Int Adv Econ Res (2012) 18:397–407
DOI 10.1007/s11294-012-9377-9

Determinants of Interest Rate Pass-through for Emerging Market Economies: The Role of Financial Market Structure

Nilufer Ozdemir · Cuneyt Altinoz

Published online: 29 August 2012

Abstract It is essential for central banks to assess whether or not the pass-through from monetary policy rates to credit and deposit interest rates is complete in order to ensure price stability. In this article, we analyze interest rate pass-through process for emerging market economies. Since emerging market countries lack large panel data sets that are typically available for developed countries, it is hard to analyze the determinants of pass-through coefficients for emerging market countries. To overcome the data issue, we developed a country selection procedure that minimizes heterogeneity among the countries included in the analysis. Our findings indicate that banking sectors' competition plays a more important role for emerging market countries than their developed counterparts.

Keywords Interest rate pass-through · Transmission mechanism · Monetary policy

JEL E40 · E50 · G15

Introduction

Monetary policy transmission mechanism starts with a change in central banks' policy decisions. The change in the official interest rates directly affects money-market interest rates and, indirectly, lending and deposit rates, which are set by banks.

The interest rate pass-through process describes how changes in central banks' policy rates are transmitted to retail interest rates on loans and deposits. Among various channels of monetary transmission, this channel is being accepted as one of the most important channels of monetary policy transmission mechanism. The importance of this channel and widespread applications of an inflation-targeting policy regime around the world have attracted the attention of both empirical and theoretical researchers to this subject.

N. Ozdemir (✉)
University of Mississippi, 367 Holman Hall University, Oxford, MS 38655, USA
e-mail: nozdemir@olemiss.edu

C. Altinoz
Kaplan University, Davenport, IA, USA

Empirical work in this literature generally focuses on the determinants of pass-through coefficients. These studies first estimate the pass-through coefficients for various retail interest rates. After estimating the coefficients, they analyze the determinants of the pass-through coefficients in panel data or cross section frameworks. These studies require the existence of large panel data sets, since each pass-through coefficient that is calculated by using time series observations will provide only one observation in the second step. Empirical work mostly covers developed countries or developed and developing countries together because of the lack of large panel data sets of emerging market economies. However, because of the differences in their economic structures, there is no reason for the interest rate pass-through process to be similar for emerging market countries and developed countries.

This article closes the gap in this literature by developing a sample selection procedure that allows us to analyze the determinants of the pass-through process. In this procedure, we select countries that share similar characteristics. By following large-country panel data studies, we focus on the macroeconomic characteristics, monetary policy regime, exchange rate regime, and EU membership status of the countries that we analyzed. After this selection process, we analyze the role of the banking sector structure on the pass-through coefficients. Since we have a smaller data set, this selection procedure is going to help us decrease the number of independent variables that will need to be included among explanatory variables.

Literature Review

Theoretical basis of the pass-through process is explained by two approaches: the cost of funds approach and the monetary policy approach. The first approach, developed by DeBondt (2002), focuses on the influence of monetary policy decisions on banking sectors' funding costs. Money market rates are assumed to reflect marginal costs of funds because banks rely on them for short-term borrowing. Banks would respond to changes in market rates in order to adjust their portfolio in response to a change in their funding costs.

The second theoretical approach of this literature was developed by Sander and Kleimeier (2004a) and (2004b) and Egert et al. (2007). They assume a stable yield curve, and that makes it possible to take a shortcut by looking directly at the relationship between policy rates and retail rates. This approach is referred to as the monetary policy approach.

Empirical articles analyzing the interest rate pass-through coefficients are generally based on Cottarelli and Kourelis (1994). In this article, authors analyze the determinants of interest rate pass through coefficients. They first estimate the effect on the lending rates of shocks in retail rates. Secondly, they explain the cross-country variations in the multipliers by regressing them on several variables related to the structure of these economies. They find that the speed of adjustment of lending rates is higher in inflationary environments.

