contribute to the literature by applying different estimation techniques to a longer than previously available dataset. We analyse the bank interest rate pass-through in the euro area for the period 1999:1 - 2009:11 following the 'cost-of-funds approach', *i.e.*, relating market interest rates to bank retail rates of comparable maturities. We first estimate single-equation error correction models for seven interest rate categories and ten euro area countries and find that the interest rate pass-through displays substantial heterogeneity especially in the short run, but also in the long run. However, we often fail to establish a statistically significant cointegrating relationship. We then estimate our pass-through equations in a panel framework, applying the pooled mean group estimator (PMGE) advanced by Pesaran et al. (1999), allowing for country-specific interest rate pass-through in the short run, while constraining the long-run pass-through to be homogeneous across countries. We find significant evidence of substantial heterogeneity in the short-run pass-through. Finally, we conduct sub-sample analysis and conclude that, contrary to the hopes that were associated with the introduction of the single currency, important heterogeneities in the bank interest rate pass-through persist in the Euro area. In fact, our results indicate that the efficiency of the interest rate pass-through has somewhat declined in the second half of the existence of the European Monetary Union.

The paper proceeds as follows. In Section 2, we sketch the theory of the bank interest rate pass-through and review the existing empirical evidence for the euro area. Section 3 presents the empirical analysis, and Section 4 concludes.

2 The bank interest rate pass-through

2.1 Theory

The vast literature on interest rate pass-through starts from a simple mark-up pricing model following Rousseas (1985):

$$r_t^b = \alpha + \beta r_t^m, \tag{1}$$

where r_t^b is the lending rate charged by banks, r_t^m the marginal cost approximated by a market interest rate, α a constant mark-up and β is the pass-through parameter. Because interest rates are usually found to follow non-stationary $I(1)$ processes, Equation (1) can be estimated in the form of an error correction model capturing both the long-run equilibrium between retail rates and market rates as well as the associated adjustment dynamics.

Two approaches can be found in the literature (see Kwapil and Scharler 2006 for a survey). The 'monetary policy approach' addresses the linkage between bank lending rates and the policy rate (or short-term market rate taken as a proxy). By contrast, the 'cost-of-funds approach' investigates the relationship between bank lending rates and market rates of comparable maturities, which are argued to be the accurate measure of banks' cost of funds (e.g. de Bondt 2005, Sorensen et al. 2006, van Leuvensteijn et al. 2008). In this paper, we will follow the cost-of-funds approach[1].

2.2 Empirical evidence for the euro area

Several studies have investigated the interest rate pass-through in the euro area. The focus is on three main issues: the completeness (or lack thereof) of the long-run pass-through; the short-run speed of adjustment; and the degree of heterogeneity in the pass-through across countries and interest rate categories. An important issue is whether the pass-through has become more complete, faster and more homogeneous since the introduction of the euro and the liberalisation and integration of the European banking system.

de Bondt (2005) estimates the pass-through from the policy rate to market rates and from longer-term market rates to bank rates for different bank rates in the euro area aggregate, using both vector error correction (VEC) models and single equation error correction models. Based on the latter, the author finds that the long-run pass-through from market rates to bank rates of comparable maturities ranges from 0.35 to 0.98 for deposits, and from 0.92 to 1.53 for loans for the time period 1996:1-2001:5. However, no cointegration tests are reported. The immediate pass-through ranges from

[1] See Greenwood-Nimmo et al. (2010) for an analysis of the pass-through from policy-controlled short-term rates to longer-term bank rates and bond yields in the U.S. and Germany.

0.02 to 0.35 for deposits and from 0.13 to 0.54 for loans. For the sub-period 1999:1 to 2001:5, the immediate pass-through is somewhat higher, but, interestingly, the long-run pass-through is lower in most cases.

de Bondt et al. (2005) estimate single equation error correction models (but do not formally test for cointegration) relating bank interest rates to short-term and long-term market rates for eight euro area countries and for one deposit and four bank lending rates for the period 1994:4-2002:12. They find a sluggish and heterogeneous speed of adjustment, with the error correction coefficient ranging from 0.08 to 0.30 for the different categories and countries. For the sub-period 1999:1-2002:12 they find a somewhat faster speed of adjustment, while the long-term pass-through has generally not increased, and even decreased in some cases.

