Integration Benefits on EU Retail Credit Markets – Evidence from Interest Rate Pass-through

Friedrich Heinemann and Martin Schüler

Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim

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Abstract
Lending and borrowing interest rates are often slow to adjust to changing capital market conditions. This paper argues that national differences of the pass-through speed in the EU can be regarded as a retail-oriented indicator of financial integration. Based on an ECB database the speed of interest rate adjustments for different markets and countries is measured - showing a considerable fragmentation of markets. Simulations show how much consumers in some countries could gain from a convergence of adjustment speed on the fastest levels.

JEL-Classification:

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Dr. Friedrich Heinemann
ZEW
PO Box 10 34 43
D-68034 Mannheim
Phone: +49-621-1235-149
Fax: +49-621-1235-223
Email: heinemann@zew.de

Martin Schüler
ZEW
PO Box 10 34 43
D-68034 Mannheim
Phone: +49-621-1235-148
Fax: +49-621-1235-223
Email: schueler@zew.de

1 Introduction

Competition benefits consumers in many ways. On credit markets, benefits arise from the speed of interest rate adjustment. With low competition banks are slow to pass declining market rates through to debtors. With high competition banks are forced to react in a faster way – otherwise they risk to lose market shares. Since integration of the EU markets for financial services intensifies competition it should, therefore, also speed up pass-through of interest rate changes.

Based on this consideration it is the objective of this study to quantify the potential benefits from further integration by focusing on interest rate pass-through. The link between market and lending interest rate has extensively been studied for monetary policy purposes (see survey below). However, to the authors' knowledge this study is the first to use it to develop benefit indicators for further financial retail market integration.

The quantification of benefits follows a straightforward strategy. If borders played no role for EU credit markets significant national differences in adjustment speed between market and retail rates should vanish. Thus, perfect integration would imply convergence of pass-through speed between national markets. Of course, no one can forecast exactly to which level this convergence would lead. In our study we work with the assumption that pass-through speed converges to the level of the national market that is adjusting fastest today. This assumption allows to simulate retail interest rates for different countries and to compare these simulated with actual series. This comparison is the base for our suggested new indicator of integration benefits.

This indicator extends the literature on financial market integration which suffers from its wholesale perspective: Wholesale oriented indicators often hint at a high level of integration of the EU financial market. This result is in sharp contrast to the obvious incomplete integration of retail markets. Since our indicator is based on a central price indicator of European retail financial markets – retail lending rates – it should help to get a more complete picture of the degree of integration.

Indeed it can be shown that based on the experience from the second half of the nineties debtors in some countries could have gained substantial interest rate savings in periods of rate declines. Since the pass-through is asymmetric – i.e. it is faster if this is for the bank's advantage – this also indicates a net consumer gain over the whole interest rate cycle. The

findings on heterogeneous pass-through also support the view that today retail financial markets are much less integrated in Europe than many indicators based on capital market links seem to suggest.

The analysis proceeds the following way. In section 2, the pass-through literature is surveyed, followed by a discussion of the relationship between market integration and interest rate adjustment. After the presentation of some descriptive results (section 3) the core quantitative part follows in section 4. Section 5 concludes.

2 The concept of interest rate pass-through in monetary and integration economics

2.1 Short- and long-run links

The main objective of the existing interest rate pass-through literature is a better understanding of a central bank's interest rate policy. This literature's focus is the response of bank lending rates to changes in the money market rate which is an important part of the monetary transmission mechanism. Two groups of studies can be distinguished insofar the possible long-run relationship (cointegration) between lending and money market rate is taken into account or not.

Studies with a short-run focus

Studies with a main focus on the short-run link between money market and lending rates (e.g. Borio/Fritz, 1995, Cottarelli/Kourtelis, 1994, and Donney/Degryse, 2001) usually employ the following autoregressive distributed lag model for lending rates:

$$L_t = \mathrm{c} + \beta_0 M_t + \sum_{\mathrm{i}=1}^{\mathrm{k}} (\alpha_{\mathrm{i}} L_{t-i} + \beta_i M_{t-i}) + \varepsilon_t \qquad (1)$$

Where L_t and M_t are lending rate and money market rate at time t, respectively. k is defined as the model's optimal lag-length and ε_t is an error term. The coefficient β_0 measures the short-run or impact effect of changes in the money market rates on lending rates. A value of β_0 of less than one displays lending rate stickiness, i.e. sluggish adjustment of lending rates to money market rates. Equation (1) has to be estimated in differences if the interest rate series exhibit unit roots in order to avoid spurious results.

Studies taking account of the long-run link

Equation (1) implies that a long-run link between money market and lending rate can be calculated as

$$\theta = \frac{\sum_{j=0}^{k} \beta_j}{1 - \sum_{i=1}^{k} \alpha_i} \qquad (2)$$

Thus, in the long-run equation (1) becomes

$$L_t = \theta_0 + \theta M_t + u_t \qquad (3)$$

Equation (3) states the cointegration equation, i.e. the long-run relationship between the lending rate and the money market rate. This long-run relationship can be incorporated in the model. By doing so, one gets the following error correction specification:

$$\Delta L_t = c + \beta_0 \Delta M_t + \sum_{i=1}^{k} (\alpha_i \Delta L_{t-1} + \beta_i \Delta M_{t-i}) + \gamma (L_{t-1} - M_{t-1}) + \varepsilon_t \qquad (4)$$

Where Δ is the first difference operator. According to equation (4) changes in the lending rate, over time, are due to two sources. First, with a lag, changes in the lending rate are due to changes in the money market rate. Second, they are due to deviations from the long-run relationship. Moazzami (1999), Sander/Kleimeier (2001) and Mojon (2000) follow this road.

By estimating equation (4) the short-term impact multiplier as well as the long-run multiplier and its standard error can directly be obtained. Estimation of equation (4) is computationally more efficient compared to estimation of the standard pass-through model (Moazzami, 1999). Therefore, if cointegration between the money market rate and the lending rate is present, estimating the error correction specification is preferable.

