Brazil's Bank Spread in International Context

From Macro to Micro Drivers

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Abstract

In an international context, this paper analyzes the main drivers of Brazil's bank spreads measured by the *net interest margin*, by estimating internationally comparable measures for (i) institutional and regulatory (micro-) factors; (ii) macro-economic factors; and (iii) banking competition factors. The paper produces and applies a novel data set covering 197 areas and countries; ranging from 1995 to 2009, including 106 banks for Brazil and 16,434 banks worldwide. The analysis finds that *micro-factors* are the main drivers of spreads across the world. In the case of Brazil, the spread is found to be strongly accounted for by *micro-factors*—also in international comparison. For example, micro-factors contributed 7.2 percentage points (79 percent) of the 11.5 percent total spread in Brazil in 2009, while macro-factors and

banking competition factors jointly accounted for only 1.9 percentage points (21 percent). Conversely, Brazil does not rank high in international comparison in terms of *macro-economic risk*: Brazil and other countries from Latin America and the Caribbean are found to feature the *highest* micro-factors in the world while having the second-*highest* spreads and the second-*lowest* contribution of macro-factors. These unique findings suggest that countries striving toward reducing bank spreads should consider policies aimed at reducing microeconomic frictions in their banking sectors, in particular, (i) the economic costs of holding reserves, (ii) credit risk, and (iii) implicit interest payments. In terms of policy dialogue, this would be especially relevant for Brazil and for Latin American and Caribbean countries in general.

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BRAZIL'S BANK SPREAD IN INTERNATIONAL CONTEXT: FROM MACRO TO MICRO DRIVERS¹

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1. Introduction

In a financially liberalized environment, the difference between what banks charge to lend money and what they pay to borrow is not only an indicator of risk, but also an indicator of banking sector lack of competition, which may have detrimental implications for saving, investment, and growth. This is evidently the case in Brazil where there is no apparent lack of profitable investment opportunities, but rather a high opportunity cost of capital that prevents new investments from being profitable (Hausmann, Rodrik, and Velasco, 2005).

However, in terms of social welfare, it is not necessarily clear whether high spreads are detrimental or not. A narrow spread may indicate that the banking market is competitive, but may also render the banking system less stable and less insulated from macroeconomic shocks through low bank capital and low profitability. Nevertheless, as spreads widen, the cost of interacting with the financial system becomes prohibitive for some borrowers and, since spreads reflect the cost of intermediation, policymakers and central bankers care about its level and volatility, as well as its determinants.

Brazil's high spreads could be reduced by dampening the institutional and regulatory forces that keep intermediation costs high at the bank level. Spreads would, furthermore, diminish if banking market competition was increased and the volatility of interest rates and economic growth were reduced. As a result, both micro-factors and macro-factors are relevant to consider when assessing the efficiency of a banking system and the associated levels of spreads.

By international comparison, the spread in Brazil is considered to be high, but such comparisons are based on questionable methodologies that do not address cross-country heterogeneity and representativeness issues regarding borrowing and lending costs. As a result, an analysis of country-specific as well as cross-country determinants of spreads would serve to identify some common factors relating to the efficiency of the banking system and, thereby inform policy discussions for countries with high spreads.³

Such an empirical strategy requires a systematic treatment of the determinants of spreads in a large number of countries, including Brazil. Following the methodology proposed by Saunders and Schumacher (2000), the analysis in this paper will first filter out the bank-specific institutional and regulatory determinants of spreads. For example, Saunders and Schumacher (2000) find that the institutional and regulatory factors accounted for about 60 percent of the net interest margin (NIM; the difference between a bank's interest earnings and expenses as a percentage of interest earning assets) in the United States in 1995. The residual from this analysis (the 40 percent in the case of the United States) then encompasses the contribution to the size of the spread caused by macroeconomic risk factors and banking market structural factors, such as the degree of competition. Such an exercise therefore informs policy makers with information about the potential sources of high spreads and, in the case of Brazil, provides the basis for evaluating whether to address micro or macroeconomic constraints in reducing spreads.

³ In the 1990s, many Latin American countries eliminated interest rate ceilings, reduced reserve requirements, and halted direct credit controls. These market-oriented reforms have promoted financial deepening and produced economic benefits. The generally high spreads in Latin America must be evaluated in light of a transition from repressed financial systems to liberalized financial environments.

The purpose of this paper is to shed light on the dimensions of inefficiencies and the lack of competition in the banking system in Brazil with the ultimate goal of informing policy discussions. The paper focuses on estimating from an international perspective, the micro and macro-drivers of spreads in Brazil. The paper presents a novel analysis of spreads in Brazil in an international context by comparing a large number of countries in terms of not only their net interest margin but, more importantly, in terms of the main drivers of spreads as a path towards a more nuanced measure of risk.

