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Lending interest rate pass-through in the euro area

A data-driven tale

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Abstract

The harmonized MIR retail interest rates for the euro area, available as of January 2003, show remarkable differences both in levels and dynamics with the previous unharmonized NRIR rates. This evidence should suggest caution in extrapolating the findings of the NRIR-based literature on the incomplete long-run pass-through of market rates even into the short term business lending rates, the least sticky ones among bank rates. We show that long run pass-throughs for MIR rates of smaller and larger short-term business loans are almost always complete or nearly so in nine of the founding EMU countries and in Greece.

JEL Classification: E43; E52; E58; F36

Keywords: Interest rates; Monetary policy; European Monetary Union (EMU); Taylor principle

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1. Introduction*

The transmission of monetary policy hinges on how policy rate changes, via changes in market interest rates, are transferred to bank rates, that are likely to influence aggregate demand. An incomplete equilibrium or long run pass-through (PT) could actually violate the Taylor principle - that a central bank should raise its interest rate instrument more than one-to-one with increases in inflation (Woodford 2003, 91) - and monetary policy would fail to be stabilizing. It is therefore interesting to estimate long run PTs, to assess the effectiveness of the single monetary policy and the uniformity of the transmission via the banking sector across the EMU countries.

The literature on structural breaks, possibly associated to the introduction of the euro, and on equilibrium PTs for the last break-free period, relies on the unharmonized National Retail Interest Rates (NRIR) database collected by the European Central Bank (ECB), with a sample ending at most at September 2003. The main results on the second issue – the focus of this short paper - are of incomplete long run PTs in most countries, even for the short term business lending rate, the one with the highest PT among the retail rates and with a better maturity matching with market interest rates (Marotta 2008).

The harmonized bank interest rates in the ECB MIR database, as of January 2003, do show remarkable differences both in levels and dynamics with the NRIR series. This evidence should suggest caution in extrapolating beyond the first years of the EMU the findings of the NRIR-based literature. This paper shows in fact that using the new database the estimated long run PTs for short term business lending rates are much closer to be complete, though cross-country range is quite wide.

The paper is organized as follows. Section 2 provides a selected review of the NRIR-based literature and lays out the shared empirical framework; section 3 describes the harmonized MIR short term business lending rates and reports the estimates for long-run PTs; section 4 concludes. The Appendix summarizes the main features of the NRIR database.

2. A selected literature review

Empirical literature on bank rate PTs for aggregate data is embedded in a standard Klein-Monti model of a monopolistic bank, under the assumptions of risk neutrality, perfect information, no switching nor adjustment costs, no joint production of loans and deposits nor cross-subsidization between loans and deposits (Klein 1971, Monti 1972 and, for an extension to an oligopolistic

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setting, Freixas-Rochet 1997). The lending (deposit) rate is determined as a mark-up (-down) over the marginal (opportunity) cost, proxied by a market rate matching the maturity of bank products

For estimation purposes, whenever the null of cointegration is not rejected, the Autoregressive Distributed Lags (ARDL) specification in Cottarelli-Kourelis (1994) is reparametrized as an Error Correction Mechanism (ECM), following the Granger representation theorem for cointegrated variables.

Let an equilibrium, or cointegrated, relation between interest rates integrated of order one (I(1)):

$$r_t = \alpha + \beta\, mr_t + \varepsilon_t \qquad \varepsilon_t \sim NID(0, \sigma_\varepsilon^2) \qquad (1)$$

with I(0) OLS residuals, *ecm*, at the first stage of the Engle-Granger (1987) two-step estimation procedure[1], where:

- r = bank rate;
- mr = driving market interest rate;
- *ecm* = stationary residual or deviation ("error" in the ECM acronym) of the bank rate from its long run equilibrium value.

α includes the credit risk premium; the presence of a linear trend in eq. (1) would be instead theoretically inconsistent (Hamilton 1994, 501). Short term dynamics parameters are obtained in the second step, according to the general-to-specific approach (Hendry 1995), dropping sequentially insignificant regressors from the unrestricted specification:

$$\Delta r_t = \theta ecm_{t-1} + \sum_{i=0}^{k} \gamma_i \Delta mr_{t-i} + \sum_{j=1}^{k} \lambda_j \Delta r_{t-j} + u_t \qquad u_t \sim NID(0, \sigma_u^2) \qquad (2)$$

where Δ is the first difference operator.