2.2 Main findings

In general, pass-through studies display three major results.[1] First, the short-run impact multiplier typically is below one, indicating that lending interest rates adjust sluggish to money market rates. Second, they find significant asymmetry in the stickiness of upward and

[1] See appendix 1 for a summary of results.

downward movements of retail rates. Finally, there are considerable differences in pass-through coefficients and speed of adjustments across countries.

Sluggish adjustment

A bank will only adjust its rate when the optimal rate differs by such an amount from the existing rate that the revenues from changing the rate exceed the costs of change. Such costs may arise from different sources which leads to several explanations as to why retail interest rates are sticky (Nabar et al., 1993):

- Asymmetric information between banks and borrowers can lead to adverse selection and moral hazard. In this case an optimal interest rate exists that maximises a bank's expected return on loans. Borrowers accepting a higher rate than this optimal rate are likely to be poorer than average credit risks and existing borrowers are likely to choose riskier projects when facing such a higher rate. This explains that an increase in loan rates above this optimal rate may actually reduce the bank's expected return.
- There are "menu costs" that may prevent banks from adjusting retail rates instantly. These administrative costs may involve, for example, labour, computing and notification costs.
- Banks may be interested in long-term relationships with their customers and as a consequence change loan rates upward less often than justified by the movement in the underlying cost of funds. Banks and customers have an implicit risk-sharing arrangement that includes that banks keep retail interest rates more fixed than the money market rate. In return, bank customers are willing to pay a mark-up for this insurance.
- Banks can react to a change in money market rate not only by changing the interest rate. The true loan price can adjust along other dimensions such as collateral, commitment and fees.
- Rate stickiness can result from the fact that the retail interest rates have a longer maturity than the money market rate. Banks will not adjust their rates instantly when there is uncertainty about the future development of market rates.[2]
- A lack of competition among banks or between banking finance and direct finance such as commercial papers may lead to sluggish adjustment of retail rates. Banks in concentrated

[2] However, this point is of no relevance in our case, since we take long-term market rates as costs of fund for long-term retail rates, see section 2.4.

markets are able to increase their profit margin by postponing a decrease in rates. In this context the cost of lowering rates would be the foregone monopoly rent – an opportunity cost.

Asymmetry in the stickiness

There are a number of studies that find significant asymmetry in the stickiness of upward and downward movements of retail rates (e.g. Mester/Saunders, 1995, and Mojon, 2000). The pass-through to credit rates is higher in periods of increasing money market rates than in periods of decreasing market rates. The opposite holds true for deposit rates.

Consumers face costs of switching banks. This reduces the interest rate elasticity of the credit demand curve and the deposit supply curve. Thus, the maximisation of banks' income may result in this asymmetric pass-through.

Besides, when concentration in the banking market is lower this interest rate cycle asymmetry of the pass-through is less pronounced (Hannan/Berger 1991, Neumark/Sharpe 1992).

Heterogeneity in the pass-through across countries

As appendix 1 reveals there are also substantial differences in the pass-through across countries. Mojon (2000) undertakes a number of regressions in order to analyse which observable features of the institutional and financial structure can explain these differences across countries.[3] His findings reveal the following: The volatility of the money market rate as a feature of the *monetary policy regime* has a negative effect on the pass-through to credit rates. Obviously, changes in the money market rate are more likely to be passed through to retail rates if they are perceived to be permanent. In contrast, like with nominal prices, the pass-through to lending rates is higher when inflation is high.

Both *competition among banks and from direct finance* affect the pass-through significantly. The competition intensity among banks leads to faster adjustment of credit rates when the

[3] Mojon (2000) performs a panel regression for the countries in the Euro area. A similar approach was undertaken, for example, by Cottarelli/Kourelis (1994), that tested the impact of banking market structure on a cross-section of pass-through elasticities estimated for 31 countries. They found the following indicators of financial structure to significantly lower the speed of adjustment of bank rates to money market rates: the absence of money market for negotiable short-term instruments, relatively high volatility of the money market rate, restrictions of international capital flows, the existence of barriers to entry, and public ownership of the banking system.

market rate is falling and of deposit rates when the market rate is rising. As an indicator for the competition from direct finance, the volume of short-term securities – that can also be seen as a substitute to traditional bank deposits – has a positive impact on the pass-through, i.e. competition from direct finance increases the speed of adjustment.

Finally, higher staff costs, which are taken as an indicator for the *rigidity of bank costs* lead to a smaller degree of pass-through to credit rates.

2.3 Pass-through and financial market integration

As explained above national differences in pass-through speed are caused by a multitude of factors. Nevertheless, an unequivocal statement about the impact of market integration on the link between market and lending rates is possible: integration fosters convergence of pass-through speed between national markets. Reasons to expect this link between market integration and pass-through are the following:

- A fully integrated money market - as it is now given for the countries of the Eurozone - implies a single level of volatility of money market rates. Furthermore, an integrated financial market fosters diversification of credit risk across corporate sector issuers of debt securities. As a consequence, also smaller companies will have access to direct finance. Therefore, with market rate volatility and availability of direct finance relevant determinants of pass-through speed are equalised (Mojon, 2000).
- Full integration of financial markets implies that consumers chose among credit offers without paying interest to the domicile of a bank. If integration is that far advanced different pass-through speeds are eliminated directly through debtors' arbitrage: In a time of falling market rates, potential debtors would shop around all over Europe and chose the credit offers of fastest adjusting banks. In times of rising rates a bank moving ahead with lending rate adjustment immediately loses attraction.

This relationship between integration and pass-through speed allows to use the concept originating from the monetary transmission literature for different analytical purposes in the context of integration economics.

First, national differences in pass-through speed can serve as an indicator of integration. This usefulness is derived from the fact that full integration of financial markets is a sufficient (but

not necessary condition) for convergence of pass-through speed. The only paper known to the authors using the pass-through approach in this respect is Sander/Kleimeier (2001). Second, national differences in pass-through speed can lay the base for the calculation of indicators of integration benefits. This idea will be developed up to a first quantification in the empirical part of the paper.

