

Central bank and Credit spread: transparency matters?

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Abstract

Central banks transparency can mitigate the problems regarding asymmetric information on credit market. Therefore, better credit market conditions can induce banks to reduce credit spread. The present study analyzes the effect of central bank transparency on credit spread based on a database of 65 countries for the period 2000 to 2014. In order to evaluate the effect of central bank transparency on credit spread two transparency measures were used: transparency of financial stability and transparency of monetary policy. The results indicate that countries in which central banks are more transparent, credit spread is smaller. Moreover, credit spread in development countries are more impacted by central bank transparency than developed countries.

Key words: asymmetric information; credit spread, central bank transparency

Resumo

A transparência dos bancos centrais pode mitigar os problemas relativos à informação assimétrica no mercado de crédito. Portanto, melhores condições do mercado de crédito podem induzir os bancos a reduzir o spread de crédito. O presente estudo analisa o efeito da transparência do banco central sobre o spread de crédito com base em um banco de dados de 65 países para o período de 2000 a 2014. Para avaliar o efeito da transparência do banco central sobre o spread de crédito foram usadas duas medidas de transparência: transparência da estabilidade financeira e transparência da política monetária. Os resultados indicam que os países em que os bancos centrais são mais transparentes, o spread de crédito é menor. Além disso, o spread de crédito nos países em desenvolvimento é mais afetado pela transparência do banco central do que os países desenvolvidos.

Key words: informação assimétrica; spread de crédito, transparência do banco central

JEL Classification: E44, E52, E58.

1. Introduction

Literature about credit spread emphasizes the role of risk in banking activities. An important element, which justifies the risk effect on the credit spread, is the absence of perfect information in the credit market. Hence, the lack of clarity in the credit market might cause banks to increase their risk aversion, generating impacts on the credit spread (Ordoñez 2012; Kwart, 2002; Japelli and Pagano, 2000). Credit spread represents the margin charged by the banks to engage in financial intermediation. Since a stable financial system is known for being capable of continuously perform financial intermediation (Woodford, 2010; BCBS, 2010; Schinasi, 2004), high credit spreads can affect financial stability.

Information asymmetry is a typical problem in financial markets, as much as a financial stability risk. Central banks transparency are able to minimize the current asymmetric information in the markets and reduce the uncertainty, mitigating information problems on the credit market (Blinder et al., 2008; Knutter et al., 2011; Born et al., 2012; Geraats, 2002). Therefore, better credit market conditions can induce banks to reduce credit spread.

In order to measure the degree of transparency of the central bank as well as its impacts, the literature developed indexes which would capture the different degrees of central bank transparency of monetary policy (Eijffinger and Geraats, 2006; Dincer and Eichengreen, 2014). After the crisis, the literature on central banks transparency expanded and metrics capable of measuring the transparency regarding the management of financial stability, were also developed (Cihak et al., 2012; Horváth and Vasko, 2016).

The present study contributes to the literature by analyzing the effect of central bank transparency on credit spread. For that, two transparency measures are used: the financial stability transparency measurement (*FST*), following the methodology developed by Horváth and Vasko (2016), and the transparency measurement of monetary policy used (*MPT*), an index developed by Dincer and Eichengreen (2014).

In order to consider the impact of Central Bank Transparency on credit spread, panel data models are used. The sample consist of 65 countries in the period between 2000 and 2014. The results indicate that credit spreads are smaller in countries where the central bank are more transparent. In addition, the effect of central bank transparency on credit spread in developing countries is stronger than in developed countries. The findings of this paper shed light on a possible course of action of policymakers to reduce credit spread. Efforts to increase transparency in the management of financial stability and transparency of monetary policy can lead to the reduction of the credit spread, with consequent gains for financial stability.

This paper is organized as follows: the next section presents the data and methodology used in this work. In section 3 the results are presented for the total sample and for two segmented samples: developed countries and developing countries. Finally, section 4 presents the conclusion of this study.