The key parameter is the long run PT, β. θ, that is adjustment speed to β, also known as loading factor, should result statistically significant if cointegration holds.

Within this econometric framework the main findings in the NRIR-based literature can be summarized as follows (Marotta 2008). Focusing on the short-term business lending rate, because it has the highest medium to long run PT in most studies[2], cross-country and national studies provide widely different results, owing to their choices on how to deal with EMU-related structural breaks on PTs and how to select the driving market rate(s),

Among the studies for nine EMU founding countries, De Bondt *et al* (2005) adopts as a driver a combination, with estimated weights, of the 3-month interbank rate and of the 10-year

[1] In a bivariate relation, with at most one cointegration relation, the procedure is robust to misspecification and to reduced sample size (Maddala-Kim 1998).

[2] A notable exception is Gropp *et al* (2007), with an euro-wide PT over a semester of about 0.7 vs 0.9 for the long-term business lending rate, using quarterly series up to 2004 obtained by chain-linking the NRIR and the MIR rates.

Government bond yield, under the assumption that the second one provides a signal on the persistence of the policy rate. The findings are that, assuming a break at January 1999, the bond yield becomes statistically insignificant and long run PTs decrease below one (except for the Netherlands) in the EMU period. Sander and Kleimeier (2004) endogenously search for a single break and choose, as an alternative driver to a market rate matching the maturity of loaned funds, the overnight rate, taken as a proxy for the monetary policy rate, in order to capture also the PT from policy to market rates. Depending on the driver, estimated long run PTs show opposite patterns over time (on average, rising from 0.71 up to 0.87 in the post-break period with the overnight rate, decreasing from 0.91 down to 0.72 with a market rate).

Marotta (2008) searches for multiple structural breaks using the longest available NRIR series for each country (end-sample ranging from December 2002 for Portugal to September 2003 for Belgium, Ireland, Italy and the Netherlands) and a maturity matching market rate. The main findings are:

a) the detection of two breaks in four countries and one in five other ones;

b) in cointegrated relations (except for Germany), the estimated β shrinks everywhere in the last break-free period, on average from 0.9 to 0.7, except for France and Ireland. The unitary value for a complete equilibrium PT is outside the upper end of the 5% confidence interval except for the Netherlands[3] in the last period. The cross-country range remains wide, going from 0.59-1.25 to 0.6-1.1, with a cluster in the last break-free period around 0.7 for most countries, Germany being an outlier (Table 1).

Chionis and Leon (2006) find for Greece that long term PT decreases after joining the EMU, and is equal to 0.52 or 0.78, depending on the estimation method[4].

3. Pass-through for MIR lending rates

As of January 2003 the ECB collects a set of harmonized bank rates statistics (denoted with the MIR acronym) that relate to aggregates with common features across the EMU countries such as, for instance, the initial horizon of rate determination, an aspect that provides a synthetic representation of the contract maturity and of the rate fixation. Though bound to be the ideal data base for empirical analysis on PTs across countries, the as yet short sample hinders econometric exercises focused on long run parameters (see also Baele *et al*. 2004, Sørensen-Werner 2006, ECB 2006).

These warnings notwithstanding, we performed an econometric investigation over the sample 2003:01-2007:03 considering the two rates most closely related to the NRIR short business

[3] Unsurprisingly, because the NRIR series for that country is the base rate. See also Appendix.
[4] The paper reports only point estimates.

lending rate(s). The motivation is twofold. First, four years (two years for Greece) after the launch of the single currency, national banking systems should have had enough time to adjust their pricing policy to the new monetary regime. Second, the availability of harmonized bank rates for business lending with a well defined maturity (floating rate and initial fixation up to one year) and split for size (up to and over 1 million euro), should help better estimate the response to the same monetary impulse, proxied by an euro area market rate, across EMU countries.

It is worth noticing that harmonized and unharmonized series in the few overlapping months are sizably different not only in levels but also in dynamics (for a selected group of countries see Figure 1), a fact that should warn against simplistic chain-linking NRIR and MIR series.

In the empirical exercise we run first ADF tests for the order of integration. As usual, the null that most retail rates are I(1) cannot be rejected (Table A1). The 3-month Euribor rate was chosen as the driving market rate because, besides being I(1), it is almost always the mostly correlated (in first differences) with bank rates (results available upon request).