Several articles followed the approach proposed by Cottarelli and Kourelis (1994). One strand of literature based on this approach focuses on the pass-through coefficients in the Euro area. Since the introduction of the common currency makes the

convergence of the transmission process among the member countries very important, these articles analyze the convergence of the pass-through coefficients among member countries and evaluate the transition periods for the candidate countries. One example of this literature is DeBondt (2002). The main contribution of his study is that, for the first time, both bank deposit and lending rates at the level of the euro area are analyzed in their study. They find that interest rate pass-through is higher in the long-term interest rates. Sander and Kleimeier (2006) investigate interest rate pass-through convergence for eight central and eastern European countries that joined the European Union. They find that the pass-through in many of these countries has become faster recently and is generally more complete than in the euro zone. Karagiannisa et al. (2011) examine the interest rate pass-through mechanism for the Eurozone and the U.S. and analyze the influence of recent financial market tensions on their pass through processes.

Another strand of literature focuses specifically on the role of financial structure in interest rate pass-through. Mojon (2001) analyzes how the financial structure would influence long-run pass through coefficients after a shock affecting money market rates for EU countries. He finds that the stickiness of lending rates is influenced by the existence of constraints on competition among banks, and that the degree of stickiness is quite different across countries. Leuvensteijn et al. (2008) analyze the impact of loan market competition on the interest rates applied by euro area banks to loans and deposits. They use interest rate data that cover a longer period and that are based on more harmonized principles than those used by previous pass-through studies for the euro area. Their results suggest that bank loan rates respond more strongly to market rates when competition is high. Gigineishvili (2011) expands the literature by covering 70 countries from all regions. He uses a wide range of macroeconomic and financial market structure variables to uncover structural determinants of pass-through and finds that countries with fixed exchange rate arrangements tend to have weak pass-through.

This paper analyzes the role of banking sector structure in the monetary policy pass-through process only for emerging market countries. To overcome the data problem, it controls for most of the heterogeneity of countries that are analyzed. It starts with grouping countries based on their inflation and GDP figures, and then among the countries that share similar macro characteristics, analyzing their monetary policy regime. After controlling for these characteristics, the role of financial structure in the pass-through process is analyzed.

Empirical Analysis

As discussed in the literature review, the articles that analyze the determinants of the pass-through coefficients share a common point. They all have large panel data sets. Table 1 shows the panel data coverage of leading examples of this literature. All of these examples, except for Gigineishvili (2011), cover at least 10 years' observations. Here, having large time series helps a lot in terms of increasing sample size, since researchers typically divide their samples into subsamples in their analysis. Gigineishvili (2011) compensates for the shortness of its time period with a large number of countries included in the study.

Table 1 Panel data dimensions of selected studies

Researchers	Number of countries	Time period
Cottarelli and Kourelis (1994)	31	1983–1993
DeBondt (2005)	25	1990–2002
Gigineishvili (2011)	81	2005–2010
Sander and Kleimeier 2004a	11	1993–2002

Table 2 shows the retail interest rate data that is available for selected emerging market countries. As it can be seen from the table, only one country has longer than 10 years' retail interest rate data that can be used in an interest rate pass-through study. Additionally, the ones with longer time series have only one or two retail interest rate data that are available to researchers. In this section, we will first explain how we overcome the lack of large panel data sets for emerging market countries. Next, data that is used in the estimation will be introduced.

Selection Procedure

As discussed above, the literature analyzed the determinants of interest rate pass through coefficients in detail before for developed countries and developed and developing countries together. As long as the researchers have large data sets, they could analyze the role of this heterogeneity. However, this is not an option for researchers studying emerging market countries that do not have large data sets available. This study fixes this problem by focusing on country selection process to control for at least some of the characteristics of these countries.

