"What is the importance of regulation and transparency in the subprime crisis?"

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What is the importance of regulation and transparency in the subprime crisis?

Abstract

The subprime crisis has put in doubt the actual rules of regulation and demands the necessity of a search for mechanisms capable of reducing the occurrence of crisis. Particularly the lack of transparency of information among financial market agents is an important element of the causes of crisis and its dissemination. This study evaluates data from 37 countries on accountability of big financial institutions regarding the Basel principles, as well as respective regulatory agencies. The findings reveal that countries with greater transparency and regulation of their financial sector experienced a lower effect due to the subprime crisis. Furthermore, there exists a greater concern with transparency and banking regulation in developed economies compared to developing ones. Hence, political transparency matters in developed economies while the economic transparency regarding bank risk is relevant in developing countries. Finally, an increase in accountability of the regulatory authority can imply less vulnerability of its financial markets.

Introduction

The experience from creation and crashes of bubbles in financial markets was not sufficient for market agents to become immune to the new occurrences. Contrary to the Asian crisis at the end of the 1990s which contaminated the real economy only for the countries involved in it, the crisis began in the developed economies with the American subprime bonds putting the banking institutions of all nations in the same position of liquidity crisis. As a consequence, a coordinated action of regulatory agencies became necessary for mitigating the financial crisis.

Since the 1980s, due to the increase in the bank insolvency and bank risk the analysis in regard to the financial regulation has received attention. Nowadays, it is recognized that the definition of a minimum capital requirement as the unique instrument to cover risks is not sufficient to prevent banks from incurring credit failure. With the intention to improve the financial regulation, the New Basel Accord (New Accord) was disclosed. Besides a minimum capital requirement, the instruments of regulation were revised and a number of criteria for transparency were defined for the financial institutions.

It is important to note that under an environment where the New Accord has been in effect since 2007 in Europe and has just been implemented in the USA, the subprime crisis happened. In short, the international crisis, observed from the second semester of 2008, has put in doubt the actual rules of regulation and demands the necessity of a search for mechanisms capable of reducing the probability of the occurrence of a new crisis.

In particular, the lack of transparency of information among financial market agents is an important element of the causes of crisis and its dissemination. Furthermore, the benefits to self-regulation in financial markets, defended, for example, by Greenspan (ex-Fed chairman), are put in doubt. This article is focused on the aftermath of the peak of subprime crisis in the USA. Hence, this analysis takes into consideration several principles of banking regulation proposed by the New Accord and the advantages that can be achieved through a more efficient regulation based on an increase in the transparency of information.

Therefore, this study makes an evaluation of accountability of big financial institutions in regard to the Basel principles, as well as concerning respective regulatory agencies from different countries. Hence, an index of this accountability is created (index of regulation and transparency) based on information disclosure by banking institutions from 37 countries. Moreover, an analysis is made for the cases of developed and developing economies, with special attention to the most important emerging countries in the world, that is, Brazil, Russia, India and China – BRICs countries). In addition, empirical evidence on the relation within this index with the return of and the volatility in the stock markets is shown. In brief, this analysis represents an important instrument to identify and to improve the banking regulation for preventing a future financial crisis.

This paper is organized as follows. The next section shows the main characteristics of the New Accord concerning banking regulation as well as the main facts regarding the subprime crisis. Section 2 presents the index for evaluating the behavior of several banking institutions according to the principles of Basel II and makes an analysis of its performance for developed economies, BRICs countries, and

emerging economies. Section 3 offers empirical evidence on the subprime crisis through cross-country estimations for the relation within regulation and transparency index with the most known stock market rating and its volatility based on a sample of 37 countries. The final section concludes the paper.

1. Basel II and the *subprime* crisis

The first supranational attempt to implement a supervision and control over the banking industry was made by publication of the Basel Accord in 1988. The main objective of this accord was to assure the safety and solvency of the world financial system through the exigency of a minimum regulatory capital. This capital would be sufficient to reduce the risk of insolvency which can imply a systemic risk and also to provide for eventual losses which imply damage to depositors.

The development of the banking system, the spreading out of the operations through the Internet and the globalization of the financial system implied the release of the New Basel Capital Accord. According to the New Accord, a good supervision needs efficient regulation system and not only a supervision instrument (BIS, 2004). Based on this premise, this accord establishes that the banks may reveal what part of its capital will be available for covering all sorts of risks.

The first pillar of the New Accord (Basel II) deals with the minimum capital for covering the credit, market, and operational risks. The core principles define that the central banks which joined the New Accord must define a minimum coefficient of capital charge for the banks under its supervision. This coefficient must be capable of reflecting the institutional risk and, in the case of internationally active banks, will not be less than 8%.

The original objective of the Basel Accord was to create rules to be adopted by internationally active banks so that they would be assured competition under equal conditions. Later on the coefficient of capital became a tool of prudential regulation. The idea behind this is that assuming the hypothesis that a bank fails a higher equity capital implies a lower intervention by the government. Moreover, it is expected that a higher equity capital of the institution promotes more care in its investments.

It is important to note that, in the presence of asymmetric information, there exists a problem in the principal-agent relation inherent to the function of supervising. Although it is not possible for the supervision agency to monitor daily all the banking activities of all institutions, when the value of the coefficient capital is lower than a determined index, that institution will be called to make restitution of its capital for continuing its activity. Furthermore,

under the depositor's perspective, a low (high) value of coefficient capital can mean a difference between institutions in regard to the risk strategy.

The second pillar is related to the process of banking supervision. The new framework demands that the regulator of each country assures that each institution has an adequate internal process for evaluating its capital taking into account a complete analysis of its risks based on New Accord proposal. According to the instructions provided in pillar 2, it is the responsibility of the banking supervision in the last instance to: evaluate, judge, and approve (or not) the strategies of risk management, the control and methods for calculating risks, as well as the instruments of mitigation and hedging of banks.

Estrella (2004) highlights that the banking industry has a conflict of interests with the supervision agencies (public and private). Banks desire to receive the highest profits for their stockholders and depositors, however, this procedure tends to be associated with higher risks. On the other hand, there exist regulatory agencies with the objective of mitigating the occurrence of a systemic risk. Therefore, the regulatory agencies have the role of obligating banks to be transparent in regard to their exposure to the risk.

The third pillar has respect to the market discipline to be reached through transparency in the information. The New Accord establishes recommendation and requirement of disclosure in several areas including how each institution calculates and discloses its capital adequacy and methods of risks evaluation. The necessity for information appears as an important factor for the market discipline. According to the literature, an effective transparency in the information disclosed to the private agents is an important tool for monitoring the financial institutions. Therefore, the Basel Committee expects that with the stimulus to the market discipline through disclosure of information, the market's participants are in the position of creating proper mechanisms for the risk mitigation.