The following consideration shows that consumers benefit from a convergence of interest rate adjustment speed. Debtors in countries with banks that – before integration - adjust slowly would gain from integration in periods of decreasing market rates since the credit rate would be lowered earlier than with fragmented markets. Of course, the same debtors might loose in periods of increasing market rates. However, as discussed above there is asymmetry in the stickiness of retail rates observable. The pass-through to credit rates is higher in periods of increasing money market rates than in periods of decreasing market rates. Thus, over the whole interest rate cycle, debtors in today's slow adjusting markets would gain from more integration. An analogous argument applies to creditors of bank deposits. These would gain from a faster correction of deposit rates.

The extent of benefits depends on the level to which adjustment speed converges. In the following, convergence to the top is assumed. It can be regarded as likely that the degree of competition in a unified EU financial market will exceed the present national levels of competitive pressure. One could therefore even assume that the adjustment speed will exceed the degree of today's fastest adjusters. In this sense the assumption of convergence to the top is conservative.

2.4 Methodological consequences

The insights of the existing pass-through literature demands a careful specification of the quantitative analysis in regard to the asymmetry of adjustment and the possible long-run restriction.

Since banks react differently in times of increasing and falling interest rates this has to be taken into account for the regressions. Since we focus on potential benefits of debtors in periods of falling market rates, the estimation of the pass-through process must also be based on a period of mainly falling rates. This is the reason that we restrict the estimation base to the second half of the nineties where we are in the comfortable position that interest rates more or less constantly fell over a period of some years.

Furthermore, we follow the more advanced studies and account for a possible long-run link between costs of funds and lending rates. This is also necessary since we link interest rate pass-through with financial market integration which clearly requires also a long-run perspective. Our starting point is the approach undertaken, for example, by Mojon (2000). First, the error correction model of equation (4) is estimated provided that the costs of funds variable and the retail bank rate are cointegrated. In the case that the series are not co-integrated the error correction term is dropped from the equation and we come back to the standard pass-through model of equation (1) that is estimated in differences to avoid spurious regression problems due to the non-stationarity of interest rates.

While these first steps are more or less standard, the specific integration focus demands qualifications to the approaches of the monetary transmission literature. One difference concerns the choice of the market interest rate. In the monetary literature, money market or central bank rates are always used as cost of funds variables – even if the pass-through to long-run fixed rate credits is studied. Thus, the analysed adjustment effectively mixes up two different reactions: first the term-structure reaction of long to short term interest rates and second the reaction of retail lending to market interest rates. This approach is legitimate for this strand of literature which is exclusively interested in the effects of monetary policy. This paper, however, with its interest shifted to financial market integration has to be more precise. It has to disentangle the term structure link from the intermediation link. For this purpose, market rates are chosen corresponding to the maturity of the interest rate agreement. For mortgage lending rates, long-term government bond yields are used instead of money market rates as a basis for the pass-through analysis.

The analysis then enters completely new terrain by developing integration benefit indicators based on the pass-through concept. To reach this objective, we simulate development of retail lending rates in different markets assuming these markets were characterised by the pass-through speed of a fast adjuster. Potential interest rate savings are calculated for the falling market rate period in the second half of the nineties.

3 Data and descriptive analysis

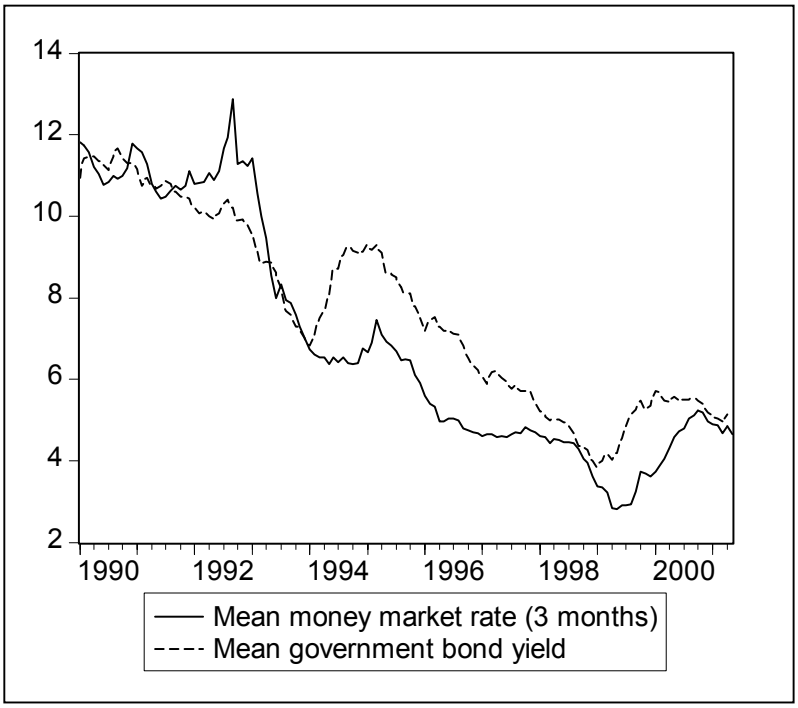
The analysis is based on monthly data from the ECB data base "National Retail Interest Rates".[4] The ECB regards the rates included as the "main indicators of retail financial market conditions in the Member State concerned" (ECB, 2001). National series are summarised under common headings but are not fully harmonised. This means that underlying credits might be different between member states in regard to average size, default risk and other characteristics. Therefore, differences in levels between member states can not be directly interpreted – which is a less serious problem for this paper's approach since it exploits only the link between market and retail rates *within* a country. The descriptive analysis is based on three lending rates and two deposit rates: mortgage loans to households ("N2" in ECB data base), consumer loans to households ("N3"), short term loans to enterprises ("N4"), time deposits ("N8") and savings accounts ("N9"). The econometric analysis will focus exclusively on credit rates due to lacking data availability for deposit rates.