As Cottarelli and Kourelis (1994) and Gigineishvili (2011) indicate, macroeconomic characteristics and the type of the monetary policy regime that countries follow

Table 2 Retail interest rate data available for selected emerging market countries

Retail interest rate data availability for selected countries	
Belarus	2002–2011
Bosnia	2006–2011
Bulgaria	2007–2011
Czech	2004–2011
Hungary	2004–2008
Kosovo	2004–2011
Latvia	2004–2011
Lithuania	2005–2011
Macedonia	2005–2011
Poland	2004–2010
Romania	2007–2011
Russia	1995–2011
Slovak Republic	2004–2011
Slovenia	2003–2011
Ukraine	2006–2011

Related Central Banks' Web-pages

could play a role on the pass-through process. As Leuvensteijn et al. (2008) show, EU membership status also has an impact on the pass-through process. Our selection process is going to be based on these findings. In selecting the countries, we are going to analyze these properties.

For this purpose, first of all, macroeconomic characteristics of emerging market countries are controlled for. Inflation and GDP growth data that belongs to 25 emerging market economies are downloaded from the International Monetary Fund's (IMF) web-site and these countries are ranked based on their performance on these two important macro indicators. Tables 3 and 4 show how these countries did in the time period analyzed. Each row in these tables shows countries that are in the indicated percentiles. For instance, Mongolia is shown to be in the highest inflation and highest GDP growth percentiles. In Tables 3 and 4, Poland, Czech Republic, Hungary, Macedonia, and Croatia take place at the lowest percentiles in both categories. That is to say, these are the countries that share low inflation and low GDP growth characteristics. In the following part, these five countries are going to be taken as countries with the same macro characteristics.

After narrowing down countries in our sample to five, we analyzed other characteristics that could potentially be a factor influencing the monetary policy transmission. Table 5 shows other characteristics: the monetary policy regimes, their EU membership status, and their currency regimes. The currency regimes column indicates whether a country is a member of the Euro system or has its own independent monetary policy. The table indicates that Czech Republic, Poland, and Hungary share very similar characteristics here. First of all, they all have the same monetary policy regime, which is inflation targeting. Additionally, all three countries became an EU member approximately at the same time. Finally, while they are all EU members, they still have their own currencies and, accordingly, have independent monetary policies. Therefore, these countries share very similar characteristics. In the remaining part of the paper, the pass-through processes of these countries are going to be analyzed in detail.

Theoretical Model

After selecting the countries that will be analyzed in detail, we are going to focus on estimations. In this literature, interest rate pass-through coefficients are analyzed in error correction mechanism framework. Equation 1 below is the error correction

Table 3 Countries ranked based on their average inflation figures in 2004–2008 period

Percentiles	Countries					
100	Mongolia	Russia	Turkey	Moldova	Ukraine	Belarus
75	Georgia	Latvia	Kyrgyz Republic	Romania	Kazakhstan	Azerbaijan
50	Slovenia	Armenia	Slovak Republic	Estonia	Bosnia and Herzegovina	Bulgaria
25	Poland	Macedonia	Albania	Czech Republic	Croatia	Hungary

The IMF

Table 4 Countries ranked based on their average GDP growth figures in 2004–2008 period

Percentiles	Countries					
100	Georgia	Kazakhstan	Belarus	Mongolia	Armenia	Azerbaijan
75	Romania	Slovak Republic	Ukraine	Russia	Latvia	Lithuania
50	Kyrgyz Republic	Turkey	Albania	Estonia	Moldova	Bulgaria
25	Hungary	Croatia	Macedonia	Slovenia	Czech Republic	Poland

The IMF

model that is commonly estimated by the literature. In this equation, r_t and m_t represent retail interest rate and money market interest rate respectively.