A visual inspection of the lending spreads over the 3-month Euribor rate shows they are trending downwards almost everywhere, instead of being about constant as implied by a complete PT and a sufficiently fast adjustment to it (Figure 2). A formal test confirms that the null of stationarity is rejected always, at least at the 5% confidence level[5], except for France and the Netherlands (larger loans); Table 2. Unsurprisingly, the null of cointegration is also always rejected (results available upon request).

We estimate therefore ARDL(3,3) specifications and compute accordingly $\hat{\beta}$ (Table 3). Out of twenty cases and within the two standard errors confidence interval, $\hat{\beta}$ is equal to one in ten cases and to 0.9 in other seven cases; the smallest estimate, at the lower end of the 95% confidence interval, is 0.69 in Germany for loans up to 1 million euro.

These results, hopefully because of better data, suggest that the expected effects of less incomplete PTs owing to a more predictable monetary policy in the euro area are eventually materializing, though national banking systems are still adjusting, as suggested by the overall no cointegration outcome. The changes in estimated PTs do not warrant extrapolating NRIR-based results and highlight the complex task of running monetary policy in the euro area, also because of the lack of reliable statistical information over a long enough time span. A similar caveat applies however to the MIR-based estimates, on the grounds of the sharp change in the monetary policy stance late 2005, with policy rates on an upward trend since then, and of the likely asymmetries in the adjustment of bank rates when policy rates are increasing compared to declining rates.

[5] Kwiatkowski-Phillips-Schmidt-Shin (1992; KPSS) level test statistics for the null of stationarity, with critical values, adjusted for sample size, from Sephton (1995).

The rather wide cross-country range of the point estimates of β for both types of business loans, equal to about thirty basis points, signals the persistent segmentation of the retail banking markets even for products more open to cross-border competition. A similar finding is in a study that shows the slow cross-country convergence of MIR credit interest rates, most especially for the short term business loans up to 1 million euro (Vajanne, 2007).

4. Conclusion

The overall picture of an incomplete equilibrium pass-through, even for the least sticky bank rate, produced by the NRIR-based literature, contrasts with the economic intuition that a reduced volatility in money market rates, owing to a single monetary policy, is bound to mitigate uncertainty and to ease therefore the transfer of policy rate changes to retail rates. These expected effects could have been offset by other contemporaneously developing processes in the sample period ending 2002-early 2003, such as the consolidation of the banking industry, mostly within national borders, and the revision of Basel capital requirements, during a prolonged period of low output growth and of lenders' deteriorating creditworthiness in the euro area.

The harmonized bank interest rate series in the ECB MIR database, available as of January 2003, do show remarkable differences both in levels and dynamics with the NRIR series, thus suggesting caution in extrapolating the findings of the NRIR-based literature beyond the first years of the EMU. This paper shows in fact that long run pass-throughs for MIR rates of smaller and larger short-term business loans are almost always complete or nearly so in nine of the founding EMU countries and in Greece; the smallest estimate, at the lower end of the 95% confidence interval, is 0.69 in Germany for loans up to Eur 1 million.

These results highlight the complex task of running monetary policy in the euro area, also because of the lack of reliable homogeneous statistical information over a long enough time span.

Appendix. The NRIR database

The national short term business lending rate are the series, coded "N4", selected by each of the nine EMU countries contributing to the unharmonized NRIR database[6]. The series have several idiosyncratic features, witnessing the fragmentation of national retail banking markets, and are therefore hardly comparable across countries. Rates are computed as simple averages (Netherlands), sometimes excluding extremes (Austria, Germany, Portugal) or considering range of values for different types of loans (Ireland) or as weighted averages by stocks (for France, averages of three end of month rates); they refer to new businesses, except for Italy (outstanding stocks); borrowers include also non enterprises (Germany, Italy r_1); they are base rates, therefore excluding credit risk premia, in Netherlands and Belgium (r_2); they refer to loans explicitly secured (Germany, Ireland, Portugal) and of different maturities (from overdrafts for France and Ireland to 18 months for Italy); there are changes in January 1999 in the way the series are constructed (Netherlands, Portugal); for details see the NRIR methodology (ECB 2002).

[6] Two rates, coded as N4.1 and N4.2 (in this paper r_1 and r_2), for Belgium, Italy and Portugal.

