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BEHAVIORAL ECONOMICS IN BANKING: BEHAVIORAL FACTORS AS DETERMINANTS OF THE INTEREST RATE SPREAD

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Abstract

The paper discusses behavioral factors that affect banks' clients and examines empirically their influence on banks' interest rate spreads. We devise a model that combines macroeconomic variables, which have been considered in earlier works, along with variables that indicate behavioral patterns, combined in a single index. Empirical results show that the constructed behavioral index has positive effect on banks' interest rate spread, suggesting that patterns of customer behavior related to making less rational choices enable banks to extract higher spreads.

Keywords: Interest Rate Spread, Behavioral Economics, Banking

JEL Classifications: G20, C33

1. Introduction

Behavioral economics is a subfield of economics that explores how decision-making and behavior deviate from rationality assumed in standard economic models, as well as the implications that these deviations produce in a socio-economic context (Mullainathan and Thaler, 2000). The fast-growing knowledge in this field helps enrich and improve standard economic models, as well as advance the understanding of important effects that are not captured by them. The application of the field has become most popular in finance, although it is also gaining popularity in savings (Mullainathan and Thaler, 2000) and other policy and economic areas (Thaler, 2015). Although financial decision-making is one of the areas where behavioral economics has had major contributions, less behavioral economics insights have been applied to the consumer banking industry context. The aim of this paper is to explore the relationship between behavioral factors or biases and banks' interest rate spreads.

Although bank profitability can be measured in a variety of ways, in this paper we focus on the interest rate spread – the difference between the lending and the deposit interest rates. This allows us to focus on the external factors affecting the bank interest rate spread on a country

level as opposed to bank specific performance determinants such as management effects, for example. A careful examination of the literature has indicated that so far research has not extensively analyzed behavioral factors when it comes to the clients' choice of a bank services provider. This paper explores the way and magnitude in which such behavioral factors can affect banks' pricing patterns as measured by the interest rate spread. Traditionally, the interest rate spread has been explained by variables related to the macroeconomic conditions and financial structure of a respective country. Such standard interest rate spread models could therefore be improved by the inclusion of statistically significant behavioral factors.

In this study, we construct and test a model that captures determinants of interest rate spread related to the macro environment and the industry structure. In addition, we also include measurable behavioral variables, combined in a single index that is related to the clients' behavioral patterns. The paper uses panel data on twenty-two European countries covering a period of eleven years.

2. Literature Review

The level and determinants of the interest rate spread has been examined by a number of studies. While some of these utilize bank-specific variables in cross-sectional country data, others focus on key macroeconomic and industry structure variables to explain banks' interest rate spreads.

For example, Demirguc-Kunt and Huizinga (1999) study the determinants of the net interest margins (the net interest income divided by total assets) and find a number of significant variables related to the bank characteristics, macroeconomic conditions, taxation, financial structure, and legal and institutional indicators. The authors conclude that corporate tax burden is fully passed onto the clients, unlike reserve requirements. In addition, they establish that foreign banks in developing countries are more profitable than domestic ones. Other empirical studies conducted in the context of Africa suggest that increases in overhead costs, equity, liquidity, and market concentration are positively correlated with the net interest margins (Khumaloand *et al.* 2011).

Some economists have used an approach developed by Ho and Saunders (1981) to determine the factors that contribute to banks' interest rate spread. According to this model, the pure interest rate spread depends on "the degree of managerial risk aversion, the size of transactions undertaken by the bank, bank market structure, and the variance of interest rates" (Ho and Saunders 1981, pp. 598). Using this approach, Afanasieff *et al.* (2002) suggest that macroeconomic indicators are the most important determinants for the size of the spread, especially inflation rate, risk premium rate and required reserves, while microeconomic indicators seem to be of less importance. In another study performed in the European context, market concentration, interest rate risk, credit risk, risk aversion of the bank, and operating expenses are found to be the most important determinants (Maudos and Guavara 2004). The regulatory components like reserve requirements and capital-to-asset ratios, as well as volatility of interest rates (Saunders and Schumacher, 2000) have also been identified as significant factors.