$$\Delta r_t = \mu + \beta \Delta m_t + \sum_{i=1}^{k} \alpha_i \Delta m_{t-i} + \sum_{i=1}^{l} \delta_i \Delta r_{t-i} + \gamma ECT_t \quad (1)$$

where ECT_t is the lagged value of the residual term estimated from Eq. 2:

$$r_t = \varphi + \theta m_t \quad (2)$$

If retail rate and money market rate are found to be cointegrated, then the long run multiplier is simply θ in Eq. 2. Otherwise, it is calculated by using the following formula

$$\theta = \frac{\beta + \sum \alpha_i}{1 - \sum \delta_i} \quad (3)$$

Analysis of Pass-through Coefficients

In the second step, the determinants of these coefficients are analyzed in a panel data framework by following Cottarelli and Kourelis (1994) and others. Below, z_{it} represents the variables that reflect the characteristics of the countries that will be analyzed. Since we have already controlled for the macro characteristics, monetary policy, and exchange rate regimes together with EU membership status, in this section we will examine the role of banking sector structure in these economies.

$$\theta_{it} = \alpha + \phi z_{it} + \varepsilon_{it} \quad (4)$$

Table 5 Other characteristics of the countries in our sample

	Inflation targeting	EU membership	Currency
Macedonia	No	No	Macedonian Denar
Czech R	Yes	2004	Krona
Poland	Yes	2004	Zloty
Croatia	No	No	Kuna
Hungary	Yes	2004	Forint

Related Central Banks' Web-pages

Data

This analysis covers the 2004–2008 time period. In the estimation of interest rate pass-through coefficients, monthly data downloaded from related central banks' web-pages are used. After estimating pass-through coefficients for deposit and loan interest rates for Hungary, Poland, and Czech Republic, in the second step we use annual banking sector structure indicators downloaded from the European Bank of Reconstruction and Development's (EBRD) and the World Bank's web-page.

Calculation of Interest Rate Pass-through Coefficients

Equations 1 and 2 are used in the estimation of interest rate pass through coefficients. Since we use monthly data, by following Mojon (2001), I let the maximum number of lags, which are shown by k and l in Eqs. 1 and 2, be equal to six and analyzed various combinations of these lags. Optimal lags are chosen based on the Akaike information criterion (AIC) of estimated equations. In order to capture the changes in the interest rate pass through coefficients through time, the time period is divided into two by following the literature. First, coefficients are calculated for the time period between the first month of 2004 and sixth month of 2006. Second, coefficients are calculated for the time period between the seventh month of 2006 and last month of 2008. Table 6 (below) shows pass-through coefficients. By following Mojon (2001) and DeBondt (2002), the existence of cointegration between retail bank interest rates and market interest rates is directly tested by examining the significance and the sign of the coefficient of the error-correction term, γ. Table 6 reports pass-through coefficients and cointegration test results.

Second Step: Determinants of Pass-through Coefficients

After estimating the pass-through coefficients, the determinants of these coefficients are estimated. Thanks to the country selection procedure that is used, we do not need to include macroeconomic characteristics, policy regime, and membership status in the EU in our regression here. At this stage, only characteristics of financial market structure will be analyzed. For this purpose, a panel data set that includes pass-through coefficients and financial market variables is created. The time dimension of this panel data is equal to two, since we have two sets of estimations for the pass-through coefficients. In order to have measures of financial market indicators, we followed the approach introduced by Mojon (2001) and took the averages of financial market indicators for the two time periods analyzed.

Table 7 presents the averages of several banking sector characteristics variables for the countries examined here. Among these variables, the *z*-score is used to indicate the health of the banking sectors. The *z*-score is constructed as the sum of the mean return on assets and the mean ratio of equity to assets, divided by the standard deviation of the return on assets. It measures the number of standard deviations that a bank's rate of return on assets can fall in a single period before it becomes insolvent. A higher *z*-score signals a lower probability of bank insolvency. We accept that banks that are less likely to fail when healthy, and by following Demirguc-Kunt and Huizinga (2011) and others, we use higher values of this variable as an indication of the soundness