Another advantage from the transparency of information to the market is the equalization of the accounting data that are published, which in turn implies more consistency and comprehension. In brief, the transparency, in the last instance, allows the private agents to evaluate key information in regard to capital, risk exposure, and evaluation process. Notwithstanding, banks use different methods for measuring their risks and, thus, open the possibility for different interpretations concerning the true exposure risk of the institutions. The equalization will permit a real comparison among the results of the financial institutions and, thus, will ease the establishment of criteria for the

market's participants taking decisions (Goodhart, Hoffmann, and Segoviano, 2004).

It is important to note that moments of economic stability are favorable to the growth of financial markets. Hence, there exists an increase in the amount of business and the private agents make riskier investments, such as mortgage bonds and subordinated debts. These investments can imply more profitability but the investor is subjected to a higher risk.

The increase in the international liquidity due to the fast growth of China and the high prices for oil and commodities combined with the low interest rates practiced by the Federal Reserve (Fed) implied an environment where: (i) commercial banks gave mortgage credit with low interest rates to customers with low credibility and without a real guarantee of receiving (subprime bonds); (ii) investment banks were avid about the securitization of mortgage loans, converted them into other financial products and spread out these derivatives by the market; and (iii) insurance corporations also participated in the process of selling other derivatives that they believed would work as a hedge for those investments.

As a consequence, the house price was rapidly growing because the supply was lower than the demand. Moreover, the easy credit contributed to the increase in building houses. The increase in the price of houses permitted the creation of a second mortgage which allowed the public access to new loans which were sustained by the difference between the actual value of the house and the original value. This procedure implied an injection of capital in the economy and a considerable share of this amount was directed to the increase in household consumption.

The success of the above mentioned process would only be assured in the case where the house prices would increase indefinitely. However, the American inflation started to increase and the Fed decided to increase the interest rate in order to restrain it. The prices of houses that were overvalued initiated a depreciation and the share of mortgages increased. The result was that the public which had mortgages stopped paying and the houses were repossessed by the financial agents.

Due to the new conjecture, in April 2007, the New Century Financial, a firm specialized in subprime loans, filed for chapter 11 bankruptcy and fired half of its employees. The debts were repassed to other banks and the subprime bond market initiated a collapse. The recurrent devolution of houses accelerated the fall in prices. Thus, the banks did not receive the mortgage payments and the guarantee given by houses was insufficient to cover the loans.

In September 2007, the British bank Northern Rock received emergency support from the Bank of England for covering the losses with subprime bonds. On the day after the customers withdrew more than US$ 2 billion initiating one of the highest flight capitals in Great Britain. The banks showed signs of lending money amongst them and the crisis through contagion induced the European Central Bank to invest more than € 200 billion in the banking sector. Afterwards, the Fed and the Bank of Japan acted as lenders of last resort for banks with difficulty due to the market turmoil.

In February 2008, the British government nationalized the Northern Rock bank and in the following month the Fed offered more than US$ 200 billion for banks in difficulty. On February 17, 2008 the fifth largest American bank, the Bear Stearns, was bought by the JP Morgan Chase for US$ 240 million, but one year ago the same bank was evaluated at US$ 18 billion. In July, the financial authorities in the USA helped two giants in the mortgage sector, Fannie Mae and Freddie Mac. These two companies represented almost half of the American mortgages. Two months later, the government assumed control of both companies.

September 2008 can be considered as the center of the crisis (see Table 1). After several days in the search for a buyer, Lehman Brothers filed for chapter 11 bankruptcy and after some days Merrill Lynch, one of the most important American investment banks, was sold to Bank of America in order to avoid greater losses. In the same month, the Fed announced a bailout package of US$ 85 billion to avoid the bankruptcy of the largest insurance company in the world, AIG.

Table 1. Chronology of the losses due to the crisis

Date	Institution	Home office	Historical	Value of losses
April/2007	New Central Financial	USA	Company specialized in subprime loans filed for chapter 11 bankruptcy	N/A*
August/2007	European CB	Europe	Aid to the banking sector due to losses with subprime bonds	€ 203.7 billion
September/2007	Northern Rock	UK	Received emergency support from the Bank of England	N/A
October/2007	UBS	Switzerland	Subprime market losses	US$ 3.4 billion
	Citigroup	USA	Subprime market losses	US$ 3.1 billion
	Citigroup	USA	Accumulated losses in the semester	US$ 40 billion
	Merrill Lynch	USA	Subprime market losses	US$ 7.9 billion
March/2008	Fed	USA	Attempt to ease conditions in the credit markets, by new emergency lending to banks	US$ 200 billion

Table 1 (cont.). Chronology of the losses due to the crisis

Date	Institution	Home office	Historical	Value of losses
	Bear Stearns	USA	Sold to JP Morgan Chase with losses of capital	US$ 17.7 billion
April/2008	Bank of England	UK	Disclosed plan for helping banks affected by market turmoil	£ 50 billion
	Royal Bank	UK	Help plan for stockholders	£ 12 billion
May/2008	UBS	Switzerland	Losses due to market turmoil	US$ 37 billion
June/2008	Barclays	UK	Losses due to international turmoil	£ 4.5 billion
July/2008	IndyMac	USA	Bankruptcy of mortgage bank determined by supervision agencies	N/A
September/2008	Fredie Mac and Fanie Mae	USA	Financial help which included the control and management of the company	US$ 200 billion
	AIG	USA	Financial help which included the control and management of the company	US$ 85 billion
	Lehman Brothers	USA	Announces losses due to the market turmoil and filed for chapter 11 bankruptcy	US$ 3.9 billion
	Merrill Lynch	USA	Sold with losses of capital	N/A
	Washington Mutual	USA	Mortgage financial backer and highest savings institution are closed by regulatory agencies	N/A
	Fortis	Belgium	The Belgium group is nationalized	€ 11.2 billion
	Fed	USA	Disclosed plan for helping banks affected by market turmoil	US$ 700 billion
	Wachovia	USA	Fourth largest bank is bought by Citigroup	US$ 42 billion
	Bradford &Bingley	UK	Mortgage bank is nationalized	£ 50 billion
	Glitnir	Island	Third largest bank in the country is nationalized	N/A

Source: Adaptation from "Timeline: Sub-prime losses" – BBC news[1]. * N/A – non available.

It is important to note that in a similar manner to the banking system, a shock over the market of bonds and insurance causes an impact on the financial system and, thereby, on the real economy, implying a systemic risk (Bandt and Hartmann, 2000). However, the contagion can be avoided by banks if the institutions adopt the principles introduced by the New Accord and, in the last instance, by the isolation system inherent to the universal banks. Therefore, the capital charge for covering the market risk would be sufficient for covering eventual losses in the variation of prices of the mortgage bonds.