Sander and Kleimeier (2004) apply non-linear pass-through models to monetary policy shocks as well as cost-of-funds changes. They estimate pass-through equations for the period 1993:1-2002:10 and, after endogeneously determining structural breaks, find that monetary policy transmission has become faster, that heterogeneity across the euro zone has decreased in some banking markets, and that more competition improves the pass-through predominantly in deposit markets. Yet, as a general result, the long-run pass-through still falls short of unity for both the 'monetary policy approach' and the 'cost of funds approach'. Also, the authors conclude that national characteristics remain important pass-through determinants.

Kleimeier and Sander (2006) estimate the pass-through from unexpected and expected future changes in policy rates to retail rates for seven interest rate categories in ten euro area countries for the period 1999:1-2003:5. The long-run multiplier of a simultaneous change in unexpected and expected policy rate changes is highly heterogeneous across countries and interest rates, and almost always below 1. Equilibrium adjustment is also found to be heterogeneous as well as asymmetric in some cases.

Marotta (2009) estimates single-equation error correction models for the pass-through from market rates to short-term business loans of comparable maturities in nine euro area countries and for the period 1993:1-2002/2003, depending on the countries. He rejects the hypothesis of a complete pass-through over the entire time period and the EMU period, based on KPSS stationarity tests for the interest rate spread. Interestingly, however, sub-sample analysis reveals an almost complete long-run pass-through in nearly all countries for the time period before and during the first years of the EMU, but a much lower pass-through of around 0.7 on average for a later sub-period. At the same time, however, the speed of adjustment has increased in most countries. Yet, the degree of heterogeneity across countries has not decreased to a significant extent.

Sorensen et al. (2006) use a new data set, combining non-harmonised retail interest rate statis-

tics (for the period 1999-2002) with the new harmonised MFI interest rate statistics published by the European Central Bank (ECB) (for the period 2002-2004) for two deposit rates and four lending rates and ten euro area countries. Applying a two-step dynamic SUR panel estimation, they find an incomplete long-run pass-through for nearly all categories, ranging from 0.15 on average for current account deposits to 1.166 on average for mortgages. The average speed of adjustment ranges from 0.09 to 0.43. The Pedroni cointegration tests reject the null hypothesis of no cointegration in most but not all cases. Homogeneity is rejected in nearly all cases, both for countries and for products.

van Leuvensteijn et al. (2008) use the same data set for the period 1994:1-2006:3 and eight euro area countries and essentially confirm the results by Sorensen et al. (2006), while also establishing a positive relationship between an indicator for market competition and the completeness and speed of adjustment of the pass-through. Schwarzbauer (2006), also using the MFI statistics, also concludes that the pass-through is higher in countries with stronger competition in the banking sector.

As an overall pattern, it emerges that the pass-through from market to bank retail rates is generally incomplete and equilibrium adjustment is more or less sluggish. The pass-through is typically higher and faster for loans than for deposits. Somewhat surprisingly, the size of the pass-through seems to have decreased for some rates in some countries, while the speed of adjustment has tended to increase, at least for some interest rates in some countries. In spite of these ambiguous findings, the existing evidence is often interpreted as suggesting a higher efficiency in the monetary transmission in the euro area countries, as the higher speed of adjustment is seen to overcompensate the lower (or constant) long-run pass-through (e.g. de Bondt 2005, de Bondt et al. 2005, Marotta 2009). However, given the small number of observations available in the existing studies, the results of sub-sample analyses need to be treated with some caution. Another issue is that a comparison between countries based on non-harmonised national interest rate series can be misleading.

3 Empirical analysis

3.1 Estimation strategy

We estimate two different equations. Equation (2) is an error correction model:

$$\Delta r_t^b = \alpha + \rho r_{t-1}^b + \theta r_{t-1}^m + \sum_{j=1}^{p} \varphi_j \Delta r_{t-j}^b + \sum_{j=0}^{q} \pi_j \Delta r_{t-j}^m + \varepsilon_t \tag{2}$$

where we use $p = q = 6$ and then sequentially drop insignificant lags.[2] Following Pesaran et al. (2001), we apply a bounds-testing procedure to test the null hypothesis of no long-run relationship between the levels of r_t^b and r_t^m. The associated long-run pass-through coefficient is given by $\beta = -\theta/\rho$ and the speed of adjustment is given by the error correction coefficient ρ.