Less work has been done in exploring behavioral factors that could significantly influence the overall interest rate spread in a banking industry. This is not surprising given that for years the main paradigms applied to financial decision-making have been grounded on the assumption of agent rationality. Recently, the growing field of behavioral finance has demonstrated that financial behavior can be better explained by models, which relax the two tenets underlying guaranteed individual rationality: Bayes' law assuming that agents update their beliefs based on new information and Savage's notion of Subjective Expected Utility (SEU) suggesting that agent choices are always normatively acceptable (Barberis and Thaler, 2003). Citing research that reveals failures in rational decision-making of professional investors and traders Barberis and Thaler (2003) argue that it is important to understand the biases that influence the formation of beliefs and preferences such as overconfidence, optimism and wishful thinking, representativeness, conservatism, belief perseverance, anchoring, availability bias, etc. Classical economics believes that educated and well-informed consumers play the role of checks and balances that push out unscrupulous sellers out of the market, which has led to the dominating philosophy that providing more information leads to increased consumer literacy and smarter

financial choices (Hilgert *et al.* 2003). The advance of behavioral economics has made it obvious that even educated consumers with access to information are incapable of navigating complex financial products and services, which forces them to choose on the basis of simplifying shortcuts or seemingly insignificant factors. This problem has been shown to be even more severe among households with lower income and level of education (Campbell 2016). Citing a series of studies from US, Dutch, Swedish and Canadian context Badarinza *et al.* (2016) discuss how consumer confusion is associated with mistakes and systematic ignoring of information, especially when it is less visible and salient.

In the context of overwhelming complexity, seemingly unimportant factors become important in decision-making. Studies confirm the importance of aspects such as convenient location in choosing a bank (Manarai and Manarai, 2007). Mokhlis *et al.* (2010) outline nine factors that seem to influence the choice for a bank service provider, including objective ones such as branch location, proximity, ATM service, financial benefits, service provision, marketing promotions, as well as less tangible ones such as sense of security and the influence of other people or social conformity. Efficiency and quality of service have also been identified as important factors for customers who demonstrate little tolerance for waiting in line leading to bias towards providers with more branches (Jantan *et al.* 1998). Building larger network of ATMs, applying more aggressive marketing tactics and achieving good personal relationships with bank personnel are also identified as factors influencing customers' perceptions and choice (Jantan *et al.* 1998; Calem and Mester, 1995; Manarai and Manarai, 2007). All of these findings suggest that to compensate for the inability to navigate the more complex product characteristics, consumers find it easier to use simpler shortcut attributes to arrive at a choice.

In addition to product complexity and the importance of financial literacy decision-making in finance and banking context is associated with difficulty of imagining future outcomes and the presence of uncertainty, which are known to be important factors influencing consumer perceptions and choice (Kahneman and Tversky, 1984). Given the nature of bank services uncertainty can be perceived as a key determinant of choice as customers seek to lower risk perceptions for services, which are often with intangible outcomes and potential benefits that are expected sometime in the future. Yiu *et al.* (2007) explore the influence of uncertainty on readiness to adopt online banking. Perceived risk is identified as a significant factor in decision making in banking context also in Kuisma *et al.* (2007) where the authors conclude that people who resist the adoption of internet banking and show sustainable preference for ATM services are driven by habits (preference to avoid the cost of learning) and avoidance of risk associated with the new format of the service. Beckett *et al.* (2000) also explore the growing importance of online channels and note that processing online operations can actually stimulate switching behavior as it reduces the importance of factors such as influence by the personnel or convenience. Online context seems to increase the importance of utilitarian benefits allowing for more rational decision making (Beckett *et al.* 2000).