Table 6 Summary of the estimation results of eqs. 1 and 2

		2004–2006			2006–2008		
	Dependent Variable	β	θ	Co	β	θ	Co
Czech Rep	HHs Overnight Dep	0.099**	0.270^	No	0.467**	0.269***	Yes
	HHs Dep. Up to 1Y	0.846 ***	0.774***	Yes	0.615***	0.872*	Yes
	HHs Dep. Over 3Y	0.272**	0.31^	No	0.023***	0.022^	No
	NF Overnight Dep	0.228 ***	0.258**	Yes	0.214**	0.224^	No
	NF Dep. Up to 1Y	0.799 ***	0.696***	Yes	0.664**	1.097^	No
	NF Dep. 1 to 2Y	1.061**	1.568**	Yes	1.065**	1.029***	Yes
	Mortgage up to 10Y	0.930**	0.898**	Yes	0.244**	1.161*	Yes
	HHs Other lending 1Y	1.037*	0.319^	No	0.241*	1.086*	Yes
	NF Other Loans up to 1Y	0.474*	0.787**	Yes	0.853**	0.786**	Yes
	NF Other Loans 1Y	1.020**	1.072**	Yes	0.912**	0.984***	Yes
	NF Other Loans 5Y	1.769**	1.643**	Yes	1.195**	0.815**	Yes
	Revolving Loans	0.536**	1.058***	Yes	0.662**	0.581***	Yes
Hungary	NF Overnight Dep	0.252**	0.442^	No	0.384**	0.314***	Yes
	NF Total Dep	0.393**	0.897***	Yes	0.780***	0.964***	Yes
	NF Dep up to 1Y	0.400**	0.899***	Yes	0.783***	0.966*	Yes
	NF Dep over 1Y	1.322**	0.724***	Yes	0.538**	0.713***	Yes
	NF Dep up to 2Y	2.370**	0.919***	Yes	0.913**	0.887**	Yes
	NF Dep over 2Y	1.510**	0.561***	Yes	0.448**	0.609***	Yes
	HHs Total Dep	0.543**	0.766***	Yes	0.875**	1.106***	Yes
	HHs Dep up to 1Y	0.547***	0.771***	Yes	0.864***	1.119***	Yes
	HHs Dep 1 to 2Y	0.984**	0.664***	Yes	0.893**	0.890***	Yes
	HHs Dep over 1Y	0.382**	0.444***	Yes	0.639**	0.437**	Yes
	NF Other Loans	0.466**	0.915***	Yes	0.695***	0.689^	No
	NF Floating Rate up to 1Y	0.357**	0.925***	Yes	0.703**	0.699^	No
	NF Floating Rate over 1Y	2.109**	0.591***	Yes	0.795**	0.795**	Yes
	HHs Loans for Cons.	1.044**	0.603***	Yes	0.802**	0.454*	Yes
	HHs Floating rate	2.230***	1.032**	Yes	0.612**	0.666^	No
Poland	HHs dep 6 months to 1Y	0.923**	0.901***	Yes	1.083*	1.018***	Yes
	HHs Total Dep	0.309**	0.785***	Yes	0.261*	1.127***	Yes
	NF Dep 1 to 2 years	1.356***	0.925***	Yes	3.076**	0.596*	Yes
	NF Dep Total	0.478**	0.876***	Yes	0.245*	1.049***	Yes
	NF and HHs Total Dep	0.361**	0.825***	Yes	0.540*	1.0670***	Yes
	Repos	0.264**	1.028***	Yes	0.422**	1.051***	Yes
	HHs Loans for Consumption total	1.870**	1.839^	No	0.574***	1.198***	Yes
	Mortgage up to 1Y	0.641**	0.883^	No	0.364*	1.155***	Yes
	HHs Adjustable rate loan up to 3Y	1.204**	0.876***	Yes	0.876*	1.042***	Yes
	HHs Adjustable rate loan up to 1Y	2.021**	1.088***	Yes	1.111*	0.555^	No