As pointed out by Goodhart et al. (1998), the main characteristics of the bonds and insurance markets are: (i) bonds of insurance companies have long-term maturity and they are not subject to a run on cash; (ii) in the insurance companies there is no link between each market trading and the payment system; (iii) the transactions in the bonds and insurance markets are rapid; (iv) the commitment of the companies with their contractual obligations is determined by the performance of their bonds; and (v) the insurance companies are not directly part of the payment system. Hence, these characteristics would be sufficient to armor the world market bonds or to safeguard the AIG.

The AIG case deserves special attention because it is filled with incoherencies. In the morning of September 15, 2008, the AIG had the classification of Triple A by Standard & Poor's, Moody's, and Fitch. At the end of the day, the classification fell two degrees in these classifications but remained as A. The following day, after losing more than half of AIG's market value, the USA government decided to nationalize the company. The main problem was that the agencies risked not to detect that the mortgage insurance companies used low quality bonds as a guarantee. As a consequence, neither AIG nor the other insurance companies could be classified with the highest degree of evaluation. In brief, the agencies' risk contributed to deepen the dimension of the crisis.

Taking into account that one of the factors that propitiated the occurrence of the crisis was the bad management and evaluation of the risks in the derivative market, a good strategy would be to adopt the minimum regulatory capital for this market. This question has been explored for more than one decade and, until the crisis, the eventual necessity of the adoption of prudential regulation, also for bonds and insurance markets, has been judged as unnecessary. In particular, the regulatory agencies may amplify the supervision on the agencies' risk and improve the criteria of classification. Consequently, the market agents could know the real value of the bonds used as a guarantee in the transactions among banks, and between these banks and the insurance companies.

2. Regulation and transparency index

Based on the fact that the crisis was caused by the absence of adequate regulation which in turn implied frustration in the expectations of the public and, thus, provoked incorrect decisions, an evaluation is made regarding the regulation through

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[1] See, http://news.bbc.co.uk/2/hi/business/7096845.stm.

transparency and taking into account several big financial institutions with their home offices in several countries. Considering the information made available by the World Bank and the International Monetary Fund, the analyses were made for three groups of countries:

(i) *Developed economies* – Australia, Austria, Belgium, Canada, Denmark, France, Germany, Greece, Italy, Japan, Norway, the Netherlands, New Zealand, Portugal, Singapore, South Korea, Spain, Sweden, Taiwan, United Kingdom, and the USA;

(ii) *BRICs economies* – Brazil, Russia, India, and China; and

(iii) *Emerging economies* – Argentina, Brazil, Chile, China, Czech Republic, Hungary, India, Indonesia, Mexico, Philippines, Russia, Slovak Republic, South Africa, Sri Lanka, and Turkey.

The study on regulation and transparency of central banks became common in the contemporary literature. Transparency in the conduct of the monetary policy can be justified due to the existence of asymmetric information between monetary authority and the other economic agents (de Mendonça and Simão Filho, 2008). A high degree of transparency attenuates uncertainties, develops the capacity of the private sector to forecast the central bank's decisions and increases the monetary policy efficiency. Making an analogy with the financial institutions, the transparency can be defined as the presence of asymmetric information between the financial firms and the other economic agents. Hence, an increase in the transparency of the banking system decreases the uncertainty of the financial market, improves the public's forecast and can, through market discipline, lead to a better banking supervision.

Making an analogy with the classification presented by Geraats (2002) in regard to the types of transparency in the conduct of the monetary policy, we classify the financial institutional transparency in the following manner:

(i) Political transparency – can be understood as institutional transparency – refers to the access by the public in regard to the institutional objectives and organizational arrangements that classify the conduct of the financial policymakers;

(ii) Economic transparency – focuses on the financial information (data, risk models, and financial forecasts) which is used in the conduct of the financial policy adopted by the banking industry;

(iii) Procedural transparency – describes the manner in which the decisions regarding risk policies are taken (strategy and accountability);

(iv) Policy transparency – refers to the announcement of the strategies adopted by the banking firms concomitant with explanation for their premises and the policy inclination for the policymaker's future actions;

(v) Operational transparency – concerns the implementation of the financial policy including a discussion on control errors for the use of management instruments.

Economic and political transparencies are more relevant concerning the analysis of the financial system stability. Due to the relevance of the transparency and regulation for the stability of the sector and taking into consideration the proposal in the New Accord, this section presents an index created for evaluating the behavior of several banking institutions according to the principles of Basel II.

The requirement to calculate the regulatory capital for covering the losses due to operational risk events was introduced by the New Accord. In addition, the requirement to calculate the minimum capital charge for operational risk is an exigency for internationally active institutions. Hence, this study takes into account the implementation of this exigency by countries present in this analysis with the objective of evaluating the degree of commitment of banking institutions and of their respective central banks with the principles of Basel II.

In order to create the index, named as "regulation and transparency index", the economic transparency was divided into two subgroups. The first group is focused on the risks of the financial firms while the second one concentrates on the account information. For capturing the essence of the crisis, the period of analysis comprises the months of September, October, and November 2008. Table 2 shows the method for calculating the degree of transparency and regulation of the financial institutions.

The responses to the questions in Table 2 were classified based on the following criteria: (i) degree "1" is attributed to the institutions when the activity under consideration (from A.1.1 to B4) is an exigency determined by the regulatory agencies; (ii) degree "0.5" is attributed to the institutions when, although the activity is not an exigency of regulatory agencies, the banking institution performs it in a regular manner; and (iii) degree "0" is attributed to the institutions when neither the institution performs the activity nor it is an exigency of the regulatory agencies.

The different stages regarding the level of commitment of the financial institutions to the principles of Basel II are evident, for example, when a comparison is made between Barclays Capital (the USA) which has already been calculating the operational risk by the

Advanced Measurement Approach (AMA) since 1999 and the Banco Espírito Santo (BES) bank (Portugal) which has just received the authorization by the supervision agency for using the Standardized Approach. Another relevant example is the time of 18 months that the banking supervision in Germany (Bundesbank) needed for authorizing the AMA requested by Dresdner Bank AG. Moreover, 60% of the banks in France are already authorized to calculate the operational risk capital charge through the AMA.