Secondly, we estimate the pass-through equation as a panel data model, applying the pooled mean group estimator (PMGE) advanced by Pesaran et al. (1999):

$$\Delta r_{it}^b = \alpha_i + \rho_i r_{i,t-1}^b + \theta r_{i,t-1}^m + \sum_{j=1}^{p} \varphi_{ij} \Delta r_{i,t-j}^b + \sum_{j=0}^{q} \pi_{ij} \Delta r_{i,t-j}^m + \varepsilon_{it} \tag{3}$$

where we use $p = q = 2$. The main advantage of the PMGE in our context is that while it constraints the long-run pass-through parameter to be homogeneous across countries $i = 1, 2, ..., N$, it allows for country-specific heterogeneity in the the error correction term and the short-run dynamics. In light of the existing literature on the interest rate pass-through, this is a reasonable compromise: while individual country estimations often suffer from a degrees of freedom problem due to short sample periods (particularly in the case of sub-sample analyses), the use of average euro-area wide data is likely to hide important heterogeneity between different countries. Even though the assumption of homogeneous long-run pass-through may not always be justified, the PMGE approach has proven to be rather robust to outliers in the group-specific long-run coefficients, particularly when they display large standard errors and/or are not systematic across groups (see Pesaran et al. 1999, p. 629).

3.2 Data

We use an updated version of a data set initially constructed by Sorensen et al. (2006).[3] It contains monthly observations on seven interest rate categories for ten euro area countries for the period 1999:1 - 2009:11 for different bank and corresponding money market rates of comparable maturities. The interest rate categories and abbreviations used hereafter are: mortgage loans (MORT), consumer loans (CONS), long-term business loans (LT), short-term business loans (ST), current account deposits (CAD), time deposits (TD), and saving deposits (SD). The following countries are included in the data set: Austria (AT), Belgium (BE), Germany (DE), Spain (ES), Finland (FI), France (FR), Ireland (IE), Italy (IT), the Netherlands (NL), and Portugal (PT). The data set is comprised of chain-linked time series combining the non-harmonised national retail interest rate statistics (NRIR), covering the period 1999:1 - 2002:12, and the harmonised MFI interest rate statistics, available from the ECB, for the period 2003:1 - 2009:11.

[2] We use the automatic lag selection procedure implemented in Eviews 6.

[3] The data set was kindly provided to us by Christoffer Kok Sorensen from the ECB. For a detailed description, see Sorensen et al. (2006, Appendix 3).

3.3 Estimation results

Table 1 shows the estimation results for Equation (2). The null hypothesis of no long-run level relationship can be rejected in more than half of the cases by means of the PSS F-test.[4] The evidence in favour of cointegration is particularly strong for long-term business loans and consumer loans, while for current account deposits and saving deposits no long-run relationship can be established. The pass-through is typically more complete and the speed of adjustment higher for loans than for deposits (with the exception of time deposits). For mortgages, short-term and long-term business loans and time deposits most long-run pass-through coefficients are close to 1, except for some outliers. However, size and significance of the short-run adjustment parameter varies considerably between countries. To take just the example of mortgages, it ranges from very low (between -0.01 and -0.04 for Germany, Spain, Finland, Portugal and the Netherlands) to much higher values (-0.25 for Ireland and -0.33 for Italy). In these cases, where heterogeneity is much more important in the short-run adjustment than in the long-run pass-through, pooled mean group estimation appears particularly interesting (see below). We also calculate an efficiency coefficient as the product of the speed of adjustment and the pass-through coefficient, following Sorensen et al. (2006). We find considerable heterogeneity across products and countries. For instance, the efficiency coefficient ranges from -0.105 (France) to -0.317 (Italy) for mortgages and from -0.095 (Spain) to -0.294 (Ireland) for long-term business loans (considering only cases where a cointegrating relationship could be established). It cannot be concluded from our estimations that the interest rate pass-through is consistently more or less efficient in some countries than in others. For instance, while the pass-through to mortgage rates is found to be more efficient in Italy than in Germany (where the PSS F-test does not reject the null of no long-run relationship), the opposite is true for long-term business loans.