Because of the space limitation, we only include a summary of our results here. More detailed version of this table is available upon request

Authors' calculations. Here NF, HH, Cons, and Dep represent nonfinancial sector, households, consumption loans, and deposits. 1Y, 3Y, 5Y, and "Co" represent 1 year, 3 year, 5 year rates and if the rates are cointegrated or not. The independent variables in these equations are the money market rates. Variables with ***, **, and * are significant at 1, 5, and 10 % respectively. ^ indicates that Eq. 3 is used in the calculation and all of the variables used are found to be significant at least at 10 % level

Table 7 Summary of banking sectors' characteristics

	z-score	Cost-income ratio	Asset share of state-owned banks	Concentration ratio
Hungary	6.47	1.01	5.93	0.70
Poland	6.73	0.68	21.32	0.61
Czech Republic	9.96	0.62	2.65	0.64

The World Bank and EBRD

of the banking system. The banking sector concentration ratios reflect the share of the three largest banks in the assets of the total banking sectors. It is generally used to indicate the degree of banking sector competition. The cost-income ratio shows profitability. The figures on the table show that the banking system in the Czech Republic is the safest among three banks examined here. It has the lowest income ratio, which shows profitability, and the share of state-owned banks are found to be the lowest in this country. Countries on this table are found to have very similar concentration ratios.

Table 8 presents panel data estimation results for the determinants of the pass-through coefficients. As it can be seen from the table above, higher *z*-scores are found to be associated with faster pass-through processes. The coefficient of the banking sector concentration ratios shows that the pass-through process is going to be slower if the banking sector becomes non-competitive. Finally, the last variable in this table is the cost-income ratio. It is shown that higher cost-income ratios indicate faster pass-through coefficients.

After estimating the determinants of the pass-through coefficients, our next task is to see whether our results are different from previous examples of the literature, which uses either only developed countries or both developed and developing countries in their analysis. Table 9 shows examples from the literature's findings on the determinants of the pass-through coefficients. Comparison of Tables 8 and 9's findings shows that our results are in line with the findings of the literature in terms of the signs of the coefficients. However, our findings indicate that the value of the banking sector health variable for emerging market economies is not as high as the literature finds, while the value of the competition and cost variables are higher than the literature's findings. Additionally, our results indicate that for the countries we analyzed, the state banks ownership is not significant.

Table 8 Determinants of interest pass-through coefficients

	Coef.	Std. Err.
z-score	0.15	0.10
Concentration	−7.28	2.64
State bank share	−0.02	0.02
Cost-income ratio	1.50	0.89
_cons	3.40	1.07
R-square	0.300	
F-value	9.14	

Author's calculations

Table 9 Examples from the literature's findings

	Competition	Cost	Health	State/ Private
Sander (2004)			1.00–5.54	
Mohsin and Rivers (2011)				−0.33–0.5
Gigineishvili (2011)		0.69		
Leuvensteijn et al. (2008)	−0.15			

Conclusions

The lack of large panel data sets prevents researchers from studying the determinants of pass-through coefficients only for emerging market countries. In this study, we used a sample selection process based on the literatures' findings on the determinants of these coefficients in order to solve this data problem. For this purpose, 25 emerging market countries are grouped based on their macroeconomic structure, monetary policy framework, exchange rate regime, and the status of their EU membership. After implementing this selection process, three emerging market countries are selected and determinants of the interest rate pass-through coefficients are analyzed for these economies.

Our results indicate that characteristics of banking sectors in these countries, such as the health of the banking sector, degree of concentration, and cost structure indicators are significant determinants of the pass-through coefficients. While signs of the coefficients we found in this study are in line with the literature, comparing our results to the coefficient values found in previous studies shows that determinants of the pass-through coefficients are different for emerging market countries from the previous findings of the literature. The literature finds that the coefficient of the banking sector health is higher than our estimates, while their competition and cost variables are lower.