Table 2. Regulation and transparency index

Code	Questions	Degree
A	Economic transparency	
A.1	Regarding the institutional risks and principles of Basel II	
A.1.1	If the institution calculates the credit risk	0, 0.5 or 1.0
A.1.2	If the credit risk is disclosed in periodic reports	0, 0.5 or 1.0
A.1.3	If the institution calculates the market risk	0, 0.5 or 1.0
A.1.4	If the market risk is disclosed in periodic reports	0, 0.5 or 1.0
A.1.5	If the institution calculates the operational risk	0, 0.5 or 1.0
A.1.6	If the operational risk is disclosed in periodic reports	0, 0.5 or 1.0
A.2	Regarding the account information and policy of transparency	
A.2.1	If the reports are available quarterly	0, 0.5 or 1.0
A.2.2	If the reports are available yearly	0, 0.5 or 1.0
A.2.3	If the Basel index is calculated and disclosed in the reports	0, 0.5 or 1.0
B	Political transparency	
B.1	If the capital structure of the institution is disclosed in the account reports	0, 0.5 or 1.0
B.2	If the structure and risk management policies are disclosed	0, 0.5 or 1.0
B.3	If the policies for mitigating risk (hedge) are disclosed	0, 0.5 or 1.0
B.4	If market environments and forecasts are disclosed	0, 0.5 or 1.0

The case of developed economies proves the existence of different stages of commitment with the introduction of the principles of Basel II (see Table 3). Assembling information available in the sites of the main banks used in this study for the period from September 25, 2008 to November 30, 2008, a significant variation in the indices for the countries in the sample is observed. The worse performance is observed for South Korea and Greece with a regulation and transparency index of 5.5 and 6.5, respectively. On the other hand, the highest indices (degree 11) are observed for the USA, New Zealand, and Sweden.

The main reason for the classification of South Korea and Greece is due to the lack of publication concerning market and operational risks by the banks and also because the regulatory agencies do not make publication compulsory (A.1.4 and A.1.6). Another relevant point is that the banks in these countries do not disclose their policies for mitigating risk nor market environments and forecasts (B.3 and B.4). The USA and New Zealand, on the other hand, have a classification greater than zero for almost all items (except for the publication of Basel index – A.2.3), while Sweden had an evaluation greater than zero in all questions[1].

Table 3. Regulation and transparency index – developed economies

I/P	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.1.6	A.2.1	A.2.2	A.2.3	B.1	B.2	B.3	B.4	Total
Australia	1	1	1	0.5	1	0.5	0	1	1	0	1	1	0.5	9.5
Austria	1	1	1	1	1	0.5	0.5	1	0	1	0.5	0	0.5	9
Belgium	1	0.5	1	0.5	1	0.5	0.5	1	1	0.5	0.5	0.5	0	8.5
Canada	1	1	0.5	0.5	1	0	1	1	1	0	0	0.5	0	7.5
Denmark	1	0.5	1	0.5	1	0.5	0.5	1	0.5	1	0.5	0.5	0	8.5
France	1	1	1	0	1	0	0.5	1	1	0	0	0.5	0.5	7.5
Germany	1	1	1	1	1	1	0.5	1	1	0	0.5	0.5	0.5	10
Greece	1	0.5	1	0	1	0	0.5	1	1	0	0.5	0	0	6.5
Italy	1	0.5	1	0.5	1	0.5	0.5	1	1	0.5	0.5	0.5	0.5	9
Japan	1	0.5	1	0	1	0	0.5	1	1	0	0.5	0.5	0.5	7.5
Netherlands	1	1	1	1	1	0	0	1	0	1	0.5	0	0.5	8
New Zealand	1	1	1	1	1	0.5	1	1	1	0	1	1	0.5	11
Norway	1	0.5	1	0.5	1	0.5	0.5	1	0	1	0.5	0	0	7.5
Portugal	1	1	1	0	1	0	1	1	1	0	1	0.5	0.5	9

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[1] In the USA, the implementation of the expensive and complex Sarbox law, which succeeded the corporative scandals in 2002, was inefficient for avoiding the subprime crisis.

Table 3 (cont.). Regulation and transparency index – developed economies

I/P	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.1.6	A.2.1	A.2.2	A.2.3	B.1	B.2	B.3	B.4	Total
Singapore	1	1	1	0	0	0	1	1	1	0	0.5	0.5	0.5	7.5
South Korea	1	1	0.5	0.5	0	0	0	1	0	1	0	0	0.5	5.5
Spain	1	0.5	1	0.5	1	0.5	0.5	1	1	1	0.5	0.5	0.5	9.5
Sweden	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5	0.5	11
Switzerland	1	1	1	0.5	1	0.5	0.5	1	1	0	0.5	0.5	0.5	9
Taiwan	1	1	1	0.5	1	0.5	0.5	1	1	0	0.5	0.5	0.5	9.0
United Kingdom	1	0.5	1	0.5	1	0.5	0	0	1	1	0.5	0.5	0.5	8
USA	1	1	1	1	1	1	1	1	1	0	1	0.5	0.5	11

The principles of Basel II have been in practice since 2008 and will have a timeline for adaptation for three more years. Notwithstanding, North American institutions, such as the Citigroup and the Barclays Capital, adopted a behavior that implied the highest index of regulation and transparency (degree 11).

Based on the information collected in the sites of some of the main banking institutions of the countries in Table 3, it is observed that there exists a lack of clear and transparent information regarding market and operational risks as well as the Basel index[1]. Therefore, the regulatory agencies may determine what information must be made available by internationally active banks and that it must be standardized in a manner which allows a better comparison among them. If the institutional transparency is, in fact, amplified, it is possible for the public to improve its expectations and the market will work with greater stability.

The following analysis is regarding banking system of the BRICs countries. These main emerging economies deserve special attention in this analysis due to the fact that, according to Goldman Sachs, (2001) these economies can become the most important ones in the world by 2050. The classification in Table 4 denotes that Brazil and China have the highest regulation and transparency index (9.5). The highlight for Brazil is the fact that it is the sole BRICs country which discloses its forecasts and market environments (B.4) and received a classification greater than zero for all items (see Table 4). In regard to China, it is important to note that the entry of foreign institutions was only permitted after the conclusion of the restructuring of the domestic banking system, especially concerning the four biggest public banks: Bank of China, Agricultural Bank of China, China Construction Bank, and Industry and Commerce Bank of China (ICBC). Moreover, until April 2008, only two Chinese banks (the Bank of China and the Bank of Communications) were present in the USA. However, at least six other Chinese banks, such as the ICBC, are planning to ask the Fed's authorization to open for business in American territory and, thus, will be adjusted based on the regulation criteria determined by this country.

Taking into account the banking institution in the BRICs, the State Bank (an Indian global bank, with operations in 32 countries) was the bank that presented the best conditions for access to the necessary information for this research. The data are available in a clear manner through a link named as "Basel II Disclosures". This example should be followed by the other internationally active institutions.

Table 4. Regulation and transparency index – BRICs

I/P	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.1.6	A.2.1	A.2.2	A.2.3	B.1	B.2	B.3	B.4	Total
Brazil	1.0	0.5	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5	9.5
Russia	1.0	0.5	1.0	0.5	0.0	0.0	0.5	1.0	1.0	0.0	0.5	0.5	0.0	6.5
India	1.0	0.5	1.0	0.5	1.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5	0.5	8.5
China	1.0	1.0	1.0	0.5	1.0	0.5	1.0	1.0	1.0	0.0	0.5	0.5	0.5	9.5

Once again a significant divergence among the regulation and transparency indices is observed (minimum of 6.5 and maximum of 9.5). In a general way, it is observed that the central banks in the BRICs obligate the calculation of regulatory capital for covering risk (credit, market, and operational). However, there exists only the exigency for disclosure of the credit risk although the disclosure of the others is encouraged. Only the Central Bank of Brazil discloses a quarterly Basel index. The negative highlight is the Russian case with a regulation and transparency index of only 6.5. This result is explained by the fact that the Russian banks did not disclose their operational risk (A.1.5 and A.1.6), forecasts and market environments (B.4).