Tables 2 and 3 show the estimation results for Equation (3). The full sample estimations essentially confirm the results from Table 1. The PMGE produces realistic estimates for the long-run pass-through and the average speed of adjustment (see Table 2). The long-run pass-through is close to 1 for mortgages, long-term business loans and time deposits, around 0.8-0.9 for consumer loans and short-term business loans, and around 0.5 for current account and saving deposits. As expected, the PMGE does not seem to be strongly affected by the outliers from the single-equation estimations.[5] Again, the pass-through is generally more efficient for loans than for deposits. As

[4] Standard diagnosis tests generally perform well. Full estimation results can be obtained from the authors upon request.

[5] We checked the robustness of our results by re-estimating Equation (3) for sub-samples of countries with homogenous individual long-run pass-through coefficients. For this purpose, we have excluded extreme outliers by applying a simple rule, namely excluding all countries where the estimated long-run pass-through deviated by more than 15 per cent from the average. The estimations show somewhat lower pass-through coefficients but qualitatively very similar

can be seen from Table 3, the speed of adjustment is strongly heterogeneous across countries and interest rate categories and essentially confirms the results from Table 1.

We also estimate Equation (3) for the two subsamples 1999:1-2004:6 and 2004:7-2009:11 (see Tables 2 and 3). The first sub-period corresponds to the sample used by Sorensen et al. (2006).[6] Both periods include both substantial increases and decreases in market rates and hence the results should not be driven by asymmetric responses of bank rates to rising or falling market rates. Overall there is no evidence of a general increase in the efficiency of the interest rate pass-through in the euro area over time. On the contrary, neither the speed nor the completeness of the pass-through have shown a tendency to increase, but the average efficiency coefficient has decreased, in some cases considerably, for most interest rate categories (see Table 2).[7] Only in the cases of long-term business loans and time deposits has there been a marked increase in efficiency.[8] The heterogeneity in the speed of adjustment across countries has also not decreased over time, while country-specific adjustment parameters differ considerably for the two sub-periods (see Table 3). However, due to the short sub-sample periods and reliance on chain-linked data, these results should be treated with some caution.[9]

4 Concluding remarks

We have analysed the interest rate pass-through in the euro area, applying the cost-of-funds approach in both single equation error correction estimations and pooled mean group estimations to seven interest rate categories for ten countries. Using a data set comprising almost eleven full years of European Monetary Union, we find that the interest rate pass-through is still sluggish in the euro area, but nearly complete in the long run, at least for loans and time deposits. In addition, there is strong evidence of substantial heterogeneity both across countries and products. Furthermore, sub-sample analysis suggests no improvement regarding completeness, speed of adjustment as well as heterogeneity since the introduction of the euro. On the contrary, the overall efficiency of the

patterns. We also found that the results are robust to different choices of lag order.

[6]The results of that study are nearly identical to ours, except for consumption loans and current account deposits where we found a somewhat larger long-run pass-through.

[7]In order to check whether this result was due to a weaker pass-through during the financial crisis starting in 2008, we ran a further set of regressions for the sub-sample 2004:7-2007:12. Hoewever, we found no systematic improvement in either speed or completeness of the pass-through.

[8]However, the pass-through coefficient exceeding 1 for business loans in the second sub-sample is certainly not indicative of efficient monetary transmission but may rather point to adverse selection problems, see de Bondt et al. (2005).

[9]Notice that the estimates for the sub-periods cannot easily be compared with the results for the whole sample. In particular, the estimated speed of adjustment coefficient (and hence the efficiency coefficient) is typically higher for each of the sub-periods than for the whole period.

interest rate pass-through has somewhat decreased in the second half of the existence of the monetary union, although the results from our sub-sample analysis should be treated with some caution. As longer sample periods for the harmonised interest rate data become available, further research should seek to reassess our results, which have important policy implications: the existence of heterogeneous pass-through from market to bank rates both across countries and products makes it difficult for the Central Bank to react to (symmetric) adverse demand shocks by means of the interest rate channel alone. Additional research should therefore be directed to further exploring the reasons behind the lasting and even growing heterogeneity in the interest rate pass-through. At the same time, policy makers should not soleley rely on the interest rate channel of monetary transmission for aggregate demand management.