As explained in the preceding section, market rates are chosen corresponding to the maturity of the credit and deposit products. The 3-months money market rates from IMF's International Financial Statistics are used for all variable interest rate credits and deposits. For fixed rate products (most of the mortgage interest rates in the ECB data base refer to fixed rates) government bond yields, again from IMF's International Financial Statistics, serve as the market reference rate.

A first descriptive approach should make a difference between periods of increasing and falling interest rates since an asymmetric pass-through belongs to the well established empirical facts. Based on development of average market interest rates (figure 1) the following periods are chosen for calculations of simple correlations (tables 1-5): 1995:03 – 1999:01 as a period of declining bond yields, 1999:01 - 2000:01 as a period of increasing bond yields, 1995:03 – 1999:05 as a period of declining money market rates and 1999:05-2000:10 as a period of increasing money market rates.

[4] These data can be downloaded from www.ecb.int (Statistics).

Figure 1: Average money market rates and government bond yields



Unweighted average of: Belgium, Germany, Spain, France, Ireland, Italy, Netherlands, Austria, Portugal, Finland, Great Britain.

Table 1: Correlation coefficients mortgage loan rates and government bond yields

Country	95:03-99:01 decreasing bond yields	99:01 00:01 increasing bond yields
Belgium	0.882	0.923
Germany	0.987	0.988
Greece	-	-0.296
Spain	0.978	-0.200
Italy	0.928	-0.588
Netherlands	0.921	0.864
Austria	0.929	-0.091
Portugal	0.910	-0.524
Finland	0.926	0.308
Great Britain	0.934	0.928
Ireland*	0.843	-0.702
Average	*0.924*	*0.146*

*Mortgage credits for Ireland included in the ECB data base are floating, therefore correlation with money market rate.

Table 2: Correlation coefficients consumer loans and money market rates

Country	95:03-99:10 decreasing money market rates	99:10-00:10 increasing money market rates
Belgium	0.821	0.958
Germany	0.751	0.923
Greece	-0.108	0.897
Spain	0.981	0.913
Austria	0.798	0.976
Portugal	0.930	0.218
Finland	0.919	0.983
Great Britain	0.130	0.266
Average	*0.653*	*0.767*

Table 3: Correlation coefficients short-term enterprise loans and money market rates

Country	95:01-99:07 decreasing money market rates	99:07-00:10 increasing money market rates
Belgium	0.980	0.993
Germany	0.861	0.958
Greece	0.406	0.966
Spain	0.990	0.921
France	0.704	0.941
Ireland	0.941	0.953
Italy	0.976	0.952
Netherlands	0.896	0.968
Austria	0.763	0.981
Portugal	0.984	0.710
Average	*0.850*	*0.934*

Table 4: Correlation coefficients time deposit rates and money market rates

Country	95:01-99:07 decreasing money market rates	99:07-00:10 increasing money market rates
Belgium	0.994	0.998
Germany	0.968	0.985
Greece	0.361	0.951
Spain	0.995	0.986
France	0.993	0.993
Italy	0.978	0.976
Netherlands	0.892	0.983
Austria	0.766	0.939
Portugal	0.991	0.951
Finland	0.829	-0.889
Great Britain	0.928	0.873
Average	*0.881*	*0.795*

Table 5: Correlation coefficients savings accounts rates and money market rates

Country	95:01-99:07 decreasing money market rates	99:07-00:10 increasing money market rates
Belgium	0.882	0.416
Germany	0.911	0.974
Greece	0.297	0.957
France	0.845	0.179
Ireland	0.840	0.938
Great Britain	0.873	0.856
Average	*0.775*	*0.720*

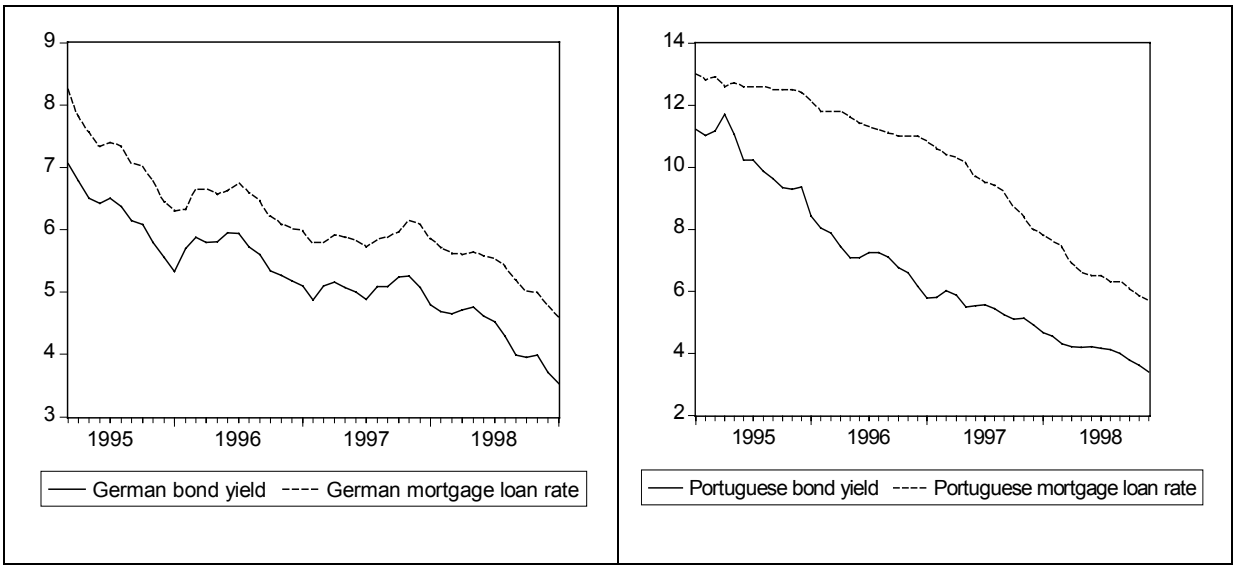
Some of the correlation coefficients have to be treated with caution. This holds particularly for the period of increasing rates in 1999 which suffers from its short time-span and possible distortions through transitory EMU effects on the underlying interest rate series. Particularly the mortgage rate correlation coefficients for the increasing interest rate period seem to be affected resulting in implausible negative signs.