In addition to choice simplification and the importance of less important service attributes, a number of studies establish the importance of loss aversion as a mechanism explaining the decision-making process in financial context (Rabin and Thaler, 2001). Beckett *et al.* (2000) provide a new consumer behavior perspective to the financial service industry suggesting that the main limitation of the past models is the strong focus on information that determines rational choice. Using consumer confidence and involvement as dimensions, they propose a matrix with four categories of customers: rational-active, repeat-passive, relational-dependent, and those who do not purchase. The authors outline the different behavioral profiles of the four groups and outline the main factors that they identify as important for choosing and staying with a provider, including attitudes towards service provider, perceived complexity of service and risk perceptions, as well as more objective factors including price, convenience and life changes. An interesting contribution of this study is the established importance of delivery channel and whether it involves face-to-face interaction (Beckett *et al.* 2000).

3. Data Specification

We conduct an econometric analysis to explore the effect of behavioral factors on the interest rate spread. For this purpose, we collect data from twenty-two European countries, representing a broad and unbiased sample of emerging, developing, and developed markets. Table 1 below lists the countries in the dataset.

Table 1. List of Countries in the Dataset

EUROZONE COUNTRIES		NON-EUROZONE, EU COUNTRIES	NON-EU COUNTRIES
Austria	France	Bulgaria	Albania
Belgium	Greece	Romania	Republic of Serbia
Estonia	Spain	Czech Republic	Ukraine
Italy	Latvia	Croatia	Russian Federation
Ireland	Finland	Hungary	Switzerland
Germany	Portugal		

We consider thirteen variables as estimators for our dependent variable - the interest rate spread. For most variables, the data covers period of eleven years (2003 – 2013). Information about data calculation and data sources is provided in Table 2.

3. Model Specification

Our model is designed to include variables shown to affect the interest rate spread as well as variables that influence the behavior of bank clients in their choice of deposits or loan products. Thus, the model seeks to provide a more accurate prediction of banks' interest rate spread by accommodating for the acknowledged importance of behavioral factors.

The interest rate spread represents the difference between the lending (*lendintr*) and the deposit interest rate (*depintr*). In the model, this is the regressed variable *I.* The regressors can be grouped into four broad categories: 1) Macroeconomic indicators *(M)*; 2) Financial structure indicators *(F)*; 3) Legal and institutional indicators *(LI)*; 4) Indicators influencing consumer behavior *(CB)*. The general form of the starting regression is as follows:

$$I = \alpha_0 + \beta_1 M + \beta_2 F + \beta_3 LI + +\beta_4 CB + \varepsilon \quad (1)$$

The macroeconomic indicators we include are GDP per capita (*gdppercap*), inflation rate (*inflrate*), unemployment rate (*unempl*), capital to risk-weighted assets ratio (*captorwassr*), and taxation (tax). GDP per capita (*gdppercap*) is an important measurement for the economic development of the country. Demirguc-Kunt and Huizinga (1999) find the indicator to have a positive but insignificant effect on banks' profitability on its own but significant effect when interacting with other variables. Many studies confirm the hypothesis that the overall growth in the economy tends to reduce the risk and thus results in lower lending rates and interest rate spread, respectively (see for example Afanasieff *et al.* (2002), Liebeg and Schwaiger (2007), Chortareas *et al.* (2012)). Unemployment rate (*unempl*) has also been used as a measure of the overall macroeconomic activity. Demirguc-Kunt and Huizinga (1999), Poghosyan (2012), and Raharjo *et al.* (2014) find that the influence of the inflation rate (*inflrate*) is positive, while Afanasieff *et al.* (2002) find it to be significant and negative. The effect on profitability is ambiguous since inflation raises interest rates and also banks' cost. As for the effect on the interest rate spread, it is expected to be positive assuming banks pass the rising costs onto customers and if lending interest rates rise by more than the deposit rates.

Bank regulatory capital to risk-weighted assets ratio (*captorwassr*) represents the ratio of bank capital to its risk-weighted assets. It is expected that the effect of this variable would be significant and positive, if banks pass the cost of holding more capital onto customers. Saunders and Schumacher (2000), Chortareas *et al.* (2012), and Raharjo *et al.* (2014) confirm this result,

while Poghosyan (2012) find that interest rate spreads tend to shrink with increasing capital adequacy.