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	MORT				CONS				ST				LT			
	PSS	SoA	PT	EC	PSS	SoA	PT	EC	PSS	SoA	PT	EC	PSS	SoA	PT	EC
AT	12.69	-0.113	1.209	-0.137	73.62	-0.297	0.754	-0.224	4.32	-0.119	0.924	-0.110				
		(0.03)	(0.12)			(0.03)	(0.02)			(0.04)	(0.07)					
BE	3.12	-0.045	1.305	-0.059	10.96	-0.214	0.427	-0.091	3.03	-0.105	0.865	-0.091	6.83	-0.114	0.833	-0.095
		(0.02)	(0.23)			(0.05)	(0.12)			(0.05)	(0.10)			(0.03)	(0.15)	
DE	1.89	-0.038	1.201	-0.046	6.66	-0.190	0.179	-0.034	0.93	-0.030	0.670	-0.020	18.20	-0.215	0.865	-0.186
		(0.02)	(0.23)			(0.05)	(0.12)			(0.02)	(0.28)			(0.04)	(0.07)	
ES	1.86	-0.032	0.955	-0.031	0.31	0.028	0.307	-0.009	1.08	-0.058	1.057	-0.061	5.50	-0.094	1.005	-0.095
		(0.02)	(0.14)			(0.04)	(1.28)			(0.06)	(0.26)			(0.03)	(0.29)	
FI	2.49	-0.035	1.145	-0.041	3.29	-0.034	1.567	-0.053					10.10	-0.281	0.737	-0.207
		(0.02)	(0.22)			(0.02)	(0.41)							(0.06)	(0.14)	
FR	30.36	-0.094	1.122	-0.105	19.19	-0.103	1.140	-0.117	1.14	-0.055	1.107	-0.061	16.94	-0.150	1.073	-0.160
		(0.01)	(0.07)			(0.02)	(0.15)			(0.04)	(0.41)			(0.03)	(0.14)	
IE	17.14	-0.250	0.842	-0.211					3.14	-0.102	1.012	-0.103	15.84	-0.284	1.032	-0.294
		(0.04)	(0.05)							(0.05)	(0.14)			(0.05)	(0.14)	
IT	24.15	-0.334	0.947	-0.317					29.30	-0.358	0.830	-0.297	3.04	-0.086	1.004	-0.086
		(0.05)	(0.03)							(0.05)	(0.02)			(0.04)	(0.32)	
NL	0.16	-0.009	0.529	-0.005					24.52	-0.54	0.946	-0.513				
		(0.02)	(1.03)							(0.08)	(0.02)					
PT	1.34	-0.024	0.900	-0.022	15.91	-0.329	1.592	-0.523	2.00	-0.113	0.833	-0.094				
		(0.01)	(0.25)			(0.07)	(0.21)			(0.06)	(0.15)					

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	CAD				TD				SD			
	PSS	SoA	PT	EC	PSS	SoA	PT	EC	PSS	SoA	PT	EC
AT	1.32	-0.027	0.396	-0.010	1.94	-0.018	0.694	-0.040				
		(0.02)	(0.20)			(0.02)	(0.16)					
BE					0.84	-0.036	0.759	-0.027	11.04	-0.062	0.481	-0.030
						(0.03)	(0.27)			(0.02)	(0.13)	
DE					4.06	-0.094	0.904	-0.085	1.75	-0.021	0.713	-0.015
						(0.03)	(0.06)			(0.01)	(0.30)	
ES	1.48	-0.043	1.062	-0.013	3.24	-0.059	1.062	-0.063	1.67	-0.019	0.114	-0.002
		(0.03)	(0.09)			(0.03)	(0.20)			(0.01)	(0.22)	
FI	0.80	-0.032	0.233	-0.008	5.33	-0.070	0.624	-0.044				
		(0.03)	(0.13)			(0.02)	(0.15)					
FR					4.60	-0.122	1.003	-0.123	9.88	-0.155	0.453	-0.070
						(0.04)	(0.06)			(0.04)	(0.08)	
IE									1.31	-0.012	-0.421	0.005
										(0.01)	(1.16)	
IT	0.94	-0.043	0.434	-0.019	4.79	-0.154	0.838	-0.129				
		(0.03)	(0.06)			(0.05)	(0.06)					
NL	4.66	-0.059	0.388	-0.023	2.96	-0.118	0.776	-0.092				
		(0.03)	(0.09)			(0.05)	(0.09)					
PT					0.54	-0.019	0.977	-0.019				
						(0.02)	(0.59)					