Nevertheless, the following stylised facts emerge: The pass-through of changing market rates to retail rates is relatively slow for consumer credits and savings accounts. The adjustment is faster for mortgages, short-term enterprise credits and time deposits. Average correlation coefficients support the asymmetry hypothesis for consumer loans, enterprise loans, time deposits and savings accounts: Here the adjustment is faster if it benefits the bank: for credits in times of increasing market rates and for deposits in times of falling market rates.[5]

As explained above the primary focus of this paper is on differences in pass-through speed between countries. Here the correlation coefficients give only a first rough but helpful insight – as can be demonstrated by one example: In the falling interest rate period the correlation analysis indicates for mortgages that Germany is a relatively fast and Portugal a slowly adjusting market. Figure 2 depicts the time series for these examples. It shows that market and retail rates in Germany move in a parallel way while the link is much less pronounced in the Portuguese case. In this falling market rate period this means that Portuguese debtors benefit less. In order to quantify these effects, a more precise approach will be employed in the following section.

[5] Note, however, that for time deposits this result depends on the negative correlation coefficient for Finland.

Figure 2: Examples of a fast and a slow pass-through in the mortgage market



4 Adjustment speed and benefits of integration

In order to quantify benefits of a accelerated interest rate pass-through our focus will be on the period of falling market rates between 1995 and 1999. We try to answer the following question: How much would have debtors saved in this period if all EU countries had been characterised by the adjustment speed of the fastest credit market?

In principle it is possible to pose a similar question for deposit markets and periods of rising market rates. Unfortunately, there was no period with increasing money market rates in the nineties lasting much more than a year. Thus, a data base for a similar analysis for deposit rates is lacking. Therefore, the following analysis is restricted to the markets for mortgage lending, consumer credits and short-term enterprise lending.

The econometric approach is based on the estimation of equation (4) and takes account of the possibility of cointegration between market and retail rates. The analysis proceeds the following way: In a preparatory step (4.1), standard unit root and Johansen cointegration tests were executed in order to identify the level of integration of the time series and the existence of a cointegration relationship between market and retail interest rates. In a second step (4.2), the speed of pass-through is measured based on country specific estimations of equation (4). In a third step (4.3), for each market the model of a fast adjusting market serves as a basis for the simulation of retail rates in other countries. This allows to calculate an indicator for

integration benefits in terms of potential interest savings through a convergence in pass-through speed.

4.1 Preparatory diagnosis

Standard unit root tests overwhelmingly indicate that market and retail interest rates included are first order integrated (results not reported). This finding is in line with well known time series characteristics of interest rates and allows to test for cointegration between market and retail interest rates. The Johansen procedure is applied using as many data points as available for each country retail market combination, the maximum range is from January 1980 to April 2001. One has to be aware that these long periods raise the possibility of structural breaks. This danger has to be traded off against the restricted meaning of cointegration tests for short periods since cointegration refers to a long-run relationship. Cointegration is accepted if the trace statistic indicates the existence of a cointegration relationship with a significance level of at least 5%. The Akaike information criterion is used to decide optimal lag length in the application of the cointegration test. These preparatory diagnostics lay the basis for the estimation of country specific pass-through equations for the different retail rates.

4.2 Comparing the adjustment speed on the basis of country specific estimations

The estimation of equation (4) offers the basis for the measurement of adjustment speed. In the estimation the error correction term is included depending on whether the cointegration test has indicated a long-run relationship between market and retail interest rates or not. The length for the inclusion of lagged values of market and retail rates was again determined on the basis of the Akaike criterion.

Estimation period is identical to the periods with falling interest rates as used in the descriptive analysis. Although most time series are available starting with the early eighties the asymmetric nature of the pass-through forces to base the estimation on a restricted period. Thus for mortgage credit where the bond yield is the relevant cost of fund variable the estimation period is 1995:03-1999:01. For consumer and enterprise loans the estimation period is slightly longer 1995:03-1999:10.

Data availability allowed to estimate 23 pass-through equations indicating large country differences in the adjustment speed (estimation results are summarised in appendix 2).

In order to make results comparable the estimation results are used for simulating retail interest rate development for a common scenario – a decrease of market rates in period zero by one percentage point with no further fluctuations before and after that date.

For the assessment of reliability of these simulations, one has to be aware of the very different quality of the underlying regressions. As can be seen from appendix 2, results for mortgage markets are most satisfying in two respects: Goodness of fit is high and with one exception (Italy) the resulting pass-through processes are convergent. The results for consumer credit rates are far less satisfying. Goodness of fit is low and all processes are non-convergent, i.e. the resulting credit rate does not converge to a fixed value. The regressions for enterprise credit are again better apart from three country regressions with instable processes. Therefore, results for the mortgage market and the enterprise credit market should be taken more seriously than those for the consumer credit market.

Figure 3 depicts the pass-through to mortgage lending rates over a one year period. It shows that these retail-rates follow falling costs of funds only sluggish. Even after six months the pass-through in two thirds of the countries is far from complete. Differences in speed between countries are most pronounced between two and four months. Judging on the basis of the three months adjustment, mortgage lenders benefit fast from falling market rates in Belgium, Germany and Netherlands. Consumers in the UK, Ireland, Italy and Spain have to be more patient. Adjustment is slowest in Austria and Portugal.