Table 2. Variables and Data Sources

Variable	Notation	Calculation	Data Source	Coverage (years)
Interest rate spread	*irspread*	Difference between lending interest rate and deposit interest rate	International Financial Statistics	2003 - 2013
GDP per capita	*gdppercap*	Measured in terms of current USD	World Development Indicators (Word Bank)	2003 - 2013
Inflation rate	*inflrate*	Annual % change in GDP deflator	World Development Indicators	2003 - 2013
Unemployment rate	*unempl*	Percentage of total labor force, national estimates	World Development Indicators	2003 - 2013
Regulatory capital to risk-weighted assets	*captorwass*	Regulatory capital hold against risk-weighted assets	Global Financial Development	2003 - 2011
Total tax rate as a percentage of profit	*tax*	Taxes and contributions to the state as a % of profit	Doing Business	2006 - 2013
Bank overhead to total assets	*OHtoass*	Operating expenses as % of total assets	Global Financial Development	2003 - 2011
Nonperforming loans to total gross loans	*nonperfloan*	Nonperforming loans as % of total gross loans	World Development Indicators	2003 - 2013
Bank assets to GDP	*bankassgdp*	Total assets held by deposit banks as % of GDP	Global Financial Development	2003 - 2011
Bank concentration as a percentage	*bankconc*	Total assets of the three largest banks divided by the total of all banking assets in the state	Global Financial Development	2003 - 2011
Foreign banks as a percentage of total banks	*forbankperc*	Foreign banks as % of total banks in the state	Global Financial Development	2003 - 2010
Bank noninterest income as a % of total income	*nonintinc*	Income from fees and commissions, net gains on trading and derivatives	Global Financial Development	2003 - 2011
Political index	*political*	Equally weighting 6 indices: Voice and accountability, Political stability and absence of violence, Government effectiveness, Regulatory quality, Rule of law, Conrol of corruption	Worldwide Governance Indicators	2003 – 2013
Behavioral index	*index*	Equally weighting variables Brances per person, ATMs per person, Education (tretiary), Market capitalization of listed companies as % of GDP	World Development Indicators, Financial Access Survey	2003 -2013

Finally, taxation (*tax*) refers to the direct taxes that banks pay. The established relationship with profitability is positive, suggesting that banks pass the taxes onto customers. This relationship is confirmed by Afanasieff *et al.* (2002) and Demirguc-Kunt and Huizinga (1999).

To account for differences in the financial structure, we use the following variables: bank assets/GDP (*bankassgdp*), bank non-performing loans to total gross loans (%) (*nonperloans*), noninterest income (*nonintinc*), banks' overhead to total assets ratio (*OHtoass*), percentage of foreign banks operating in the country (*forbanksperc*) and bank concentration (*bankconc*). Bank assets/GDP (*bankassgdp*) aims to measure the importance of the banking industry in the respective country. Higher ratio would indicate higher significance of the banking sector for the country's economy. The ratio is expected to have a positive impact on the interest rate spread, as higher significance of the bank sector suggests that banks are more important as source of financing for the private business and thus possess more bargaining power in price determination. At the same time, higher level of competition among incumbents could offset this effect, so that the effect on interest rate spread is negative as in Demirguc-Kunt and Huizinga (1999). We include, therefore, bank concentration (*bankconc*) as a control variable. It measures the extent to which the bank industry in the country is dominated by a few large banks suggesting less competition and higher control over the price. We expect a positive relationship between the industry concentration and the interest rate based on the results demonstrated by Maudos and Guavara (2004), Demirguc-Kunt and Huizinga (1999), Liebeg and Schwaiger (2007), and Poghosyan (2012). In addition, Saunders and Schumacher (2000) show that greater market power of the banks in the industry leads to higher spreads. The percentage of foreign banks (*forbanksperc*) is also included in the model as it can be considered as a measure for the level of competition in the industry. More foreign banks could either lead to increased interest rate spreads due to pressure from the foreign parent banks as in Demirguc-Kunt and Huizinga (1999) or lower spreads due to increased efficiency through higher competition (Mannasoo (2012).