Note: PSS is the test statistic for the F-test proposed by Pesaran et al. (2001). The (upper-bound) critical values for the PSS F-test are 3.51, 4.16 *and* 6.44 *for, respectively, the* 10%, 5%, *and* 1% *significance levels for k=1, where k is the number of regressors (see Pesaran et al. (2001, p. 300) table CI(ii), case II). SoA is the error correction term, PT is the long-run pass-through coefficient, and EC is the efficiency coefficient given by the product of SoA and PT. Numbers in parantheses are standard errors.*

Table 1: Results for the single-equation estimations, Equation (2)

	1999:1-2009:11			1999:1-2004:6			2004:7-2009:11		
	SoA	PT	EC	SoA	PT	EC	SoA	PT	EC
MORT	-0.086	1.008	-0.087	-0.159	1.131	-0.180	-0.165	0.782	-0.129
	(0.031)	(0.030)		(0.034)	(0.027)		(0.040)	(0.014)	
CONS	-0.104	0.812	-0.084	-0.188	1.030	-0.194	-0.155	0.830	-0.129
	(0.024)	(0.029)		(0.050)	(0.051)		(0.024)	(0.032)	
ST	-0.115	0.895	-0.103	-0.295	0.814	-0.240	-0.211	0.917	-0.193
	(0.031)	(0.021)		(0.063)	(0.014)		(0.083)	(0.015)	
LT	-0.172	1.016	-0.175	-0.211	0.865	-0.183	-0.253	1.334	-0.338
	(0.027)	(0.060)		(0.029)	(0.039)		(0.043)	(0.075)	
CAD	-0.030	0.452	-0.014	-0.076	0.454	-0.035	-0.040	0.262	-0.010
	(0.007)	(0.040)		(0.047)	(0.016)		(0.031)	(0.030)	
TD	-0.090	0.970	-0.087	-0.202	0.920	-0.186	-0.199	0.909	-0.181
	(0.017)	(0.029)		(0.054)	(0.014)		(0.038)	(0.015)	
SD	-0.042	0.522	-0.022	-0.057	0.468	-0.027	-0.116	0.481	-0.056
	(0.028)	(0.081)		(0.018)	(0.125)		(0.044)	(0.039)	

Note: SoA is the average speed of adjustment coefficient, PT is the long-run pass-through coefficient, and EC is the efficiency coefficient, given by the product of SoA and PT. Numbers in parentheses are standard errors.

Table 2: Results for the pooled mean group estimations, Equation (3)