The fact that the interest rate pass through mechanism has become more important than before with the widespread implementation of inflation targeting regimes among emerging market economies highlights the role of our results on the monetary policy making process. These results show that in these emerging market countries, when financial markets are competitive and cost-to-income ratios are high, monetary policy will be quicker to affect retail rates. That is to say, in these economies, the business of the monetary policy making process is going to be easier. However, in less competitive and cost-effective countries, it will take a longer time for central bankers to influence these rates, and therefore the rest of the economy. So, the importance of forward-looking policy adjustments will be significant in these economies.

Appendix: Robustness Test

In this section, the analysis is repeated by separating the countries that have already joined the EU from countries that remain out. This time, Macedonia and Croatia are

selected as non-member countries with similar characteristics. Table 10 below replicates the results of Table 8 for them.

Table 10 shows that the results are in line with the findings of Table 8 for the *z*-score, concentration, and state banks shares variables. However, the coefficient of the cost-income ratio is found to be almost zero here. This shows that while the health of the banking sector and competition variables play similar roles, the profitability of the banking sector does not seem to be important for the determination of the pass-through coefficients for non-member countries.[1]

Table 10 Determinants of interest pass-through coefficients for non-EU members

	Coef.	Std. Err.
z-score	0.21	0.06
Concentration	−3.09	1.52
State bank share	0.00	0.00
Cost-income ratio	0.00	0.00
_cons	−0.32	1.59
R-square	0.44	
F-value	9.47	

Author's calculations

References

Cottarelli, C., & Kourelis, A. (1994). Financial structure, bank lending rates and the transmission mechanism of monetary policy. IMF Working Paper WP/94/39.

DeBondt, G. (2002). *Retail bank interest rate pass-through: New evidence at the euro area level. ECB Working Paper 136*. Frankfurt: European Central Bank.

DeBondt, G. (2005). Term structure and the sluggishness of retail bank interest rates in euro area countries. European Central Bank Working Paper Series, No. 518 September 2005.

Demirguc-Kunt, A., & Huizinga, H. (2011). Do we need big banks ? evidence on performance, strategy and market. Policy Research Working Paper Series 5576, The World Bank.

Egert, B., Crespo-Cuaresma, J., & Reininger, T. (2007). Interest rate pass-through in Central and Eastern Europe: reborn from ashes merely to pass away. *Journal of Policy Modeling, 29*(2), 209–225. Elsevier.

Gigineishvili, N. (2011). Determinants of interest rate pass-through: Do macroeconomic conditions and financial market structure matter? IMF Working Paper 176.

Karagiannisa, S., Panagopoulosa, Y., & Vlami, P. (2011). *Journal of Policy Modeling, 32*(3), 323–338. May–June 2010.

Leuvensteijn, M., Sorensen, C. K., & Bikker, J. (2008). *Impact of bank competition on the interest rate pass-through in the euro area. ECB Working Paper 885*. Frankfurt: European Central Bank).

Mohsin, M., & Rivers, P. (2011). Are Domestic Banks' Interest Rate Pass through Higher than Foreign Banks? Empirical Evidence from Pakistan. Working Paper.

Mojon, B. (2001). *Financial structure and the interest channel of the ECB monetary policy. ECB Working Paper No. 40*. Frankfurt: European Central Bank.

Sander, H., & Kleimeier, S. (2004a). Convergence in euro-zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration. *Journal of International Money and Finance, 23*(3), 461–492.

Sander, H., & Kleimeier, S. (2004b). Interest rate pass-through in an enlarged Europe: The role of banking market structure for monetary policy transmission in transition countries. No 45, Research Memoranda from Maastricht: METEOR, Maastricht Research School of Economics of Technology and Organization.

Sander, H., & Kleimeier, S. (2006). Convergence of interest rate pass-through in a wider euro zone? *Economic Systems, 30*(4), 405–423. December 2006.

[1] Detailed version of the robustness test is available upon request.