Bank non-performing loans to total gross loans (%) (*nonperfloans*) measures the percentage of loans that have not been paid back. We anticipate, as in Poghosyan (2012), that this variable will have a positive effect on the spread - when more customers are defaulting on their debt banks should demand higher lending rates as the default risk is higher. Demirguc-Kunt and Huizinga (1999) use overhead to total assets ratio (*OHtoass*) to account for the overhead costs. The variable turns out to be significant and positive leading them to conclude that overhead costs are largely passed onto the clients. Similarly, Maudos and Guavara (2004) argue that operating costs have a positive relation with the spread. Demirguc-Kunt and Huizinga (1999) obtain a significant and negative effect for non-interest-assets, especially for the wealthier countries, suggesting that the presence of such assets depresses the importance of interest-earning assets. Here, we use non-interest income to verify this effect. The expected influence of banks' noninterest income (*nonintinc*) on the interest rate spread is negative, as high level of noninterest income would suggest that profits could be generated from sources other than the interest charged allowing banks to maintain a smaller spread.

Demirguc-Kunt and Huizinga (1999) estimate a significant and negative relationship between banks' profitability and the indices they use as proxies for law and order, and corruption. To measure legal and institutional factors, we use various indicators from the Worldwide Governance Indicators (WGI) supported by the World Bank. They include voice and accountability, government effectiveness, political stability and absence of violence, regulatory quality, rule of law, and control of corruption that all take values between 1 and 100. Since the variables are highly correlated between each other and to avoid multicollinearity in the model we combine them in a single variable (*political*) with equal weights.

Finally, our model aims to assess the effect of variables related to the behavior of banks' clients. As indicated by Beckett *et al.* (2000), the two main factors that affect decision-making in banking context are uncertainty and involvement. The former relates to the level of perceived risk that clients experience towards the product or service, while the latter refers to the extent to which clients are actively participating in the process and exercising control over it. In the framework used by Beckett *et al.* (2000), customers exhibiting high involvement and consumer confidence (i.e. low uncertainty) are defined as rational active as they are searching for the best offer based

on price. Based on this, we assume that in countries where "rational active" customers are predominant, the interest rate spread would be lower as customers are actively searching for the best option for financing or investing. Their preference will be based on the most favorable price offer, which expectedly would motivate financial service providers to compete on price. For countries in which confidence and involvement are low the interest rate spread is expected to be higher as in an uncertain context clients are expected to be predominantly influenced by psychological, social, and emotional factors. Lastly, we expect that moderate spread will be likely in countries where either involvement or uncertainty are low, which suggests that the decision-making may not be fully rational.

To account for this effect, we construct an index using measurable macroeconomic variables. As indicated by Beckett *et al.* (2000) and confirmed by Mokhlis *et al.* (2010), customers with low involvement value less objective factors such as convenient location when choosing their bank services provider. In our model, location is approximated through the number of bank branches per person. Its effect on the spread is expected to be positive as a higher value would suggest that bank location is a disproportionately important factor, above and beyond the real value that branch proximity creates and could thus be seen as a rational compensation for convenience. At the same time, a larger branch network is related to the accumulation of more additional costs for the bank that could be passed onto clients.

Mokhlis *et al.* (2010) point out the availability of ATMs as another criterion for bank choice. This is also related to overvaluing convenience and could be attributed to low involvement with the bank provider. We also use the number of ATMs per person and, similarly to the previous variable, we expect a positive effect, which indicates a less rational choice.

Since uncertainty is reduced with better understanding of the nature of the product or service, tertiary education is included as factor in our model. A variety of studies question whether having a higher education automatically means making a rational choice (Hastings *et al.* 2012) but it can mean greater possibility of making such a choice. Similarly, Lea *et al.* (1995) suggest that education is a significant determinant for debtors' behavior. Based on this, we expect that the anticipated relationship with the spread is negative.

We include the market capitalization of listed companies as a percentage of GDP in the behavioral index. The rationale behind this variable is that it is an indication of people searching for and using alternative ways of financing and investing, i.e. seeking the optimal solution for their needs. Therefore, a higher value would hint at a more informed and rational behavior from the users of the financial system and would subsequently be associated with lower interest rate spread. The index is computed by first standardizing the input variables, thus making them compatible in terms of scale, and subsequently aggregating the variables accounting for the expected direction of their effect on the explained variable.