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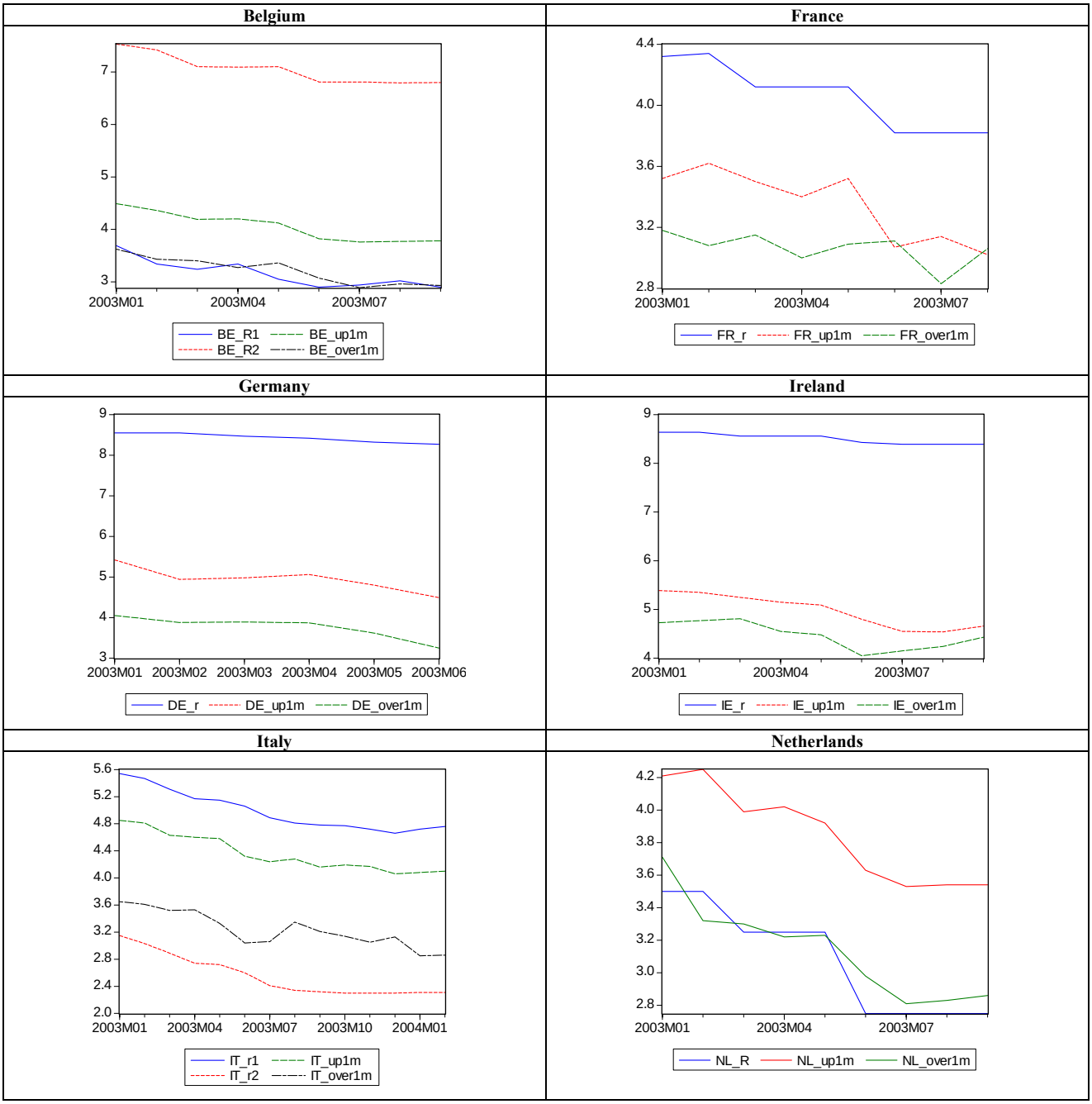