Figure 3: Pass-through speed for mortgage credit rates (in basis points)

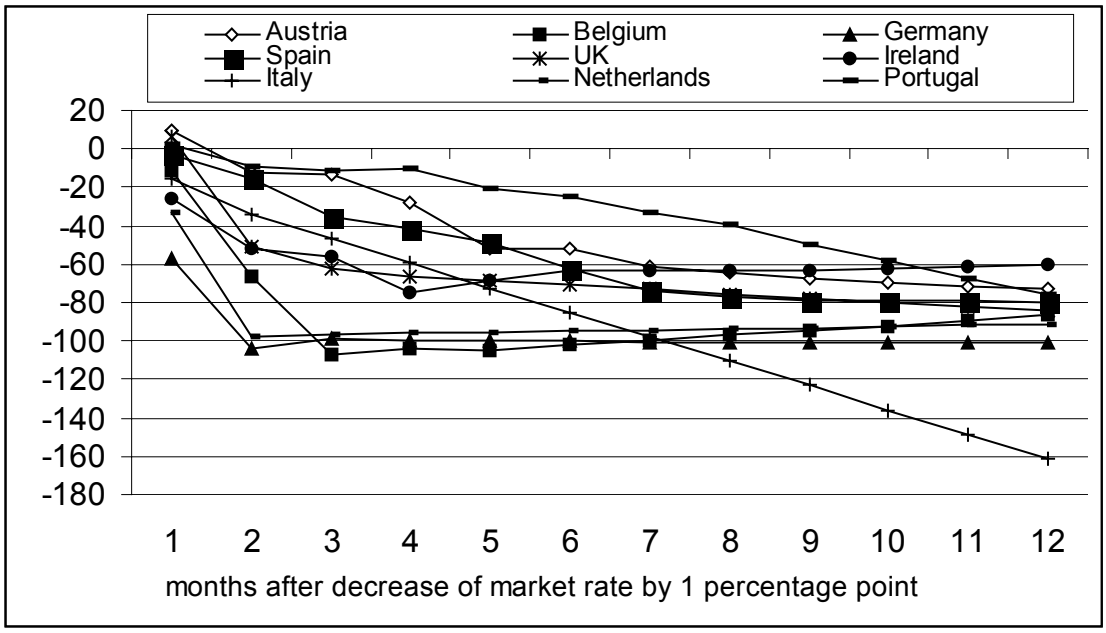


Table 6 summarises the results of the same analysis for all three credit markets based on the three months pass-through.

Table 6: 3-months-decrease of retail rates after a one percentage point fall in market rates (in basis points)

Country	**mortgage loans**	**consumer loans (short-term)**	**enterprise loans (short-term)**
Austria	-14	-60	-44
Belgium	-107	-98	-83
France	-	-	-45
Germany	-99	23	-13
Ireland	-56	-	3
Italy	-47	-	-167
Netherlands	-97	-	-62
Portugal	-11	-32	-53
Spain	-35	-46	-75
UK	-62	-73	-

Simulated effect on retail interest rate of a 1 percentage decrease in market rates (=government bond yields for most mortgage credit series and 3 month money market rate for all other series) given the estimation of equation (4). Estimation is based on the period of decreasing market rates 1995-1999 as explained in the text. Missings: No estimation and simulation possible due to data availability.

National differences in the adjustment speed for consumer loans are also substantial. While, again, Belgium is a fast adjuster where already after three months consumers get almost hundred percent of the market rate decline adjustment is not noticeable at all in Germany and relatively slow in Portugal and Spain. For enterprise credits Italy is the fastest reacting country according to these results. A particularly slow pass-through occurs in Greece and Germany.

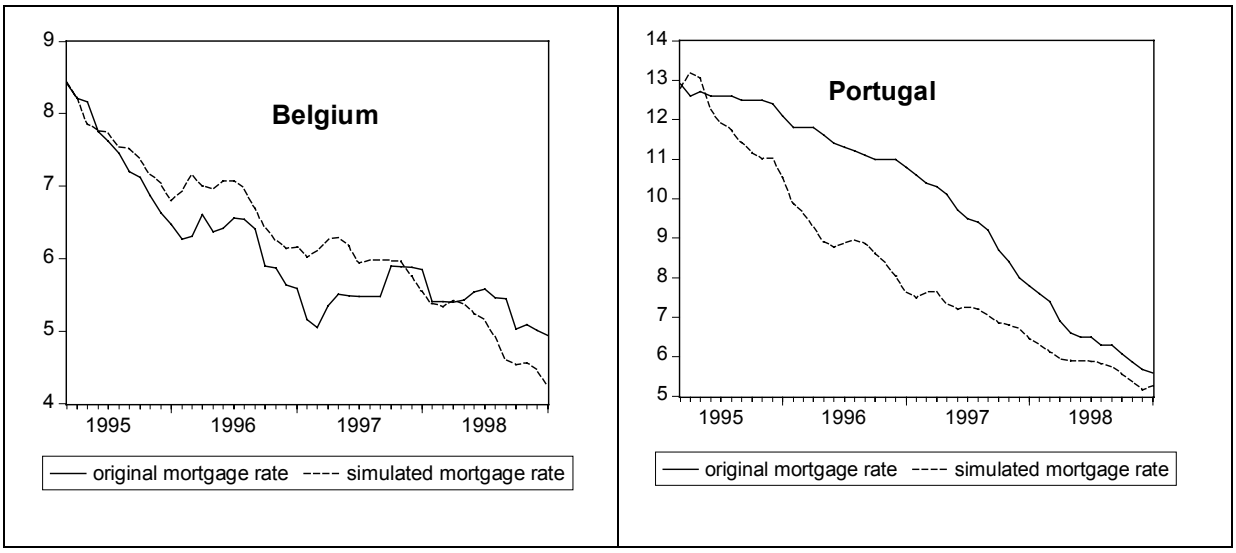
4.3 Benefits in integration scenarios

In the final step retail rates for EU countries are simulated assuming that the link between market and retail rates in each country would be as close as in a fast adjusting country. The choice of the reference country is based on the results of the three-months pass-through section with some qualifications. Germany is chosen as a reference country for mortgage credits, although it is second to Belgium in terms of the 3-month adjustment. The reason is that the underlying regression has a much better fit for Germany than for Belgium and that the difference in three-month adjustment speed is only of a minor magnitude (see appendix 2). For consumer credits Belgium as the fastest adjuster is chosen as reference country. However, simulation results for consumer credits are less reliable than for mortgage due to the non-convergence of all estimated pass-through processes.