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[1] Besides the central bank's sites, the following banking institutions were considered: Dresdner Bank AG (Germany); National Australia Bank (Australia); Bank Austria (Austria); Fortis (Belgium); Bank of Montreal (Canada); Woori Bank (South Korea); Dansk Bank (Denmark); Santander (Spain); Citigroup and Barclay (the USA); BNP Paribas (France); EFG Eurobank Ergasias (Greece); Triosbank (Netherlands); UniCredit SpA (Italy); Mitsubishi UFJ Financial Group (Japan); DnB NOR (Norway); Bank of New Zealand (New Zealand); BES (Portugal); HSBC, Halifax Bank of Scotland (HBOS – Scotland), Lloyds TSB (United Kingdom); DBS (Singapore); UBS (Switzerland); SEB (Sweden); Land Banking Taiwan (Taiwan).

The classification of economies as emerging is due to the fact that these economies have a high economic growth but still have not achieved the level of developed economies. Apart from the BRICs countries, the following countries were considered in the sample: Argentina, Chile, Czech Republic, Hungary, Indonesia, Mexico, Philippines, Slovak Republic, South Africa, Sri Lanka, and Turkey[1]. The

findings reveal that, in general, the BRICs economies had better results in comparison with other emerging economies. Besides the BRICs countries, South Africa presented a good performance (degree of 8.5 – see Table 5). This result is explained by the performance of the Standard Bank (biggest South African bank) which presents publication of its risk exposition (credit, market, and operational).

Table 5. Regulation and transparency index – emerging economies

I/P	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.1.6	A.2.1	A.2.2	A.2.3	B.1	B.2	B.3	B.4	Total
Argentina	1	0	1	0	0	0	0	1	0	0	0	0	0	3
Brazil	1	0.5	1	0.5	1	0.5	0.5	1	1	1	0.5	0.5	0.5	9.5
Chile	1	1	1	0.5	0	0	1	1	1	0.5	0	0	0	7
China	1	1	1	0.5	1	0.5	1	1	1	0	0.5	0.5	0.5	9.5
Czech Republic	1	0.5	1	0.5	1	0.5	0	1	0.5	1	0.5	0.5	0	8
Hungary	1	1	1	1	0	0	0	1	0	1	0	0	0	6
India	1	0.5	1	0.5	1	0.5	0.5	1	1	0	0.5	0.5	0.5	8.5
Indonesia	1	1	1	1	0	0	0.5	1	0	1	0.5	0	0.5	7.5
Mexico	1	1	0	0	1	0	1	1	1	0	0	0	0	6
Philippines	1	1	1	1	0	0	1	1	0.5	1	0.5	0	0.5	8.5
Russia	1	0.5	1	0.5	0	0	0.5	1	1	0	0.5	0.5	0	6.5
Slovak Republic	1	1	1	0.5	1	0	1	1	0	1	0.5	0	0	8
South Africa	1	0.5	1	0.5	1	0.5	0	1	1	1	0.5	0.5	0	8.5
Sri Lanka	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	1	0.5	0	0.5	7
Turkey	1	0.5	1	0.5	1	0	0.5	1	1	0	0.5	0.5	0	7.5

Taking into consideration all countries in the sample, the worst performance is the Argentinean case with a degree of 3. The justification for this result is due to the fact that the regulatory agency only requires the disclosure of the balance sheet of the banking firms. Moreover, Argentina was the only country that did not present a capital structure of its financial institutions (B.1). Other countries that achieved a degree of regulation and transparency lower than the average were Hungary and Mexico (6.0). In brief, the Mexican banks neither calculate nor disclose data concerning market risk (A.1.3 and A.1.4) and the Hungarian banks neither calculate nor disclose data concerning operational risk (A.1.5 and A.1.6). Furthermore, there are no disclosures in these countries in regard to their risk management policies, forecasts and market environments (B.2, B.3, and B.4). In the other countries the results are median which implies the necessity of the regulatory agencies in these countries to have more rigor in the supervision of the financial institutions.

3. Empirical evidence

With the intention of making a relation between the regulation and transparency index (RTI) with the subprime crisis, an analysis of the relation between the RTI with the most known stock market rating of each one of the 37 countries is made in this study. The justification for the use of the stock market ratings is due to the fact that these indices respond quickly to a financial crisis. Firstly, the return of the stock market rating (SR) is obtained through the division of price (points) of the index at time $t+n$ (IP_{t+n}) and the price of index at time t (IP_t), that is,

$$SR = \left(IP_{t+n} \middle/ IP_t \right) - 1. \tag{1}$$

For the analysis concerning the volatility in the stock markets, the coefficient of variation of the stock market ratings (CV) was used as a proxy. In other words, the ratio between the standard deviation (SD_{IP}) and the mean ($\overline{IP}$) of the index,

$$CV = \left(SD_{IP} \middle/ \overline{IP} \right). \tag{2}$$

The months under consideration are September and October 2008 (daily data). These months are used because they are considered to be the peak of the crisis. After this period several measures were taken by the main central banks in the world as an attempt

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[1] Besides the information considered in the previous case, the following banking insitutions were considered: Standard Bank (South Africa); de La Nacion (Argentina); Banco de Chile (Chile); Slovenská Sporitelña (Slovak Republic); Metrobank (Philippines); OTP Bank (Hungary); PT Internasional Indonesia Bank (Indonesia); Banamex (Mexico); Ceska Sporitelna (Czech Republic); Commercial Bank of Ceyton (Sri Lanka); Garanti Bank (Turkey).

to mitigate the crisis. Table 6 shows, besides the *RTI*, the return of stock market rating and its volatility of the 37 countries under study.

Making scatter plots for *RTI* and *SR*, and for *RTI* and *CV*, it is observed in both cases that there exists a negative correlation between the variables (see Figure 1)[1]. In the case of a total sample, it is observed that the greater the loss denoted by the stock market rating of a country, the less the *RTI* (correlation of 0.42) is. In an analogous way, it is observed that the greater the volatility in stock markets ratings, the less the *RTI* is (correlation of -0.40). The negative

highlights among the countries are Russia and Argentina. Although Russia has a median *RTI* (close to Mexico, Greece, and Chile) the country presented the greatest loss (-48.84%) and the greatest volatility (0.30). The positive highlight is New Zealand which, along with the USA and Sweden, has the greatest *RTI*, the lowest volatility and one of the lowest losses in its financial market. Moreover, based on Figure 1, it is possible to observe that the correlations between *RTI* and *SR*, and *RTI* and *CV* are stronger for developed economies (0.47 and 0.47) than for developing ones (0.33 and 0.36).