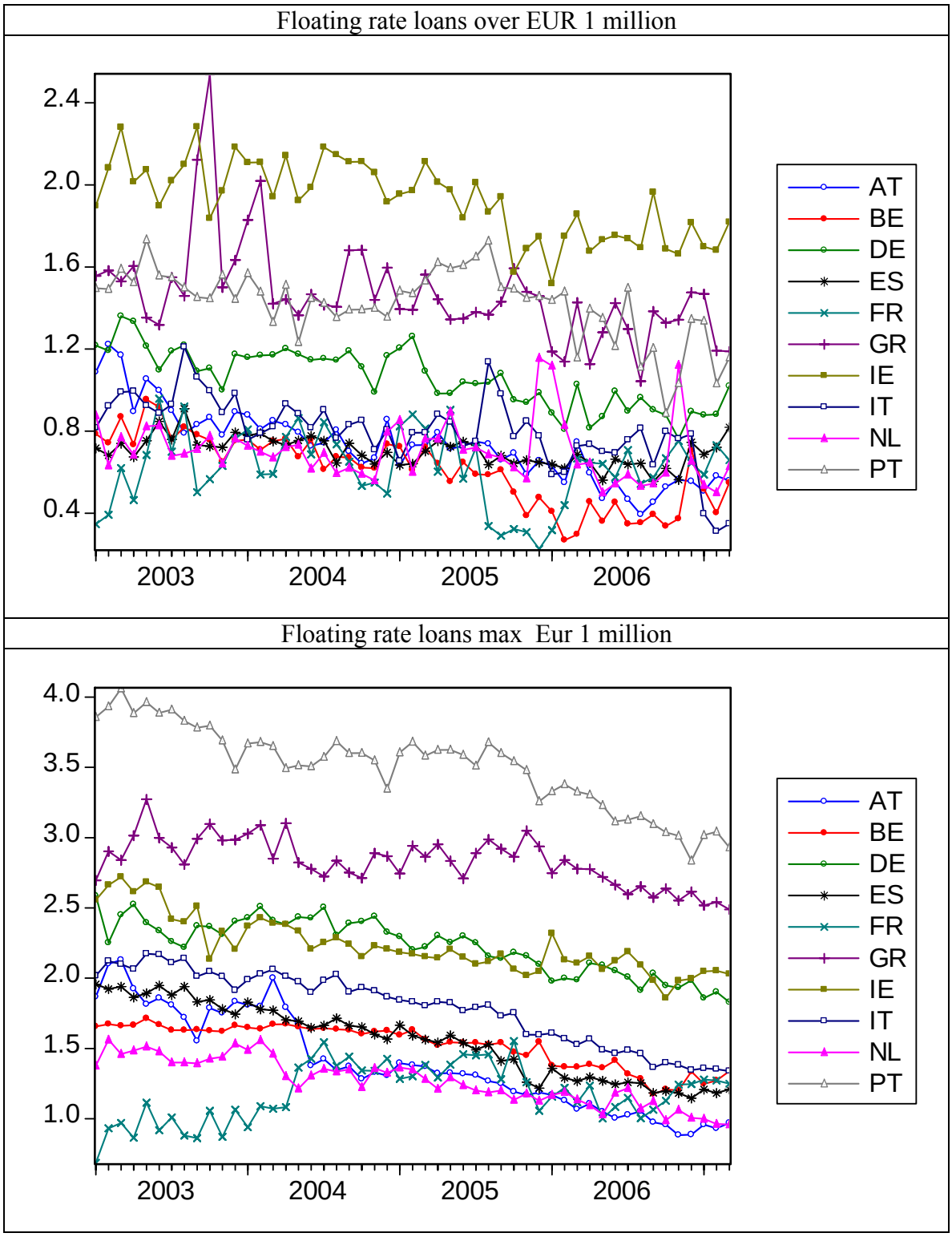
Figures and Tables