The paper is structured as follows: Section 2 discusses issues related to measurements and international comparisons of spreads focusing on Brazil and presents a review of the literature on the determinants of spreads in an international context. Section 3 outlines the methodological framework we used to estimate the main groups of determinants of spreads in Brazil and across 197 countries and areas in the world. Section 4 presents and analyzes the data. Section 5 discusses the baseline results from our estimations for Brazil from a country-specific perspective. Brazil is compared to other countries across different dimensions, such as the degree of economic and financial market development. We compare Brazil to the other BRIC countries, to the US and to its geographical region. Section 6 presents a battery of robustness analyses that reveals caveats but also the strength of our baseline results. Section 7 concludes and discusses policy implications.

2. Measurements and Determinants of Spreads in Brazil and Internationally

Measurement Issues and International Comparisons of Spreads

Empirical measures of bank spreads attempt to capture the cost of financial intermediation such as the difference between what banks charge borrowers and what they pay depositors. The theoretical concept of the cost of financial intermediation, however, has no unique empirical counterpart. The reason is that banks do not charge only one loan rate or pay a single deposit rate. Indeed, on any particular day, every bank charges and offers a multitude of rates depending on classes of customers and types of products the bank supplies. Moreover, it is not an uncommon practice for banks to increase their revenues from loans by charging fees and commissions. These fees and commissions, while not included as interest charged, effectively increase the cost faced by bank borrowers (Brock and Suarez, 2000).

An additional problem in measuring bank spread is that, by including all interest earning assets and liabilities, net interest margins may deviate significantly from the marginal spread that reflects a bank's marginal costs and revenues (Brock and Suarez, 2000). This is particularly true in countries where banks hold non-interest bearing assets as reserves and a significant amount of low-yielding bonds (largely government bonds in Latin American countries). The concept is also subject to important misrepresentation when banks experiencing serious difficulties are allowed to re-capitalize themselves by issuing bonds to be bought by the government (or the central bank) at below market prices.

We use a homogenous measure using the same methodology for all countries in our dataset to ensure cross country comparisons. We use the net interest margin (NIM) because we believe is an appropriate measure of the bank spread since it is a homogeneous measure of banks' profitability measured using international accounting standards collected by BankScope. Other measures of the bank spread provided by the International Monetary Fund's, International Financial Statistics (IMF, IFS) database may not be appropriate because reported interest rates are not homogeneous between countries. Using

the NIM provided by BankScope, from financial statements of banks worldwide, we derive a pure spread (or margin) that is comparable across banks in any country across time. This pure spread varies across countries (and over time) according to the degrees of bank competition and macroeconomic (interest-rate) volatility in each country. For example, if a significant proportion of bank margins in a given country are determined by macroeconomic volatility rather than the monopolistic behavior of banks, then policy should be focused on macro-economic policies as a tool for reducing intermediation costs. Alternatively, if a large proportion of bank margins are due to reserve requirements, then a policy of paying interest on bank reserve holdings may reduce intermediation costs.

A few studies have exclusively focused on comparing and identifying patterns related to bank spreads across countries. Most studies use a common measure of the spread such as the NIM, which is comparable across countries. This measure poses a number of problems in terms of its appropriateness for international comparison: (i) Countries with different banking sector specialization can have lower or higher net interest margins, (ii) NIMs do not take into account overhead costs—the costs of doing credit checks, monitoring of the borrower, and recovering the collateral (Beck et al., 1999), (iii) NIMs do not take into account the product mix offered in different countries—for example, in less developed markets most borrowing is done in shorter maturities while in more developed markets, where mortgages are prevalent, borrowing is done with longer maturities.

Many studies use data from the IMF's IFS database to calculate the interest rate spread (lending – deposit rate). The IFS data are not homogeneous across countries because the data for lending and deposit rates are different among countries. The IFS methodology is to report the most relevant interest rates for each country or use the most available interest rates. We cannot solely rely on this absolute spread when evaluating the relative cost of borrowing or the profitability of the banking sector in each country. During the course of this study we have attempted to find the same lending and deposit rates reported by Brazil to the IFS for other countries but it is impossible to find the exact rates. Therefore, we cannot directly compare the spreads in Brazil using the IFS database with other countries because the maturity, type of borrower and the type of interest (fixed or variable) are not the same.