For short-run enterprise credits Italy appears to be the faster adjuster on the basis of the three-month pass-through. The choice of Belgium instead of Italy is motivated by the fact that the underlying estimation of the pass-through process for Italy is exploding. This would pose serious difficulties for the simulation. The Belgian regression results indicate a convergent adjustment behaviour making it a better basis for the simulation.

Figure 4 depicts examples of the simulation results for mortgage credits for two polar cases: Belgium as a fast adjusting country and Portugal as a slow adjuster. The figure includes two series, the original and the simulated mortgage interest rate. Basis for the simulation is the country market rate and the pass-through equation of the reference country (which is Germany for mortgages).

Figure 4: Simulation results mortgage rates – two polar examples (in per cent)

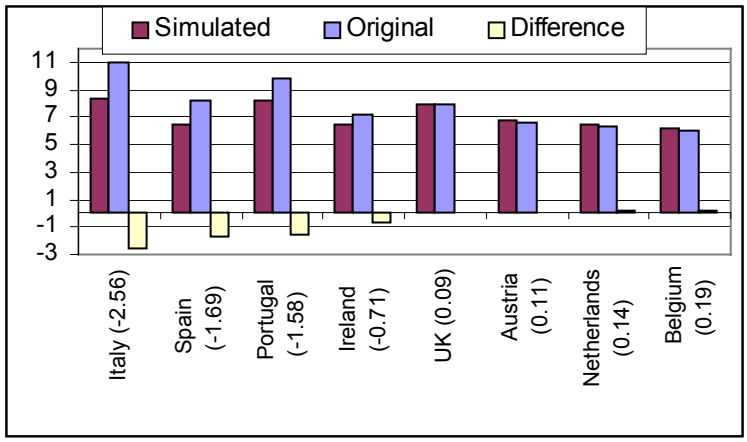


Simulation is based on country market rates and the German pass-through equation estimated on data from the declining interest rate period 1995:03-1999:01.

As expected simulations come to different results for the relation between simulated and original series. Debtors in Belgium with its fast pass-through mortgage market would not benefit from the German link between market and retail rates. The simulated rate exceeds the original rate for about two thirds of the simulation period. On average the simulated interest rates are 19 basis points higher than the actual values. The case is different for the slow pass-through market in Portugal. Here, consumers would have benefited to a large extent from German pass-through structures in the second half of the nineties. For most of the time the simulated rates are substantially below the actual series, on average the interest rate advantage amounts to 158 basis points for this period of declining market rates.

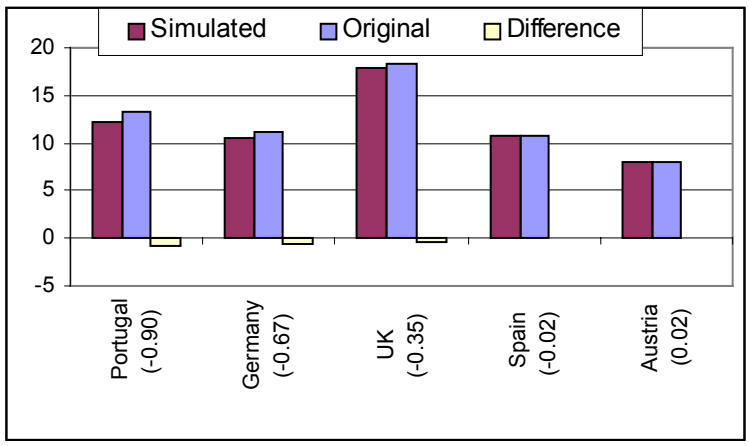
The same kind of analysis was executed for all three markets and all countries with sufficient data. Figures 5-7 summarise the outcomes of the simulations. Here, a negative (positive) value for the difference between the simulated and original series indicates that a country would benefit (lose) from the structures of the reference country.

Figure 5: Average mortgage credit interest rate 1995:03 – 1999:01(in per cent)



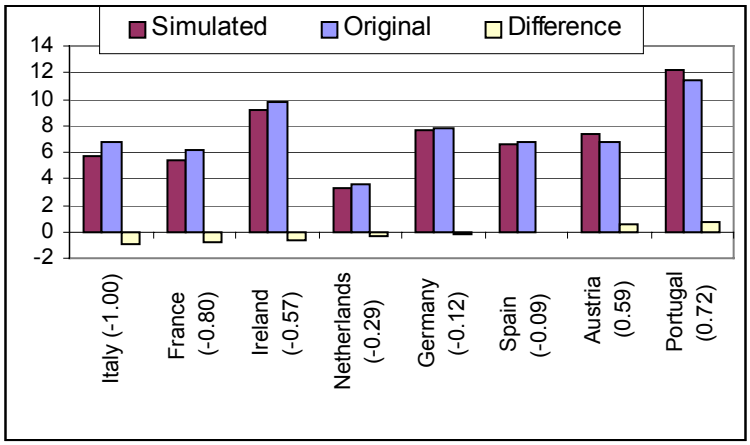
In brackets behind country name in figures 5-7: value of difference between mean original and simulated series. Reference country for the simulation is Germany.

Figure 6: Average consumer credit interest rate 1995:03 – 1999:10 (in per cent)



Reference country for the simulation is Belgium.

Figure 7: Average enterprise credit interest rate 1995:03 – 1999:10 (in per cent)



Reference country for the simulation is Belgium.

Comparing the winner-loser pattern of these simulations corresponds in most cases with the results of the three-months pass-through analysis. Relative slow adjusting countries tend to gain most.