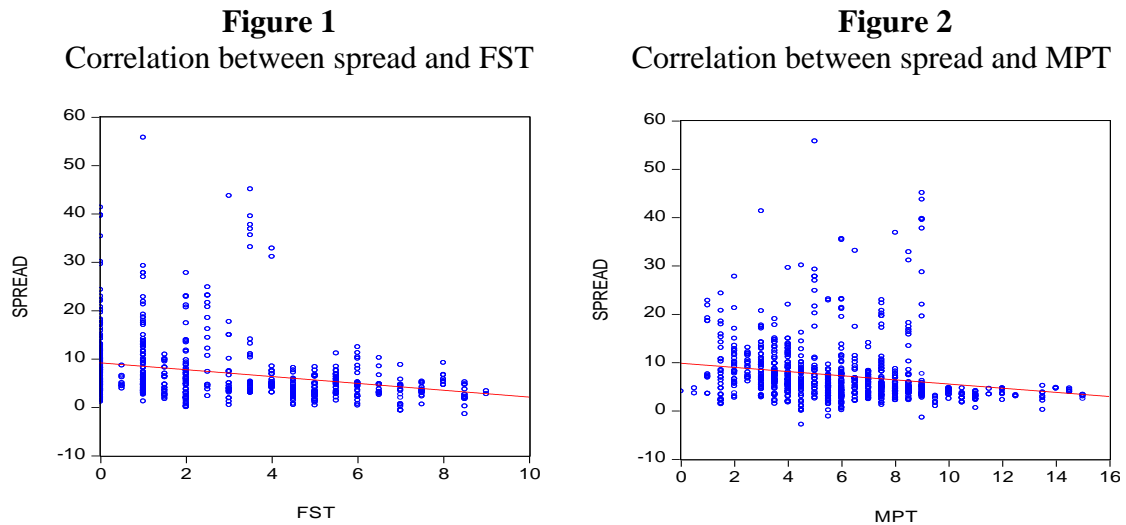
2. Data and Methodology

In order to evaluate the effect of central bank transparency on credit spread two transparency measures were used, transparency of financial stability and transparency of monetary policy. One strand of the central bank transparency literature follows Financial Stability Transparency (*FST*), that can be represented by the index developed by Horváth and Vasko (2016). Another related strand is based on monetary policy

transparency index developed by Dincer and Eichengreen (2014) (hereafter referred to as MPT). The summary of the methodologies proposed by Horváth and Vasko (2016) and Dincer and Eichengreen (2014) are presented in the appendix, Table A6 and A7.

In addition to the transparency effect, this study makes use of other variables that the literature indicates as relevant to the determination of credit spread (Aydemir and Guloglu, 2017, Birchwood et. al., 2017, Peria and Mody, 2004, Lima and Resende, 2004, Maudos and De Guevara, 2004). In order to capture the effect of credit risk on the credit spread, the non-performing credit rate (NPL) is used. With the purpose of capture the effect of credit on credit spread the ratio Credit-to-GDP is introduces on analyzes. In view of the possible effects of monetary policy on the credit spread, the monetary policy interest rate was used. All variables extracted from the database of the World Bank Group and the International Monetary Fund. Finally, to evaluate the effects of the Subprime Crisis on the spread, a crisis *dummy* which assumes the value of 1 in the years in which the crisis was most acute (2008 and 2009) and zero in the other years, was used. The description of the database, as well as the descriptive statistics of the variables used in this study, are presented in the appendix, Table A1 and A2, respectively.

For a preliminary analysis of the relation between the credit spread and central bank transparency, figure 1 and figure 2 are presented. The negative relation between credit spread and financial stability transparency (FST), figure 1, and credit spread and transparency monetary policy (MPT), figure 2, suggest that countries whose central banks are more transparent have a reduced credit spread.



As pointed out by Blinder et. al. (2008), the central bank releases have a prompt effect on the financial markets, however, it is expected that the other variables should take effects in a lagged way. Moreover, it is reasonable to consider that credit spread is not independent of what was observed in the past, in other words, there is a persistence effect. Finally, considering the relevance of the NPL in determining the credit spread, the model proposed in this study is the following:

$$SPREAD_{i,t} = \beta_0 + \beta_1 SPREAD_{i,t-1} + \beta_2 TRANSP_{i,t} + \beta_3 NPL_{i,t-1} + \beta_3 Z_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where $i = 1, 2, \dots, 65$ indicates the countries, $t = 2000, 2001, \dots, 2014$ represents the time period (annual basis); *TRANSP* regards the transparency variables: *FST* e *MPT*. *NPL*

denote credit risk. Z represent the control variables: $CRED$ (ratio Credit-to-GDP), IR (real interest rate) and the $CRISIS$ is a *dummy* variable, which assumes the value of 1 in the years in which the crisis was most acute (2008 and 2009) and zero in the other years and ε_{it} is the error term.

In order to estimate equation 1, we used OLS (Ordinary least squares), GMM in first difference (D-GMM) and system-GMM (S-GMM). It is important to highlight that the use of the dynamic panel, in which the lagged dependent variable is used as an explanatory variable, allows to analyze the transparency effect on the spread in a parsimonious model. This is possible due to the fact that the lagged spread possesses large part of the explanation in itself. Despite this advantage, the use of the lagged dependent variable in the models generates a dynamic panel bias and inconsistency in OLS estimators (Baltagi, 2005). To overcome this problem, the literature uses generalized moments methods (GMM), as suggested by Bond et al. (2001).

It is important to highlight that the main results are those estimated by S-GMM method, in which the estimation is performed using instruments at differences and lagged levels, which mitigate the bias risk, low accuracy and weak instruments that might be generate by the first-difference. (Blundell and Bond, 1998; Arellano and Bover, 1995; Staiger and Stock, 1997). Hence, S-GMM improves the performance of the GMM first-difference estimator. Despite the problems pointed out in the OLS and D-GMM methods, the results were reported in order to confirm the results of S-GMM.

It is important to emphasize that the use of the instruments in the estimations must satisfy the proposed conditions by Roodman (2009), that is, the condition of overidentification of the instruments must be guaranteed, so that the cross-section number is higher than the number of instrumented variables in order not to create results with bias. Thus, in order to confirm the validity of the instruments in the models, the J statistic was performed as a test of excessive identification moment conditions, as suggested by Arellano (2003).

3. Results

This section presents empirical evidence of the impact of central bank transparency on credit spread. For that, two subsections are presented: the first subsections evaluates the effect of central bank transparency on credit spread for the total sample. In the second subsections, from the restricted samples of developed and developing countries, it is analyzed whether there are distinct impacts of the effect of central bank transparency on the credit spread between developing countries.