The tested equation finally becomes:

$$irspread = \alpha_0 + \beta_1 gdppercap + \beta_2 inflrate + \beta_3 tax + \beta_4 captorwass + \beta_5 bankassdpegdp + \beta_6 OHtoass + \beta_7 nonperfloan + \beta_8 bankconc + \beta_9 forbankperc + \beta_{10} political + \beta_{11} unempl + \beta_{12} nonintinc + \beta_{13} index \quad (2)$$

5. Panel Estimation and Results

We report a set of panel regressions for the period 2003 – 2013 to explore the effect of the behavioral index on the interest rate spread. In addition, all regressions contain macroeconomic variables, financial structure variables and legal and institutional indicators to control for other factors influencing the interest rate spread.

We first test equation (2) for the presence of serial correlation using Wooldridge test in panel data. This methodology requires regressing the residuals from the regression in first-differences of the model on their lags (Drukker, 2003). The test performs equally well for both random- and fixed-effects models, except for the case when the error terms are conditionally heteroskedastic. In this case, the test is more accurate for random-effects models. Another advantage of the test is that an unbalanced structure of the panels does not affect its power (Drukker, 2003). Results show that there is no serial correlation.

As a next step, we estimate fixed- and random effects panel regressions. To confirm whether the individual-specific effects are correlated with the explanatory variables, we run Hausman test. Our results favor the use of fixed-effects estimator at five percent significance level. We do not report results from these model estimations as after removing the insignificant explanatory variables the dependent variable *irspread* exhibits serial correlation at five percent significance level. To account for the serial correlation problem, our baseline panel specification includes a lagged dependent variable.

We address concerns for the presence of unit roots by conducting a series of panel data unit root tests using a Fisher-type test, which does not require balanced data (Baltagi, 2005) and can thus be applied even to the variables with missing data. Based on the results, we discover that there is a presence of unit root in a number of the regressors *(gdppercap, inflrate, captorwassets, banksassgdp, political, unempl, tax, forbankspec).*

To account for the unit root problem and the serial correlation, we move on to a dynamic model of estimation, which includes the lagged dependent variable among the regressors. We apply both the Difference- (one-step, non-robust and two-step, robust) and System GMM estimation (two-step, robust) estimator and report the results in Table 3.

Table 3. Difference and System GMM Estimation

Dependent Variable: Interest Rate Spread (irspread)			
	Diff- GMM (one-step, non-robust)	*Diff- GMM* (two-step, robust)	*System GMM* (two-step, robust)
irspread (-1)	0.282*	0.391**	0.586***
Gdppercap	-0.000**	-0.000*	
Political	-0.123*		
Unempl	0.123***		
Nonintinc	-0.027***	-0.028**	
Inflrate			0.084***
Captorwass			0.182***
Bankassgdp			0.009*
Bankconc			-0.038*
Forbankperc			-0.019***
Index	2.348***	2.387***	0.668**
Cons	13.204***	12.708**	
No. of Obs.	119	119	64
Wald Chi_sq Statistic	37.68	121.43	1382.42
No. of Instruments	13	13	14
Hansen Test (p-value)	---	---	0.993
AR(1) Test (p-value)	---	0.1113	0.086
AR(2) Test (p-value)	---	0.4886	0.382
Sargan Test (p-value)	0.1495	---	0.994

Note: Standard errors are clustered at the country level and p-values appear as ***, **, * corresponding to the 1% 5% and 10% level of significance next to the estimated coefficients, respectively.

The Difference- GMM uses as instrumental variables the first-differences of the original model (Wansbeek, 2012). However, the estimator has potential problems such as endogeneity of the lagged dependent variable (Roodman, 2009). In addition, any other independent variables that are not strictly exogenous become potentially endogenous in the first-differencing. The first-differenced GMM also tends to magnify gaps in unbalanced data (Roodman, 2009). These

problems are addressed through the use of a System GMM, which allows classifying the instruments as endogenous (gmmstyle) or exogenous (ivstyle).