Figure 1a. The link between IFS and NIM across countries in 2009 is weak

Source: Authors' calculations based on BankScope data

Figure 1b. The link between IFS and NIM in Brazil from 1997 to 2009 is non-existent

Source: Authors' calculations based on BankScope data

Since the IFS spreads are not comparable across countries (due to differences in maturities, type of interest such as fixed or variable, the credit worthiness of the creditor, etc.) we use the NIM because it covers a wide range of borrowers and several types of interest rates. Moreover, we find that there is very little correlation between the interest rate spreads reported in the IFS database and the NIM across countries (Figure 1a). As expected, we find little correlation between Brazil's NIM and IFS spreads (Figure 1b). Brazil ranks at the top of the world in terms of the IFS spreads but not in terms of the NIM. Over time both the IFS and the NIM spreads have varied considerably in Brazil, from 33 to 58 percent for the IFS spread and from 8 to 15 percent for the NIM.

In order to make sure that our results are comparable across countries we need to control for institutional and regulatory features. A method to account for such heterogeneous institutional and regulatory features requires the adjustment of the net interest margin (NIM) for such factors. The resulting measure is the pure spread which is comparable across countries. The key reference for the method of deriving the pure spread is Saunders and Schumacher (2000). The same method is used in cross-country studies in Brock and Rojas Suarez (2000) and Maudos and de Guevara (2004).

Determinants of Spreads in Brazil and Internationally: A Review of the Literature

The literature on the determinants of spreads, which often include cross-country studies, mainly focuses on the spreads' determinants. Saunders and Schumacher (2000) for example find that the regulatory components in the form of interest-rate restrictions on deposits, reserve requirements and capital-to-asset ratios have a significant impact on banks NIMs. They also find that the more segmented or restricted the banking system is, both geographically and by activity, the stronger the monopoly of power existing banks hold appears to be, and the higher their spreads. They find that macro interest-rate volatility has a significant impact on bank NIMs, suggesting that macro policies consistent with reduced interest-rate volatility could have a positive effect in reducing bank margins.

In a paper that adopts a similar methodology, Brock and Suarez (2000) find that both high operating costs as well as high levels of non-performing loans increase spreads, although the size of these effects differ across the countries. In addition, reserve requirements in a number of countries still act as a tax on banks translating into a higher spread. They also note that beyond bank specific variables, uncertainty in the macroeconomic environment facing banks appears to increase interest spreads.

Demirguc-Kunt and Huizinga (1999) note that recent research, as surveyed by Levine (1997), shows that the efficacy of financial intermediation can affect economic growth. Crucially, financial intermediation affects the net return of savings and the gross return of investment. The spread between these two returns mirror bank interest margins, in addition to transaction costs and taxes borne directly by savers and investors. Thus bank interest spreads could be interpreted as an indicator of the efficiency of the banking system.

Demirguc-Kunt and Huizinga (1999) investigate how bank interest spreads are affected by taxation, the structure of the financial system, and financial regulations, such as deposit insurance. A comprehensive review of the determinants of interest spreads are offered by Hanson and Rocha (1986), who summarize the role that implicit and explicit taxes play in raising spreads and discuss some of the determinants of bank costs and profits, such as inflation, scale economies, and market structure.

Claessens, Demirguc-Kunt and Huizinga (1999) use 7,900 bank observations from 80 countries for the period 1988-1995 and examine the extent and effect of foreign presence in domestic banking markets. This data set includes all OECD countries, as well as many developing countries and economies in transition. They investigate how NIMs, overhead, taxes paid, and profitability differ between foreign and domestic banks. However, the authors do not derive the pure spread as we do in our study. They use information from the financial statements of domestic and foreign commercial banks from the BankScope database provided by IBCA. Coverage by IBCA is comprehensive, with banks included accounting for roughly 90 percent of the assets of banks in each country.⁴

Saunders and Schumacher (2000) study the determinants of bank net interest margins in six selected European countries and the U.S. during the period 1988-1995 using a sample of 614 banks. They apply the model by Ho and Saunders (1981) to a multi-country setting and decompose bank margins into (i) a regulatory component⁵, (ii) a market structure component, and (iii) a risk premium component. The overall purpose of the paper by Saunders and Schumacher is to investigate the impact of the structure of bank competition and interest-rate volatility on interest margins in a sample of banks in seven major OECD countries over time. Data for these banks have been obtained in a standardized fashion from IBCA and the BankScope database.

The estimated spreads by Saunders and Schumacher (2000) vary widely across banks, both within and across countries. For example, in 1995 the mean NIM for the US (4.197 percent) is over twice that for Switzerland (1.732 percent). Moreover, the relative size of cross-country margins appears to change over time. For example, Spain had the highest NIMs over the period 1988–1992 before being superseded by the US during the period 1993–1995. They note the importance of the micro-determinants of spreads and compared them to macroeconomic determinants. The pure spreads are, importantly, comparable across countries according to Saunders and Schumacher (2000) since the same method is used to adjust the NIMs for institutional and regulatory factors.