3.1 – Does the central bank transparency reduce the credit spread?

Taking into account the total sample, the result regarding the effect of central bank transparency on the credit spread are presented in Table 1 and 2. Table 1 demonstrates the effect of financial stability transparency, and Table 2 demonstrates the effect of monetary policy transparency on the credit spread.

The statistical significance from different methods (OLS, D-GMM and S-GMM) indicates that all forms of central bank transparency (FST and MPT) have an effect on credit spread. The negative signal for the models of transparency of financial stability and monetary policy suggests that, countries in which the central banks act with greater

transparency, a reduction of the credit spread is perceived. That is, when central banks are more transparent they mitigate the credit market failure arising from the asymmetry of information between banks and policymakers, which allows banks to reduce their risk aversion, therefore, reducing the credit spread.

The lagged variable of the credit spread is significant and positive in all models, which suggests a persistence effect on the spread behavior. The positive signal and the statistical relevance of the credit risk (NPL) indicates that the higher credit risk, the higher should be the credit spread, that is, the banks raise the spread as a way to protect themselves from possible future losses.

Regarding the credit/GDP ratio on the spread, the results are contradictory in terms of signal and significance. On the other hand, as expected, the interest rate and the dummy for crisis are positive and significant in all models. Hence, faced with a rise in interest rate, banks react with an increase in the credit spread in the expectation of defending themselves against a possible deterioration of the debtors' income. The crisis effect on credit spread suggests that banks react to an increase in risk aversion in the economic environment through credit spread.

Table 1 – Financial Stability Transparency - All countries

Credit spread estimation

Method: Regressors:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	3,090 *** (0,374)	2,575 *** (0,644)	2,691 *** (0,467)	2,704 *** (0,462)								
SPREAD(-1)	0,582 *** (0,043)	0,582 *** (0,042)	0,553 *** (0,036)	0,554 *** (0,036)	0,279 *** (0,030)	0,389 *** (0,089)	0,222 *** (0,053)	0,134 *** (0,039)	0,352 *** (0,038)	0,327 *** (0,040)	0,202 *** (0,056)	0,115 ** (0,046)
FST	-0,132 * (0,072)	-0,180 ** (0,082)	-0,164 ** (0,082)	-0,174 ** (0,081)	-1,080 *** (0,101)	-1,071 *** (0,220)	-1,518 *** (0,246)	-0,966 *** (0,321)	-0,496 ** (0,235)	-1,383 *** (0,190)	-1,442 *** (0,225)	-0,920 *** (0,272)
NPL(-1)	0,010 (0,012)	0,007 (0,012)	0,000 (0,014)	0,003 (0,015)	0,1023 *** (0,017)	0,113 ** (0,045)	0,073 (0,067)	0,249 *** (0,053)	0,201 *** (0,048)	0,120 ** (0,051)	0,118 *** (0,038)	0,214 *** (0,042)
CRED/PIB(-1)		0,013 (0,011)	0,010 (0,009)	0,009 (0,009)		0,036 (0,024)	0,063 *** (0,020)	-0,019 (0,021)		0,076 *** (0,020)	0,066 *** (0,019)	0,019 (0,024)
IR(-1)			0,036 ** (0,015)	0,038 ** (0,015)			0,078 ** (0,032)	0,141 *** (0,035)			0,097 *** (0,029)	0,137 *** (0,028)
DUMMY_CRISE				0,249 * (0,149)				1,014 *** (0,155)				0,787 *** (0,156)
N. Obs.	560	550	550	550	302	297	327	308	497	487	487	487
N. Countries	65	65	65	65	65	65	65	65	65	65	65	65
Adj. R2	0,89	0,89	0,89	0,89								
N. Inst./N. cross sec.					0,45	0,34	0,43	0,49	0,30	0,44	0,44	0,44
J-stat.					20,61	17,42	26,48	23,40	21,42	21,55	18,58	18,80
p-value					0,48	0,23	0,12	0,27	0,16	0,55	0,67	0,60
AR(1)					-2,71	-3,15	-2,65	-2,55	-0,42	-0,38	-0,38	-0,39
p-value					0,01	0,00	0,01	0,01	0,00	0,00	0,00	0,00
AR(2)					-0,69	-0,77	-1,18	-0,83	-0,03	-0,05	-0,05	-0,03
p-value					0,49	0,44	0,24	0,41	0,40	0,17	0,14	0,32