Considering these issues, we find the System GMM to be the most suitable estimator for our data. We classify the lagged dependent variable and the bank specific variables as endogenous. The macroeconomic variables and the behavioral index are classified as exogenous. Validity of instruments is checked through the use of several tests for each estimator. Sargan test for overidentifying restrictions is used to confirm the validity of instruments for the first-differenced GMM. Arellano-Bond test for autocorrelation of order 1 and 2 is applied to the two-step robust Differenced GMM estimator. For the Differenced GMM the test is found to perform better than the Sargan test for validity of the instruments (Roodman, 2009). The test is important as the estimator is based on the assumption that there is no second-order serial correlation in the first-differenced equation (Baltagi, 2005). Our results show that there is no autocorrelation in both orders.

For the System GMM estimator validity of the instruments is confirmed through Sargan and Hansen test for overidentifying restrictions. Arellano-Bond test for autocorrelation of order 1 and 2 states that there is autocorrelation of first-order and there is no autocorrelation of second-order as expected. This confirms that the System GMM is the most suitable estimation approach for our data sample.

Our econometric results show that the behavioral index is statistically significant in all specifications of the model. In all estimations, the coefficient is positive, confirming that the behavioral index has a positive influence on the interest rate spread. Higher value for this variable suggests that people are making decisions in a less rational manner. Therefore, the results imply that when people make irrational choices banks manage to exploit this inefficiency by charging higher margins. The importance of the behavioral index for the size of the spread could be also observed from its estimated coefficient. According to our System GMM estimation a one unit increase in the behavioral index would increase the interest rate spread by 0.668%.

The lagged variable $irspread_{t-1}$ is also significant for all specifications, contributing positively to the size of the interest rate spread. The other significant regressors according to the System GMM estimator are: inflation rate, capital to risk-weighted assets ratio, bank assets to GDP, bank concentration, and foreign bank as a percentage of total banks. Their influence on the spread is as expected with the exception of bank concentration. Contrary to some previous studies where market power has been found to have a positive effect on the interest rate spread (Maudos and Guavara 2004; Demirguc-Kunt and Huizinga 1999; Saunders and Schumacher 2000), here the effect is negative. In this context, greater market power might be allowing banks to achieve higher operational efficiency, which would explain the negative relation to the spread.

We have also added several bank-specific and macroeconomic controls into the System GMM estimator in order to quantify the relative importance of omitted variable bias. These variables are *OHtoass* (+) and *unempl* (+) where the signs in parentheses reflect the estimation results. Both of them have been found significant in previous studies that used longer time periods for the construction of their models (Demirguc-Kunt and Huizinga 1999; Maudos and Guavara 2004). These variables turn out to be insignificant in our estimation and hence, are not reported in the estimation tables.

6. Conclusion

This study explored the effect of behavioral factors on banks' interest rate spread. We observe that a behavioral index compiled from several macroeconomic variables indeed influences the interest rate spread in a positive way, indicating that behavioral factors can impact pricing dynamics in the banking sector. It is difficult to make a conclusion about the extent to which behavioral factors may impact banks' general profitability as the level of noninterest income and the incurred costs could also affect the net income. However, we demonstrate that banks are likely to have higher costs in countries where less rational behavior is present because they have to maintain larger branch networks to meet client expectations. Thus, banks are forced to adjust their approach to the clients according to their behavior.

Since we observe that the interest rate spread is larger in countries where less rational behavior is present, we can conclude that these costs are passed on to the clients. On the other hand, in countries where customers seem to be more concerned about the financial aspects (i.e. act more rationally), financial institutions are forced to compete on price and to maintain lower interest rate spreads.

Finally, we demonstrate that the inclusion of the index improves the standard economic models for estimation of the interest rate spread. The model with the index outperforms the one that consists of only traditionally considered determinants of the interest rate spread. Despite the unquestionable contribution of this study, it provides good basis for much needed future research. Further research with more proxies could be used to operationalize client behavior. Another valuable direction in which this research can be further developed is to apply the model on a larger sample of countries over a greater time span.

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