Table 6. Regulation and transparency index, return of stock market rating,
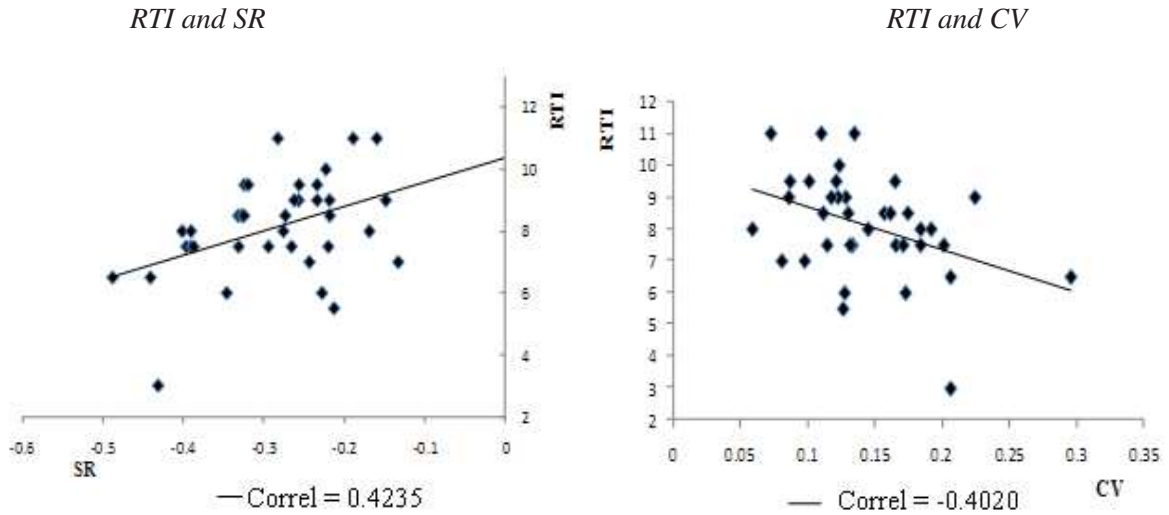and coefficient of variation of the stock market ratings

N.	Country	Index	Coef. var.	Return	RTI
1	South Africa	JSE	0.1117	-0.2184	8.5
2	Germany	DAX	0.1236	-0.2233	10
3	Argentina	Merval	0.2062	-0.4318	3
4	Australia	All Ordinaries	0.1013	-0.2341	9.5
5	Austria	ATX	0.2243	-0.2341	9
6	Belgium	Bel – 20	0.1745	-0.3321	8.5
7	Brazil	Ibovespa	0.1650	-0.3246	9.5
8	Canada	S&P TSX Composite	0.1335	-0.2659	7.5
9	Chile	IPSA	0.0811	-0.1334	7
10	China	Shanghai Composite	0.0871	-0.2565	9.5
11	South Korea	Composite	0.1265	-0.2131	5.5
12	Denmark	KFX 20	0.1571	-0.3275	8.5
13	Slovak Republic	SAX	0.0592	-0.1692	8
14	Spain	Madri General	0.1214	-0.3197	9.5
15	USA	Dow Jones	0.1103	-0.1893	11
16	Philippines	PSE	0.1303	-0.2738	8.5
17	France	CAC 40	0.1147	-0.2203	7.5
18	Greece	General Share	0.206	-0.4413	6.5
19	Netherlands	AMEX	0.1451	-0.2761	8
20	Hungary	BUX	0.1729	-0.3464	6
21	India	BSE 30	0.1616	-0.3249	8.5
22	Indonesia	Composite	0.1317	-0.3967	7.5
23	Italy	Milan MIBTel	0.1285	-0.2572	9
24	Japan	Nikkei 225	0.1657	-0.3317	7.5
25	Mexico	IPC	0.1277	-0.2280	6
26	Norway	Total Share	0.1840	-0.3909	7.5
27	New Zealand	NZSE 50	0.0729	-0.1599	11
28	Portugal	PSI 20	0.1227	-0.2626	9
29	United Kingdom	FTSE 100	0.1177	-0.2187	9
30	Czech Republic	PX	0.1918	-0.4018	8
31	Russia	Moscow Times	0.2955	-0.4884	6.5
32	Singapore	Straits Times	0.1711	-0.3875	7.5
33	Sri Lanka	All Share	0.0980	-0.2436	7
34	Sweden	Stockholm General	0.1349	-0.2830	11
35	Switzerland	Swiss Market	0.0863	-0.1487	9
36	Taiwan	Weighted	0.1840	-0.3909	8
37	Turkey	IMKB 100	0.2013	-0.2946	7.5

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[1] It is important to note that the positive inclination of the curve in the graphs regarding *RTI* and *SR* is due to the fact that negative returns are being considered in this analysis.
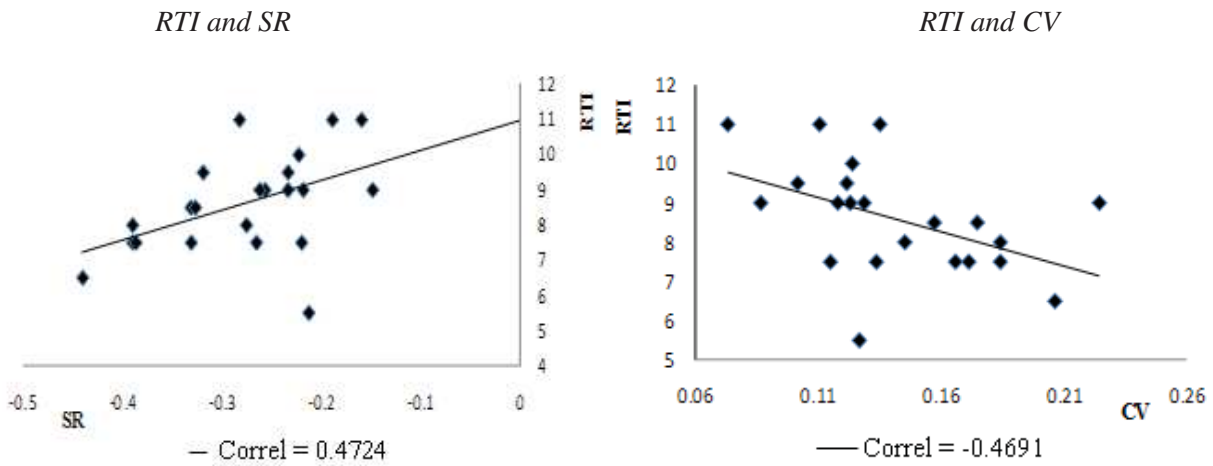
The observations above suggest that countries with a higher accountability with banking regulation (high values of *RTI*) had attenuated the effects caused by the crisis. In fact, these markets registered less financial losses and less volatility in comparison with countries where the *RTI* was lower.