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

Table 2 - Monetary Policy Transparency – All countries

Credit spread estimation

Method: Regressors:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	2,838 *** (0,525)	2,899 *** (0,540)	3,026 *** (0,487)	2,990 *** (0,486)								
SPREAD(-1)	0,647 *** (0,049)	0,646 *** (0,048)	0,611 *** (0,049)	0,612 *** (0,048)	0,386 *** (0,046)	0,398 *** (0,019)	0,298 *** (0,016)	0,275 *** (0,019)	0,444 *** (0,039)	0,430 *** (0,038)	0,379 *** (0,058)	0,231 *** (0,061)
MPT	-0,104 * (0,063)	-0,103 (0,073)	-0,098 (0,070)	-0,102 (0,072)	-1,585 *** (0,220)	-1,067 *** (0,073)	-1,468 *** (0,088)	-1,236 *** (0,138)	-1,194 *** (0,176)	-1,113 *** (0,184)	-1,072 *** (0,221)	-0,582 ** (0,246)
NPL(-1)	0,017 (0,011)	0,016 (0,011)	0,010 (0,012)	0,013 *** (0,013)	0,092 ** (0,041)	0,191 *** (0,017)	0,299 *** (0,024)	0,317 *** (0,027)	0,142 *** (0,044)	0,147 *** (0,049)	0,092 (0,080)	0,266 *** (0,083)
CRED/PIB(-1)		-0,001 (0,008)	-0,003 (0,008)	-0,004 (0,008)		-0,017 ** (0,007)	0,034 *** (0,012)	0,022 (0,019)		0,011 (0,018)	0,028 (0,024)	-0,020 (0,028)
IR(-1)			0,040 *** (0,014)	0,043 *** (0,015)			0,030 *** (0,009)	0,046 *** (0,013)			0,065 ** (0,029)	0,077 *** (0,028)
DUMMY_CRISE				0,361 ** (0,177)				0,546 *** (0,131)				0,909 *** (0,256)
N. Obs.	705	698	698	698	591	584	562	562	642	635	635	635
N. Countries	65	65	65	65	65	65	65	65	65	65	65	65
Adj. R2	0,89	0,89	0,89	0,89								
N. Inst./N. cross sec.					0,42	0,60	0,61	0,59	0,40	0,40	0,40	0,40
J-stat.					24,28	35,14	32,53	29,79	17,42	16,84	18,29	15,71
p-value					0,39	0,37	0,44	0,48	0,74	0,72	0,57	0,68
AR(1)					-2,03	-2,14	-1,91	-0,19	-0,43	-0,43	-0,45	-0,39
p-value					0,04	0,03	0,06	0,05	0,00	0,00	0,00	0,00
AR(2)					-0,96	-1,56	-1,23	-1,20	-0,02	-0,02	-0,02	-0,03
p-value					0,34	0,12	0,22	0,23	0,54	0,51	0,41	0,36

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

3.2 - Is there a difference between the effect of central bank transparency on developing countries compared to developed countries?

Central banks of developed countries are more transparent than in developing countries (Horváth and Vasko, 2016 and Dincer and Eichengreen, 2014). In this sense, the purpose of this subsection is to analyze whether there is a difference in the effects of central bank transparency on credit spread for developing and developed countries.

In general, the coefficients of the transparency indexes (*FST* and *MPT*) for developing and developed countries present statistical significance and negative signal similar to those reported in Table 1 and 2. In other words, the results presented in Table 3, 4, 5 and 6 corroborate the findings that, countries whose central banks are more transparent, tend to have lower credit spreads. The results reported in the Table (1 to 6) exhibit that all GMM estimates are overidentified (test J), and the serial autocorrelation tests (AR (1) and AR(2)) reject the hypothesis of the serial autocorrelation presence.

It is important to highlight that the coefficients of transparency of financial stability and monetary policy transparency are higher in developing countries (Table 3) than developed countries (Table 4). One possible explanation for this result is that in the least developed countries there is less information available in the credit market, which, therefore, makes the effect of central bank transparency more relevant in developing countries than in developed countries. At last, the coefficients on the other explanatory variables in the models (*SPREAD*, *NPL*, *CRED*, *IR*, Crisis) do not present significant changes from those observed in the estimations presented in the previous subsections.

Table 3 - Financial Stability Transparency – Developing Countries

Credit spread estimation

Method: Regressors:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	3,822 *** (0,511)	3,259 *** (1,031)	3,499 *** (0,744)	3,493 *** (0,738)								
SPREAD(-1)	0,576 *** (0,046)	0,577 *** (0,044)	0,544 *** (0,035)	0,545 *** (0,035)	0,358 *** (0,042)	0,302 *** (0,019)	0,165 *** (0,054)	0,248 *** (0,018)	0,339 *** (0,039)	0,256 *** (0,060)	0,162 *** (0,048)	0,122 ** (0,053)
FST	-0,177 (0,131)	-0,205 (0,136)	-0,181 (0,133)	-0,190 (0,133)	-2,115 *** (0,289)	-1,422 *** (0,139)	-2,337 *** (0,280)	-0,977 *** (0,166)	-0,832 *** (0,252)	-1,681 *** (0,386)	-2,001 *** (0,193)	-1,910 *** (0,260)
NPL(-1)	0,009 (0,013)	0,009 (0,013)	0,003 (0,015)	0,005 (0,016)	0,085 * (0,050)	0,166 *** (0,038)	0,251 *** (0,067)	0,159 *** (0,036)	0,235 *** (0,052)	0,235 *** (0,056)	0,213 *** (0,031)	0,252 *** (0,039)
CRED/PIB(-1)		0,015 (0,022)	0,010 (0,018)	0,008 (0,018)		0,078 *** (0,018)	0,110 *** (0,024)	0,039 ** (0,014)		0,130 *** (0,027)	0,089 *** (0,019)	0,068 *** (0,020)
IR(-1)			0,040 *** (0,014)	0,041 *** (0,014)			0,059 (0,038)	0,057 *** (0,014)			0,085 *** (0,027)	0,106 *** (0,033)
DUMMY_CRISE				0,229 (0,208)				0,553 *** (0,135)				0,531 *** (0,129)
N. Obs.	345	345	345	345	268	230	282	230	309	309	309	309
N. Countries	36	36	36	36	36	36	36	36	36	36	36	36
Adj. R2	0,88	0,88	0,88	0,88								
N. Inst./N. cross sec.					0,59	0,76	0,75	0,76	0,53	0,53	0,75	0,75
J-stat.					17,44	23,00	17,17	22,36	20,44	14,92	14,50	17,34
p-value					0,42	0,40	0,75	0,32	0,20	0,46	0,88	0,69
AR(1)					-2,17	-3,20	-2,48	-4,97	-0,41	-0,39	-0,38	-0,38
p-value					0,03	0,00	0,01	0,00	0,00	0,00	0,00	0,00
AR(2)					0,21	-0,83	0,00	-1,53	-0,03	-0,04	-0,05	-0,04
p-value					0,84	0,41	1,00	0,13	0,39	0,30	0,26	0,33