	MORT			CONS			ST			LT		
	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11
AT	-0.154	-0.188	-0.201	-0.22	-0.193	-0.275	-0.108	-0.064	-0.005			
	(0.016)	(0.025)	(0.026)	(0.023)	(0.028)	(0.025)	(0.04)	(0.058)	(0.081)			
BE	-0.042	-0.350	-0.096	-0.134	-0.114	-0.183	-0.096	-0.101	-0.138	-0.089	-0.116	-0.119
	(0.019)	(0.042)	(0.017)	(0.031)	(0.042)	(0.048)	(0.039)	0.079	(0.060)	(0.028)	(0.056)	(0.038)
DE	-0.032	-0.295	-0.381	-0.07	-0.032	-0.118	-0.031	-0.065	-0.007	-0.154	-0.360	-0.182
	(0.018)	(0.070)	(0.035)	(0.024)	(0.020)	(0.048)	(0.019)	(0.022)	(0.054)	(0.032)	(0.043)	(0.030)
ES	-0.032	-0.023	0.001	-0.074	-0.440	-0.100	-0.118	-1.000	-0.021	-0.11	-0.186	-0.228
	(0.016)	(0.027)	(0.034)	(0.031)	(0.078)	(0.042)	(0.066)	(NA)	(0.037)	(0.027)	(0.039)	(0.056)
FI	-0.025	-0.034	-0.277	-0.02	-0.249	-0.107				-0.247	-0.230	-0.347
	(0.017)	(0.049)	(0.073)	(0.016)	(0.041)	(0.038)				(0.045)	(0.053)	(0.075)
FR	-0.091	-0.115	-0.093	-0.082	-0.096	-0.115	-0.064	-0.483	-0.240	-0.159	-0.156	-0.174
	(0.012)	(0.021)	(0.016)	(0.016)	(0.026)	(0.024)	(0.042)	(0.097)	(0.092)	(0.022)	(0.036)	(0.025)
IE	-0.125	-0.171	-0.259				-0.097	-0.514	-0.445	-0.289	-0.212	-0.448
	(0.028)	(0.032)	(0.071)				(0.053)	(0.057)	(0.046)	(0.051)	(0.036)	(0.095)
IT	-0.329	-0.205	0.217				-0.291	-0.345	-0.180	-0.155	-0.215	-0.274
	(0.029)	(0.035)	(0.040)				(0.042)	(0.030)	(0.050)	(0.03)	(0.046)	(0.050)
NL	-0.006	-0.066	0.009					-0.417	-0.757			
	0.017	(0.041)	(0.018)					(0.080)	(0.061)			
PT	-0.024	-0.140	-0.139	-0.13	-0.190	-0.189		-0.372	-0.106			
	0.014	(0.049)	(0.055)	(0.038)	(0.077)	(0.045)		(0.079)	(0.043)			

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	CAD			TD			SD		
	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11	1999:1-2009:11	1999:1-2004:6	2004:7-2009:11
AT	-0.02	-0.014	-0.029	-0.047	-0.160	-0.138			
	(0.016)	(0.008)	(0.041)	(0.023)	(0.026)	(0.080)			
BE				-0.039	-0.467	-0.016	-0.023	-0.027	-0.070
				(0.033)	(0.084)	(0.068)	(0.011)	(0.013)	(0.020)
DE				-0.102	-0.373	-0.199	-0.023	-0.060	-0.134
				(0.03)	(0.024)	(0.066)	(0.013)	(0.035)	(0.017)
ES	-0.033	0.059	-0.159	-0.071	-0.377	-0.064	-0.009		
	(0.016)	(0.037)	(0.028)	(0.028)	(0.044)	(0.033)	(0.008)		
FI	-0.007	-0.029	-0.021	-0.044	-0.034	-0.149			
	(0.018)	(0.024)	(0.035)	(0.019)	(0.023)	(0.057)			
FR				-0.17	-0.187	-0.325	-0.152	-0.032	-0.231
				(0.038)	(0.073)	(0.073)	(0.03)	(0.030)	(0.040)
IE							-0.002	-0.107	-0.029
							(0.014)	(0.039)	0.019
IT	-0.043	-0.261	0.028	-0.137	-0.093	-0.321			
	(0.03)	(0.075)	(0.016)	(0.037)	(0.034)	(0.067)			
NL	-0.047	-0.016	-0.021	-0.153	-0.055	-0.296			
	(0.017)	(0.011)	(0.046)	(0.044)	(0.041)	(0.089)			
PT				-0.049	-0.073	-0.287			
				(0.018)	(0.022)	(0.055)			

Note: Numbers in parentheses are standard errors.

Table 3: Country-specific speed of adjustment coefficients for the pooled mean group estimations, Equation (3)

Publisher: Hans-Böckler-Stiftung, Hans-Böckler-Str. 39, 40476 Düsseldorf, Germany
Phone: +49-211-7778-331, IMK@boeckler.de, http://www.imk-boeckler.de

IMK Working Paper is an online publication series available at:
http://www.boeckler.de/cps/rde/xchg/hbs/hs.xls/31939.html

ISSN: 1861-2199

Hans Böckler Stiftung

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