However, there are also contradictions between both approaches, the most striking concerns the Italian market for enterprise loans. Here Italy shows even an overcompensating three-months adjustment. Nevertheless enterprise debtors in that country are identified as a major winner from assuming the Belgian pass-through speed. Here the simulation can be regarded as dominating the three-months pass-through result. As already explained above the Italian pass-through regression implies an instable process and thus has to be treated with caution. The simulation results for enterprise credit rates are not affected from this problem since they are only based on the regressions of the stable reference countries. Simulations for consumer credits are less reliable due to the fact of instable pass-through equations for all countries including the Belgian reference case.

For mortgage credits the simulations clearly splits countries into two groups. For the UK, Austria, Netherlands and Belgium on the one hand the pass-through structure of the German reference case would hardly make a difference. In Italy, Spain, Portugal and Ireland on the other hand, consumers would have gained much from the pass-through speed of the German market.

For consumer credits where data availability restricts the inclusion of countries and where the underlying regressions have less satisfying properties the picture is not as clear cut between Southern and Middle Europe. Now Portugal belongs together with Germany to the benefiting countries while Spain forms with Austria a group with no substantial differences from the Belgian reference case. The UK is in between.

On the enterprise credit market, creditors in Italy, France and Ireland would benefit most from a convergence of pass-through speed on the Belgian level. The Netherlands, Germany and Spain are not very different from the reference case while Austria and Portugal would even lose.

5 Conclusion

The message of the pass-through related integration indicator is unambiguous. The substantial reaction differences of national bank retail rates to changes in costs of funds supports the view that retail credit markets in Europe are still far away from perfect integration. The pass-

through indicator is a helpful corrective to the wholesale oriented integration indicators that regularly hint on high integration of EU financial markets.[6]

The results show that incomplete integration is costly for bank customers – at least in some EU countries. In the falling interest rate period of the second half of the nineties, mortgage debtors in Italy, Spain and Portugal paid on average an excess interest rate of more than 150 basis points due to the particular slow pass-through in these markets. Because of the asymmetry of the pass-through these losses are not compensated by equally sized benefits in times of rising interest rates.

The insights about the determinants of pass-through speed show the way for reducing these customer disadvantages. The Euro and the resulting convergence of money markets and financial structure will work towards convergence of pass-through speed. A more reliable and probably faster mechanism would be activated if direct cross-border retail credits become more important. This kind of cross-border activity could set in motion an arbitrage mechanism that should force banks to speed up interest rate adjustments for the benefit of debtors and depositors.

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[6] See Schüler/Heinemann (2001) for an analysis with a similar retail focus where cointegration of national retail rates is used as an integration indicator.

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Appendix 1 – Results of the literature

Pass-through of a 1 percent change in the money market rates to the lending rate
(The coefficients are not directly comparable since the underlying estimation periods differ)

Country	Study	Impact multiplier β_0	3-month interim multiplier	Long-run multiplier θ
Austria	CK			
	BF	0.40	0.78	0.86
	M			
	SK	-0.176		0.223
	DD			
Belgium	CK	0.21	0.67	0.87
	BF	0.61	0.99	1.27
	M		0.64	
	SK	0.771		0.940
	DD	0.27	0.44	-0.17
Finland	CK	0.13	0.23	0.28
	BF			
	M			
	SK	0.248		1.01
	DD			
France	CK			
	BF	0.43	0.45	0.74
	M		0.81	
	SK	0.073		0.509
	DD	0.11	0.35	0.45
Germany	CK	0.37	0.87	1.00
	BF	0.11	0.45	1.05
	M		0.67	
	SK	0.217		1.008
	DD	0.40	0.80	0.00
Ireland	CK	0.34	1.07	1.07
	BF			
	M			
	SK	0.668		0.911
	DD	0.11	0.34	0.03
Italy	CK	0.12	0.60	0.83
	BF	0.26	0.69	1.22
	M		0.54	
	SK	0.197		0.866
	DD	0.14	0.57	0.68
The Netherlands	CK	0.52	0.82	0.82
	BF	1.08	0.96	1.08
	M		1.03	
	SK	0.115		0.983
	DD	0.71	0.97	0.24
Portugal	CK	0.47	0.95	0.95
	BF			
	M			
	SK	0.168		1.170
	DD	0.03	0.01	-0.41

Appendix 1 - continued

Spain	CK	0.36	0.78	0.94
	BF	0.00	0.30	1.17
	M		0.51	
	SK	0.705		1.074
	DD	0.36	0.73	0.40
United Kingdom	CK	0.87	0.94	0.94
	BF	1.00	1.01	1.01
	M			
	SK	0.272		0.636
	DD			

Notes: CK=Cottarelli/Kourelis (1994), BF=Borio/Fritz (1995), M=Mojon (2000), SK=Sander/Kleimeier (2001), DD=Donney/Degryse (2001); For BF and DD the 1-month response is used as the impact multiplier; BF didn't calculate the 3-month multiplier but the response after 1 quarter, which is displayed instead; For DD the response after 60 month is taken as the long run multiplier; For DD the short-run loans rate to enterprises is used;

Appendix 2 – Summary of pass-through regressions

country	cointegration (inclusion of error correction term)	optimal lag length (Akaike)	adj. R^2	convergent pass-through process
mortgage lending rate				
Austria	no	4	0.233	yes
Belgium	no	2	0.362	yes
Germany	no	1	0.858	yes
Great Britain	no	1	0.395	yes
Ireland	no	3	0.527	yes
Italy	no	1	-0.053	no
Netherlands	no	1	0.574	yes
Portugal	yes	6	0.184	yes
Spain	no	6	0.731	yes
consumer short-term credit rate				
Austria	no	1	0.166	no
Belgium	no	1	0.043	no
Germany	yes	1	0.073	no
Great Britain	no	1	0.063	no
Portugal	no	1	-0.006	no
Spain	yes	3	0.180	no
enterprise short-term credit rate				
Austria	yes	4	0.455	yes
Belgium	no	1	0.595	yes
France	no	1	0.315	yes
Germany	yes	1	0.169	no
Netherlands	no	2	0.200	yes
Portugal	no	1	0.164	no
Spain	no	3	0.555	yes
Ireland	yes	1	0.503	yes
Italy	yes	1	0.887	no