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

Table 4 - Financial Stability Transparency – Developed countries

Credit spread estimation

Method:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	1,719 ** (0,620)	1,312 (0,797)	1,316 * (0,764)	1,322 (0,761)								
SPREAD(-1)	0,627 *** (0,131)	0,622 *** (0,132)	0,624 *** (0,144)	0,632 (0,142)	0,150 *** (0,011)	0,056 (0,042)	0,023 (0,040)	0,424 *** (0,083)	0,153 *** (0,011)	0,138 *** (0,025)	0,193 ** (0,079)	0,234 ** (0,104)
FST	-0,078 (0,054)	-0,155 ** (0,060)	-0,155 ** (0,060)	-0,164 (0,059)	-0,546 *** (0,019)	-0,189 *** (0,048)	-0,158 *** (0,048)	-0,200 (0,135)	-0,492 *** (0,017)	-0,328 *** (0,053)	-0,284 *** (0,078)	-0,240 ** (0,093)
NPL(-1)	0,014 (0,021)	-0,017 (0,022)	-0,017 (0,023)	-0,013 (0,023)	0,051 *** (0,006)	0,141 *** (0,021)	0,133 *** (0,026)	0,272 *** (0,051)	0,145 *** (0,005)	0,205 *** (0,013)	0,236 *** (0,024)	0,221 *** (0,024)
CRED/PIB(-1)		0,011 * (0,006)	0,011 * (0,006)	0,010 (0,006)		-0,062 *** (0,007)	-0,060 *** (0,006)	-0,039 * (0,020)		-0,031 *** (0,004)	-0,032 *** (0,004)	-0,039 *** (0,006)
IR(-1)			-0,002 (0,036)	0,003 (0,035)			0,009 (0,022)	-0,198 *** (0,060)			-0,060 (0,047)	-0,038 (0,066)
DUMMY_CRISE				0,289 (0,185)				0,075 (0,252)				0,112 (0,147)
N. Obs.	215	205	205	205	155	178	178	110	188	178	178	178
N. Countries	29	29	29	29	29	29	29	29	29	29	29	29
Adj. R2	0,85	0,85	0,85	0,85								
N. Inst./N. cross sec.					0,80	0,73	0,77	0,90	0,70	0,73	0,73	0,73
J-stat					18,40	17,32	16,42	12,42	22,21	18,02	17,94	17,14
p-value					0,36	0,30	0,35	0,41	0,14	0,26	0,21	0,19
AR(1)					-2,84	-1,83	-3,27	-3,17	-0,31	-0,31	-0,32	-0,36
p-value					0,00	0,07	0,00	0,00	0,00	0,00	0,00	0,00
AR(2)					-0,06	-0,03	-0,14	0,47	0,05	0,04	0,03	0,05
p-value					0,95	0,98	0,89	0,64	0,64	0,68	0,74	0,62

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

Table 5 - Monetary Policy Transparency – Developing Countries

Credit spread estimation

Method: Regressors:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	3,071 *** (0,601)	3,453 *** (0,741)	3,718 *** (0,585)	3,630 *** (0,575)								
SPREAD(-1)	0,645 *** (0,052)	0,639 *** (0,048)	0,596 *** (0,045)	0,596 *** (0,045)	0,425 *** (0,028)	0,409 *** (0,035)	0,439 *** (0,032)	0,491 *** (0,053)	0,439 *** (0,043)	0,428 *** (0,044)	0,376 *** (0,058)	0,262 *** (0,071)
MPT	-0,107 (0,081)	-0,067 (0,096)	-0,052 (0,091)	-0,051 (0,093)	-1,852 *** (0,188)	-2,057 *** (0,191)	-0,695 *** (0,080)	-0,483 ** (0,231)	-1,161 *** (0,250)	-1,361 *** (0,258)	-1,364 *** (0,266)	-0,788 *** (0,252)
NPL(-1)	0,017 (0,012)	0,016 (0,012)	0,011 (0,013)	0,013 (0,013)	0,118 *** (0,026)	0,128 *** (0,033)	0,053 *** (0,014)	0,097 *** (0,032)	0,179 *** (0,055)	0,175 *** (0,054)	0,146 ** (0,072)	0,304 *** (0,092)
CRED/PIB(-1)		-0,013 (0,016)	-0,019 (0,015)	-0,019 (0,015)		0,023 (0,015)	-0,024 ** (0,011)	-0,019 (0,027)		0,034 * (0,020)	0,039 (0,026)	-0,015 (0,027)
IR(-1)			0,047 *** (0,015)	0,049 *** (0,015)			0,084 *** (0,015)	0,073 *** (0,021)			0,058 ** (0,023)	0,066 *** (0,016)
DUMMY_CRISE				0,328 (0,213)				0,471 * (0,273)				1,131 *** (0,319)
N. Obs.	511	511	511	511	435	435	172	172	467	467	467	467
N. Countries	44	44	44	44	44	44	44	44	44	44	44	44
Adj. R2	0,88	0,88	0,89	0,89								
N. Inst./N. cross sec.					0,59	0,59	0,66	0,66	0,57	0,57	0,57	0,57
J-stat.					25,48	25,20	22,48	18,29	20,02	17,51	17,12	16,29
p-value					0,33	0,29	0,31	0,50	0,58	0,68	0,65	0,64
AR(1)					-1,93	-1,88	-2,97	-3,30	-0,42	-0,42	-0,44	-0,38
p-value					0,05	0,06	0,00	0,00	0,00	0,00	0,00	0,00
AR(2)					-1,41	-1,35	-1,49	-0,78	-0,02	-0,02	-0,03	-0,03
p-value					0,16	0,18	0,14	0,43	0,47	0,48	0,44	0,37