Figure 1 Harmonized (MIR) and unharmonized (NRIR) short term business lending rates (selected EMU countries)



Source: ECB's NRIR and MIR (up to and over Eur 1 million) databases. For NRIR rates see Appendix.

Figure 2 **Short term business lending spread over 3 month-Euribor rate**



Source: ECB MIR database for bank rates.

Table 1 Long run pass-through for NRIR short term business lending rates

Country: last break date - end sample	**β±2SE**
Austria: 1999:11 - 2003:06	0.63-0.67
Belgium r_2: 2001:01 - 2003:09	0.71-0.79
France: 1997:06 - 2003:08	0.70-0.82
Germany: 2001:03 - 2003:06	0.10-0.30
Ireland: 2000:06 - 2003:09	0.54-0.66
Italy r_1: 1999:06 - 2003:09	0.67-0.75
Netherlands: 1998:09 - 2003:09	0.99-1.03
Portugal r_1: 1999:11 - 2002:12	0.57-0.77
Spain: 1998:06 – 2003:03	0.78-0.86
Average (excluding Germany)	**0.70-0.79**
Greece[1]: 2001:01 - 2004:09	0.52 / 0.78

Sources: Marotta (2008), Table 5; Chionis-Leon (2006) for Greece.

[1]National series; point estimates.

Table 2 KPSS stationarity tests for MIR lending rate spreads over 3 month Euribor (2003:01-2007:03)

Country	**Test statistic**	
	Max Eur 1 mio	**Over Eur 1 mio**
Austria	0.91***	0.87***
Belgium	0.84***	0.81***
France	0.35*	0.15
Germany	0.87***	0.85***
Greece	0.64**	0.67**
Ireland	0.84***	0.77***
Italy	0.92***	0.80***
Netherlands	0.93***	0.13
Portugal	0.84***	0.48**
Spain	0.94***	0.54**

Critical values, sample = 50, level, from Sephton (1995).
***, **, *: statistically significant at the 1, 5 and 10 per cent level.

Table 3 Short term business lending rate pass-through of 3-month Euribor rate (2003:01-2007:03; standard errors in brackets)

Country	Loans max Eur 1 mio		Loans over Eur 1 mio	
	β[1]	Misspecification tests[2]	β[1]	Misspecification tests[2]
Austria	1.01 (0.03)	JB = 15.79*** BG = 0.73	0.95 (0.02)	JB = 0.78 BG = 0.04
Belgium	0.87 (0.03)	JB = 2.82 BG = 4.29	1.05 (0.03)	JB = 20.74*** BG = 0.63
France	1.00 (0.04)	JB = 0.27 BG = 0.52	1.13 (0.03)	JB = 0.40 BG = 0.79
Germany	0.77 (0.04)	JB = 0.45 BG = 0.75	0.95 (0.03)	JB = 1.74 BG = 0.79
Greece	0.80 (0.04)	JB = 3.79* BG = 0.47	0.85[3] (0.04)	..
Ireland	1.01 (0.03)	JB = 6.71** BG = 0.47	0.88 (0.04)	JB = 2.23 BG = 1.63
Italy	0.93 (0.02)	JB = 0.50 BG = 0.03	0.84 (0.05)	JB = 1.92 BG = 0.60
Netherlands	0.89 (0.03)	JB = 2.81 BG = 0.29	0.93 (0.05)	JB = 48.49*** BG = 1.56
Portugal	0.78 (0.04)	JB = 6.57** BG = 1.53	0.81 (0.05)	JB = 0.71 BG = 1.86
Spain	1.04 (0.02)	JB = 2.27 BG = 1.72	1.04 (0.02)	JB = 2.08 BG = 0.24

[1]β computed out of the ARDL (3,3), general-to-specific, specification estimates; heteroskedasticity consistent standard errors computed with delta method.
[2]Jarque-Bera (JB) test under the null of normality of residuals. Breusch-Godfrey (BG) test under the null of no correlation of residuals up to the second order.
[3]Static regression.

Table A1 Unit root tests for MIR short term business lending and market interest rates (2003:01-2007:03)

Interest rates	Augmented Dickey Fuller[a] <Eur 1 mio / > Eur 1 mio	
	Level	First Difference
Austria	-0.48 / -0.37	-2.56** / -1.80*
Belgium	1.59 / 0.95	-1.27 / -2.48**
France	1.96* / 0.43	-8.53*** / -8.25***
Germany	-0.40 / 1.23	-3.04*** / -2.27**
Greece	-1.47 / 1.36	-10.24***/-8.12***
Ireland	0.26 / 0.74	-6.53*** / -8.63***
Italy	-1.05 / -0.42	-1.14 / -7.48***
Netherlands	0.72 / -0.20	-5.56*** / - 7.18***
Portugal	-0.75 / 0.67	-6.93*** / -9.69***
Spain	-0.29 /2.51	-1.58 / -0.82
1-month Euribor	2.24	-1.09
3-month Euribor	0.84	-2.96***

[a]ADF tests with constant (level) and no constant (first difference); lags selected with the Schwartz Information Criterion.