Hence, it is possible to infer that a greater accountability of the financial institutions in response to the greater rigor in the rules imposed by regulatory and supervision agencies with the transparency rules proposed by the New Accord implied less exposition in this period of crisis.

All economies

RTI and SR   *RTI and CV*

Developed economies

RTI and SR   *RTI and CV*

Developing economies

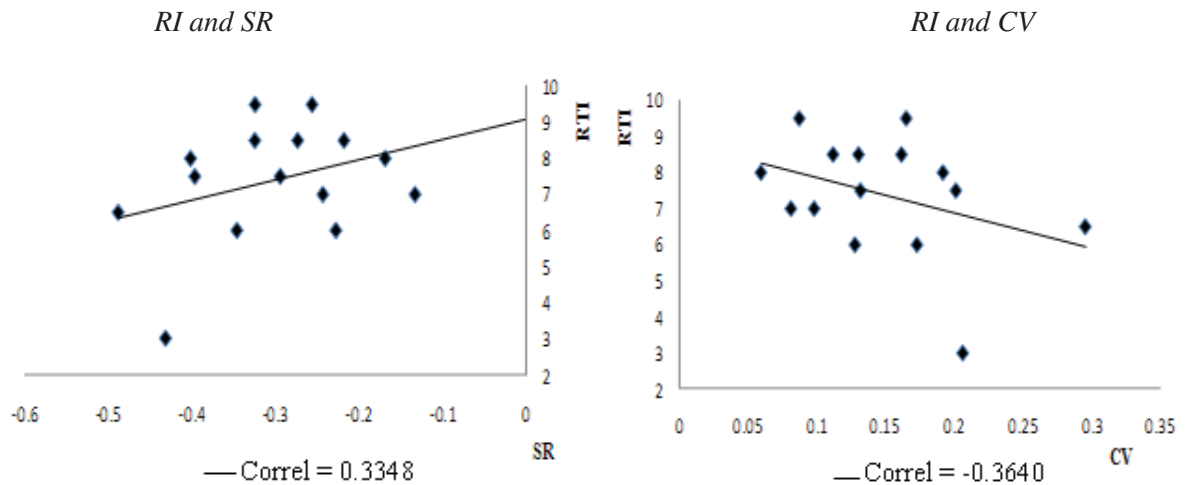*RI and SR*   *RI and CV*

Fig. 1. RTI and stock market performance

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With a view to give robustness to the analysis from correlations, cross-country estimations (OLS) for analyzing the effects of regulation and transparency (*RTI*) on return of stock market (*SR*) and volatility in the stock markets (*CV*) were made. Given that in the period under analysis all returns of stock market ratings were negative, the modulus of the variable *SR* is considered. As a consequence, greater values of |*SR*| mean greater losses. Therefore, the equations to be estimated are:

$$|SR| = \beta_0 + \beta_1 (RTI), \qquad \beta_1 < 0 \qquad (3)$$

$$CV = \alpha_0 + \alpha_1 (RTI), \qquad \alpha_1 < 0. \qquad (4)$$

The results are in Table 7. It is important to stress that in both estimations the F-statistics are significant, the Jarque-Bera normality test confirmed that the residuals are normal, and the serial autocorrelation test (Breusch-Godfrey LM) pointed at non-autocorrelation. In the first estimation, which is regarding *SR* and *RTI*, the coefficient for *RTI* is statistically significant at the 1% level for all samples (all economies, developed economies, and developing economies). This result points out the existence of a negative relation between *SR* and *RTI* which in turn confirms the previous graph analysis made. Thus, countries with a greater level of accountability concerning transparency and banking regulation presented a lower loss in their stock markets than countries with less accountability. The results of estimations in Table 7 (see adjusted R^2) indicate that the public in developed economies is more concerned with banking regulation than in the case of emerging economies.

In regard to the second estimation, which considers the relation between *CV* and *RI*, the evidence indicates the presence of a negative relation between the volatility in the stock markets and the regulation and transparency index. The statistical significance of the coefficient for *RI* reveals that countries with a greater accountability concerning transparency and banking regulation had less volatility in their financial markets for September and October. In an analogous way to the first estimation, the adjusted R^2 confirms the idea that the public in developed economies is more concerned with transparency and banking regulation than in developing countries.

In order to analyze the relevance of the items that constitute the index of transparency and regulation, the index has been divided following three specifications: (i) the first takes into account the economic transparency based on the calculation and disclosure of banking risks; (ii) the second considers the economic transparency based on account disclosure of banking firms; and (iii) the third makes the political transparency of the banks[1].

Table 7. Cross-country estimations (OLS)

Dependent variable – SR								
	All			Developed			Developing		
	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.
Constant	0.4745	6.9334	0.0000	0.5040	3.7762	0.0012	0.4524	5.5130	0.0001
RTI	-0.0230	-3.0487	0.0044	-0.0263	-1.8065	0.0859	-0.0203	-2.0811	0.0578
F-statistic		7.6511	0.0090		5.7438	0.0264		1.6408	0.2226
Jarque-Bera		0.5247	0.7692		0.6426	0.7252		0.2771	0.8706
Breusch-Godfrey LM		1.6360	0.2102		1.2257	0.3621		0.1974	0.8237
Adjusted R^2		0.1559	N=37		0.1843	N=22		0.0438	N=15
Dependent variable – CV								
	All			Developed			Developing		
	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.
Constant	0.2414	6.9455	0.0000	0.2498	4.8938	0.0002	0.2568	5.3530	0.0001
RTI	-0.0120	-3.1159	0.0037	-0.0126	-2.2121	0.0284	-0.0142	-2.4900	0.0388
F-statistic		6.7493	0.0136		5.6435	0.0276		2.1585	0.1675
Jarque-Bera		3.5449	0.1699		1.0883	0.5803		0.8662	0.6485
Breusch-Godfrey LM		0.1333	0.8757		1.1501	0.3388		0.5673	0.5843
Adjusted R^2		0.1377	N = 37		0.1811	N = 22		0.0818	N=15

Note: White (1980) *t*-statistic.

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[1] The models were defined from the general to the specific. Moreover, variables were included in the model with the object of assuring normal residuals and non-autocorrelation.

Tables 8 and 9 show the results found. The first estimation considers the relation between *SR* and the disaggregated *RTI*. Taking into consideration the total sample, the economic transparency concerning risk (A.1) presents the highest relevance in comparison with the other types of transparency (highest adjusted R^2). Furthermore, the disclosures of both credit and operational risks (A.1.2 and A.1.6) are statistically significant. These results indicate that the economic agents perceive these risks to precify their assets in stock markets.