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

Table 6 - Monetary Policy Transparency – Developed countries

Credit spread estimation

Method: Regressors:	OLS				DGMM				SGMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
C	2,017 *** (0,507)	1,810 *** (0,603)	1,765 *** (0,598)	1,805 *** (0,596)								
SPREAD(-1)	0,675 *** (0,115)	0,684 *** (0,115)	0,676 *** (0,123)	0,682 *** (0,122)	0,256 *** (0,024)	0,286 *** (0,015)	0,307 *** (0,033)	-0,020 (0,040)	0,451 *** (0,062)	0,299 *** (0,040)	0,201 * (0,109)	0,207 * (0,109)
MPT	-0,085 ** (0,046)	-0,155 *** (0,052)	-0,156 *** (0,050)	-0,176 *** (0,049)	-0,268 *** (0,070)	-0,098 (0,063)	0,074 (0,070)	-0,455 *** (0,156)	-0,373 *** (0,043)	-0,162 *** (0,042)	-0,097 (0,090)	-0,136 (0,101)
NPL(-1)	0,017 (0,012)	0,006 (0,013)	0,001 (0,011)	0,006 (0,013)	0,057 *** (0,012)	0,101 *** (0,021)	0,052 ** (0,021)	0,110 *** (0,034)	0,070 *** (0,002)	0,122 *** (0,006)	0,092 *** (0,011)	0,097 *** (0,014)
CRED/PIB(-1)		0,010 * (0,006)	0,011 * (0,006)	0,010 ** (0,005)		-0,048 *** (0,009)	-0,037 *** (0,011)	-0,032 (0,022)		-0,038 *** (0,010)	-0,035 ** (0,013)	-0,030 ** (0,013)
IR(-1)			0,019 (0,030)	0,029 (0,031)			0,052 *** (0,008)	0,140 *** (0,039)			0,123 *** (0,023)	0,139 ** (0,054)
DUMMY_CRISE				0,404 ** (0,199)				0,099 (0,135)				0,212 (0,139)
N. Obs.	194	187	187	187	117	97	97	149	175	168	168	168
N. Countries	21	21	21	21	21	21	21	21	21	21	21	21
Adj. R2	0,83	0,83	0,83	0,83								
N. Inst./N. cross sec.					0,88	1,00	1,00	1,00	1,00	1,00	1,00	1,00
J-stat.					10,89	14,55	14,02	15,07	14,37	16,99	14,20	13,68
p-value					0,45	0,34	0,30	0,24	0,57	0,32	0,43	0,40
AR(1)					-1,97	-1,69	-12,57	-2,14	-0,49	-0,41	-0,39	-0,41
p-value					0,05	0,09	0,00	0,03	0,00	0,00	0,00	0,00
AR(2)					0,10	0,90	1,12	0,95	0,02	-0,02	-0,02	-0,00
p-value					0,92	0,37	0,26	0,34	0,79	0,85	0,82	0,99

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

3.3. Robustness Analysis

The results of the estimations in the previous subsections indicate that FST and MPT leads to a decrease in credit spread. In order to check the validity of this result we testing risk spread. The risk spread is available in the Global Economic Monitor (World Bank) and represents the difference between the lending interest rate and the Treasury bill (USA short-term debt). The results are presented in table 7.

In regarding the risk spread, it is important to highlight that the coefficients on FST and MPT are statistically significant and negative in all models. Moreover, the coefficients on the other explanatory variables in the models do not present significant changes from those observed in the estimations presented in the previous subsections. Therefore, the results corroborate the effect of central bank transparency on credit spread find in this study.

Table 7 - Transparency of Financial Stability and Monetary Policy – All countries - Robustness test

Risk spread estimation

Method:	SGMM							
Regressors:	Modelo 1	Modelo 2	Modelo 3	Modelo 4	Modelo 5	Modelo 6	Modelo 7	Modelo 8
RISK_SPREAD(-1)	0,031 *** (0,005)	0,017 ** (0,008)	0,082 *** (0,006)	0,092 *** (0,009)	0,273 *** (0,011)	0,282 *** (0,014)	0,174 *** (0,020)	0,270 *** (0,029)
FST	-0,903 *** (0,033)	-1,083 *** (0,026)	-1,348 *** (0,052)	-1,284 *** (0,059)				
MPT					-1,685 *** (0,101)	-1,710 *** (0,178)	-1,070 *** (0,134)	-2,126 *** (0,168)
NPL(-1)	0,117 *** (0,003)	0,115 *** (0,003)	0,058 *** (0,005)	0,074 *** (0,011)	0,135 *** (0,007)	0,141 *** (0,017)	0,160 *** (0,021)	0,083 *** (0,032)
CRED/PIB(-1)		0,028 *** (0,004)	0,022 *** (0,004)	0,015 *** (0,005)		-0,000 (0,014)	0,018 (0,016)	0,031 *** (0,010)
TX_JUROS(-1)			0,131 *** (0,002)	0,128 *** (0,006)			0,131 *** (0,012)	0,135 *** (0,024)
DUMMY_CRISE				0,475 *** (0,119)				-0,133 (0,319)
N. Obs.	242	237	155	155	311	306	281	232
N. Paises	38	38	38	38	40	40	40	40
N. Inst./N. cross sec.	0,77	0,79	0,81	0,81	0,69	0,72	0,71	0,66
J-stat.	25,97	27,59	22,66	21,58	26,21	27,23	16,18	19,91
p-value	0,35	0,23	0,31	0,31	0,24	0,20	0,71	0,28
AR(1)	-0,33	-0,34	-0,30	-0,30	-0,39	-0,39	-0,41	-0,32
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
AR(2)	0,02	-0,01	-0,02	-0,05	-0,06	-0,06	-0,10	-0,06
p-value	0,83	0,88	0,83	0,62	0,36	0,38	0,13	0,46

Note: Levels of significance (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. Standard errors between parentheses. N.Inst / N. Cross sec. should be at most equal to 1 in each regression, in order to avoid excessive use of instruments. The J-test indicates that the models are correctly identified. The autocorrelation tests AR (1) and AR (2) reject the hypothesis of the presence of autocorrelation.

5. Conclusion

This study analyzed the effect of central bank transparency on the credit spread for a sample of 65 countries in the period from 2000 to 2014. For that, we used two measures of central bank transparency: transparency of financial stability and transparency of monetary policy and a measure of credit spread disclosed by the world bank.

The results of this study indicate that central bank transparency has an effect on the reduction of the credit spread. This result suggests that the transparency of the central bank is able to mitigate the informational problems of the credit market. The findings also suggest that the effect of central bank transparency on spread in developing countries is more intense than in developed countries, which indicate the relevancy of such transparency in these countries. In other words, efforts to increase central bank transparency can mitigate the informational problems of the credit market and thus improve financial intermediation through reduction of the credit spread.

6. References

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7. Appendix

Table A1 - Variables Discription

Variable Name	Variable Discription
SPREAD	Interest rate spread is the interest rate charged by banks on loans to private sector customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits.
FST	Measure of transparency of the financial stability prepared by Horváth and Vasko (2016).
MPT	Measure of transparency of the monetary policy developed by Dincer and Eichengreen (2014).
TX_JUROS	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.
NPL	Bank loans in default on total gross loans are the value of delinquent loans divided by the total value of the loan portfolio.
CRED	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.
CRISE	Represents a dummy variable, which assumes the value of 1 in the year in which it is a financial crisis (in study years 1 in the years 2008 and 2009) and the value of zero, otherwise.

Table A2 - Descriptive Analyzes and data base

Variable	Source	Mean	Median	Maximum	Minimum	Std. Desv.	N° OBS
<i>Financial Stability Transparency (1)</i>							
SPREAD	World Banck	7,39	5,11	55,80	-1,37	6,88	683
FST	Horváth e Vasko (2016)	2,88	2,00	9,00	0,00	2,66	780
TX_JUROS	World Banck	5,99	4,61	93,92	-42,31	9,18	714
NPL	World Banck	6,72	3,84	74,10	0,08	8,10	720
CRED	World Banck	62,01	45,78	244,10	0,00	48,19	769
<i>Monetary Policy Transparency (2)</i>							
SPREAD	World Banck	7,28	5,55	55,80	- 2,81	6,30	891
MPT	Dincer e Eichengreen (2014)	6,21	6,00	15,00	0,00	3,04	932
TX_JUROS	World Banck	6,08	4,93	93,92	- 42,31	8,75	910
NPL	World Banck	7,05	4,10	74,10	0,08	8,05	865
CRED	World Banck	58,24	40,66	253,57	0,00	48,75	967

Where (1) represents the descriptive analyzes of a sample of 65 countries regarding financial stability transparency, and (2) represents the descriptive analyzes of a sample of 65 countries regarding monetary policy transparency. It is worth mentioning that, although the number of the sample is resemble, the country composition is distinct. For more details, go to Table A4 and A5.