The analysis from developed economies reveals that the political transparency is very important (highest adjusted R^2) with special attention to disclosure of forecasts and market environments (B.4). Moreover, the economic transparency concerning account disclosure is not relevant for the analysis (negative adjusted R^2). At last, economic transparency regarding risks (A.1) is relevant to the case of credit risk.

Political transparency is not relevant for the case of developing countries (negative adjusted R^2). In regard to the economic transparency, the credit and market risks, as well as the quarterly disclosure of banking balance sheets are relevant for economic agents to precify their assets in stock markets.

The estimations in Table 9 show the relation between *CV* and *RI*. The findings were similar in both estimations. The main differences are that the Basel index (*BI*) becomes relevant for the case of developed economies and that the market risk does not matter for the precification in stock markets for the case of developing economies.

In brief, the outcomes of both estimations denote the relevance of political transparency for the case of developed economies and the importance of economic transparency concerning banking risk for developing economies. The difference in results for the economies is due to the fact that banking firms in developing economies have a low level of disclosure in regard to the political transparency and that the most developed countries disclose their institutional risks (credit, market, and operational).

Concluding remarks

Taking into account the relevance of the subprime crisis, this article analyzed the importance of banking regulation concerning information transparency of financial firms as a way to avoid or attenuate the crisis effect. It is clear that the crisis began in the developed economies, reached the developing economies, and that there is a consensus that for restraining this crisis a coordinated action by governments is needed. However, the financial regulation can be sought as an external intervention in the operation of banks and financial systems, which are accustomed to free competition and market flexibility. In brief, the crisis can put an end to the tendency for self-regulation in the financial system.

The empirical evidence in this study reveals that the importance of regulation and transparency in the banking system claims attention. Countries with greater transparency and regulation of their financial sector were damaged less by the subprime crisis. Furthermore, the findings denote that there exists a greater concern with transparency and banking regulation in developed economies compared to developing ones. Hence, political transparency is more important in developed economies while the economic transparency regarding bank risk is more relevant in developing countries. Finally, an increase in accountability of the regulatory authority can imply less vulnerability of its financial markets.

Table 8. Cross-country estimations (OLS) – disaggregate regulation and transparency index

Dependent variable – *SR*

	All									Developed									Developing								
	Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency			Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency			Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency		
	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.
C	0.39	7.42	0.00	0.22	2.58	0.01	0.32	12.09	0.00	0.45	9.09	0.00	0.26	5.53	0.00	0.38	15.95	0.00	0.42	8.47	0.00	0.38	9.35	0.00	0.29	3.88	0.00
A.1.1																											
A.1.2	-0.19	-3.78	0.00							-0.17	-2.63	0.02							-0.25	-3.22	0.01						
A.1.3	0.06	1.41	0.17																								
A.1.4	0.03	0.55	0.59							-0.04	-0.71	0.49							0.15	2.01	0.07						
A.1.5																											
A.1.6	-0.09	-2.11	0.04							-0.04	-0.77	0.45							-0.11	-1.19	0.26						
A.2.1				-0.08	-1.91	0.06							0.02	0.34	0.74							-0.14	-2.69	0.02			
A.2.2				0.11	1.28	0.21							0.04	0.94	0.36												
A.2.3													-0.04	-0.86	0.40												
B.1																									-0.02	-0.35	0.73
B.2																									0.00	-0.02	0.98
B.3																-0.06	-1.68	0.11							0.09	0.65	0.53
B.4							-0.12	-2.03	0.05							-0.20	-3.82	0.00							0.01	0.07	0.95
F-statistic		5.68	0.00		2.17	0.13		4.86	0.03		5.24	0.01		0.42	0.74		7.90	0.00		2.95	0.08		6.43	0.02		0.24	0.91
Jarque-Bera		0.48	0.79		0.94	0.63		0.28	0.87		0.43	0.81		0.54	0.76		0.99	0.61		1.09	0.58		0.19	0.91		1.02	0.60
Breusch-Godfrey LM		2.02	0.15		0.74	0.49		0.75	0.48		3.92*	0.04		5.54	0.01		0.62	0.55		0.03	0.97		0.44	0.66		0.04	0.96
Adjusted R²		0.28	N=37		0.06	N=37		0.10	N=37		0.38	N=22		-0.09	N=22		0.40	N=22		0.30	N=15		0.28	N=15		-0.28	N=15

Note: White (1980) *t*-statistics.

Table 9. Cross-country estimations (OLS) – disaggregate regulation and transparency index

	Dependent variable - CV																										
	All									Developed									Developing								
	Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency			Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency			Economic transparency (risk)			Economic transparency (Account inf.)			Political transparency		
	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.	Coef.	Stat.	Prob.
C	0.22	10.50	0.00	0.17	12.58	0.00	0.17	11.17	0.00	0.20	8.69	0.00	0.17	11.35	0.00	0.20	18.43	0.00	0.25	5.62	0.00	0.17	10.43	0.00	0.16	4.95	0.00
A.1.1																											
A.1.2	-0.10	-4.11	0.00							-0.07	-2.62	0.02							-0.16	-3.07	0.01						
A.1.3																											
A.1.4	0.03	1.54	0.13							0.02	0.58	0.57							0.06	1.40	0.19						
A.1.5																											
A.1.6	-0.05	-2.25	0.03							-0.04	-1.69	0.11							-0.10	-1.80	0.10						
A.2.1				-0.04	-2.18	0.04																-0.09	-2.32	0.04			
A.2.2																											
A.2.3										-0.04	-2.39	0.03										0.03	1.00	0.34			
B.1																									-0.03	-0.71	0.49
B.2																									-0.01	-0.06	0.95
B.3																-0.08	-2.96	0.01							0.09	1.04	0.32
B.4							-0.07	-2.22	0.03							-0.07	-2.74	0.01							-0.06	-0.64	0.53
F-statistic		5.57	0.00		3.46	0.07		5.90	0.02		1.81	0.18		6.02	0.02		12.39	0.00		3.82	0.04		2.77	0.10		1.05	0.43
Jarque-Bera		4.35	0.11		8.07	0.02		3.41	0.18		2.73	0.26		0.71	0.70		1.58	0.45		0.82	0.66		3.33	0.19		0.38	0.83
Breusch-Godfrey LM		0.21	0.81		0.10	0.91		0.36	0.70		0.40	0.67		2.00	0.16		1.90	0.18		0.07	0.93		0.46	0.64		0.61	0.56
Adjusted R^2		0.28	N=37		0.06	N=37		0.12	N=37		0.10	N=22		0.19	N=22		0.52	N=22		0.38	N=15		0.20	N=15		0.01	N=15

Note: White (1980) t-statistics.

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