Table A3 - Correlation Matrix

Variable	SPREAD	FST / MPT	RATE_INTEREST	NPL
<i>Financial stability transparency (1)</i>				
SPREAD	1,00	-0,26	0,67	0,07
FST	-0,26	1,00	-0,07	-0,12
RATE_INTEREST	0,67	-0,07	1,00	-0,09
NPL	0,07	-0,12	-0,09	1,00
CRED				
<i>Monetary policy transparency (2)</i>				
SPREAD	1,00	-0,19	0,66	0,16
MPT	-0,19	1,00	-0,06	-0,36
RATE_INTEREST	0,66	-0,06	1,00	0,16
NPL	0,16	-0,36	0,16	1,00
CRED	-0,35	0,43	-0,15	-0,20

Where (1) represents the descriptive analyzes of a sample of 65 countries regarding financial stability transparency, and (2) represents the descriptive analyzes of a sample of 65 countries regarding monetary policy transparency. It is worth mentioning that, although the number of the sample is resemble, the country composition is distinct. For more details, go to Table A4 and A5.

Table A4 - List and classification* of FST sample of 65 countries

List and classification of FST sample of 65 countries	
List of 36 developing countries	Argentina, Armenia, Bangladesh, Bulgaria, Belarus, Brazil, Bhutan, Chile, China, Colombia, Fiji, Georgia, Guatemala, Indonesia, Kenya, Kyrgyz Republic, Sri Lanka, Lesotho, Moldova, México, Mauritius, Malaysia, Namibia, Nigeria, Peru, Philippines, Russian Federation, Rwanda, Singapore, Thailand, Tajikistan, Uganda, Ukraine, Uruguay, South Africa, Zambia.
List of 29 developed countries	Australia, Belgium, Canada, Switzerland, Cyprus, Czech Republic, Germany, Denmark, Estonia, Finland, France, United Kingdom, Greece, Hong Kong SAR (China), Croatia, Hungary, Israel, Italy, Korea, Lithuania, Latvia, Malta, Netherlands, Norway, Poland, Romania, Slovak Republic, Slovenia, Sweden.

Note: Country classification according to World Bank methodology until 2016.

Table A5 - List and classification* of MPT sample of 65 countries

List and classification* of MPT sample of 65 countries	
List of 44 developing countries	Argentina, Armenia, Bangladesh, Belarus, Brazil, Bhutan, Botswana, Chile, China, Colombia, Fiji, Georgia, Guatemala, Indonesia, Israel, Kenya, Kyrgyz Republic, Lebanon, Sri Lanka, Lesotho, Macao SAR (China), Moldova, Maldives, México, Macedonia (FYR), Mauritius, Malaysia, Namibia, Nigeria, Peru, Philippines, Russian Federation, Rwanda, Singapore, Seychelles, Thailand, Tajikistan, Tanzania, Uganda, Ukraine, Uruguay, Samoa, South Africa, Zambia.
List of 21 developed countries	Australia, Bulgaria, Canada, Switzerland, Cyprus, Czech Republic, Denmark, Estonia, United Kingdom, Hong Kong SAR (China), Croatia, Hungary, Lithuania, Latvia, Malta, Norway, Poland, Romania, Slovak Republic, Slovenia, Sweden

Note: Country classification according to World Bank methodology until 2016.

Table A6 - Description of the 11 items that constitute the FST index

Item	Description
1	Is the financial stability objective explicitly stated in the central bank act?
2	Is the FSR (financial stability reports) published?
3	How frequent is the FSR (financial stability reports) published?
4	Is the FSR forward looking?
5	What is the coverage of the FSR (macroeconomic environment and risks, depositors' information and risks and other issues or market information)?
6	How frequently the stress test is published?
7	Is there a publication of the Financial Soundness Indicators (na versão em português esta frase não está em forma de pergunta)? If so, is the core and incentive set published or only the core?
8	Is there macroprudential transparency (General strategy and cooperation described and detailed description of crisis management and policy)?
9	Is there a financial stability policy committee?
10	Is there a separate section on financial stability on the central bank's website?
11	Is there a separate section (database) on the central bank's website for financial stability talks?

For more informations see Horváth and Vasko (2016)

Table A7 - Description of the 15 items that constitute the MPT index

Item	Description
1	Is there a formal statement of the monetary policy objective (s), with explicit prioritization in the case of multiple objectives?
2	Is there a quantification of the primary objective (s)?
3	Are there explicit contracts or other similar institutional arrangements between the monetary authorities and the government?
4	Is the basic economic data relevant to the conduct of monetary policy publicly available?
5	Does the central bank disclose the macroeconomic model(s) it uses for policy analysis?
6	Does the central bank regularly publish its own macroeconomic forecasts?
7	Does the central bank provide an explicit policy rule or strategy that describes its monetary policy framework?
8	Does the central bank give a comprehensive account of policy deliberations (or explanations in case of a single central banker) within a reasonable amount of time?
9	Does the central bank disclose how each decision on the level of its main operating instrument or target was reached?
10	Are decisions about adjustments to the main operating instrument or target announced promptly?
11	Does the central bank provide an explanation when it announces policy decisions?
12	Does the central bank disclose an explicit policy inclination after every policy meeting, or an explicit indication of likely future policy actions (at least quarterly)?
13	Does the central bank regularly evaluate to what extent its main operating targets (if any) have been achieved?
14	Does the central bank regularly provide information on (unanticipated) macroeconomic disturbances that affect the policy transmission process?
15	Does the central bank regularly provide an evaluation of the policy outcome in light of its macroeconomic objectives?

For more informations see Dincer e Eichengreen (2014)