Brock and Rojas Suarez (2000) explore the determinants of bank spreads in a systematic way for Argentina, Bolivia, Chile, Colombia, Mexico, Peru, and Uruguay during the mid-1990s. The methodology chosen by Brock and Rojas Suarez (2000) is similar to that of Saunders and Schumacher (2000) analyzing the behavior of bank spreads in Latin America based on bank-specific data. Since, in most cases, banks do not report the whole array of specific interest rates charged and paid, bank spreads are estimated from data in banks' balance sheets and income statements in an effort to obtain the implicit loan and deposit rates offered by each individual bank.

⁴ The data are compiled by IBCA mostly from the balance sheet, income statement and applicable notes found in audited annual reports. Each country has its own data template which allows for differences in reporting and accounting conventions. These are converted to a "global format" which is a globally standardized template derived from the country-specific templates. The global format contains thirty six standard ratios which can be compared across banks and between countries. This is the most comprehensive data base that allows cross-country comparison. While the underlying data reflects international accounting standards as much as possible, and IBCA makes an effort to standardize individual bank data while converting to global format, some differences in accounting conventions regarding valuation of assets, loan loss provisioning, hidden reserves, etc., no doubt remain.

⁵ The regulatory components in the form of interest-rate restrictions on deposits, reserve requirements and capital-to-asset ratios have a significant impact on banks NIMs.

Highlighting the difficulty in finding the most appropriate measure of banking spreads, Brock and Rojas Suarez (2000) present six alternative proxies for bank spreads, ranging from a narrow concept—one that includes loans on the asset side and deposits on the liability side—to a broad concept where all interest earning assets and liabilities plus associates fees and commissions are included. Their calculations are based on data from the Bank Superintendents of the countries in the sample.

A single country study by Afanasieff, Lhacer, and Nakane (2002) aims to uncover the main determinants of the bank interest spreads in Brazil. The main question the paper addresses is whether macro or microeconomic factors are the most relevant in affecting the behavior of such rates. The two-step approach of Ho and Saunders (1981) is employed to measure the relative relevance of the micro and the macro elements. The first step involves estimating the pure spread along the lines of Saunders and Schumacher (2000). The role played by the inflation rate, risk premium, economic activity, required reserves (all macroeconomic factors) and CAMEL-type indicators (microeconomic factors) are highlighted. Their results suggest that macroeconomic variables are the most relevant factors to explain the behavior of bank interest spread in Brazil.⁶

In a paper related to that of Afanasieff, Lhacer, and Nakane (2002), da Silva, Oreiro, and de Paula (2006) analyze the determinants of bank spreads in Brazil, especially the macroeconomic determinants of spreads. A VAR model is used to identify the macroeconomic variables that may directly or indirectly have been influencing spreads in Brazil over the period 1994-2005. They present evidence that interest rate levels and, to a lesser degree, the inflation rate are the main macroeconomic determinants of high bank spreads in Brazil, and note that the actual net interest margin comprises two elements: the “pure” bank spread and the “impure” net interest margin explained by institutional and regulatory factors.⁷

Another relevant study of the determinants of bank spreads in Brazil was conducted by the Banco Central do Brasil (BCB) in connection with the project “*Juros e spread bancário*” (“Interest rates and bank spread”). This study offers an accounting breakdown of spreads. The spreads in Brazil are broken down on the basis of the margins charged by a sample of banks that from 2004 onwards, encompasses all banks operating in Brazil for which information (on their fixed-rate, freely-allocated credit operations only) is available at each base date. The following components are considered: (a) a residual corresponding, by and large, to bank net margin; (b) tax wedge, including direct and indirect taxes; (c) *Fundo Garantidor de Crédito* (FGC, credit guarantee fund); (d) overhead; and (e) default (provision expenses for non-performing loans). The authors show how each of these components affects bank spreads in Brazil, using a methodology revised in 2004.

The study by the BCB finds that the most important constituent factors of spreads are respectively, net interest margin (a 2000-2003 average of 26.9 percent) and overhead (26.0 percent), followed by tax wedge (21.6 percent) and provision expenses (19.9 percent). Their estimations conclude that the average spreads among Brazilian banks depend on the basic interest rate, bank overhead, risk and taxes. As the variables were expressed as natural logarithms, it follows that the coefficients of the equation

⁶ The pure rate has also been derived in single-country studies by Ho and Saunders (1981) and Angbazo (1997) for US banks, by McShane and Sharpe (1985) for Australian banks, and by Afanasieff, Lhacer, and Nakane (2002) for Brazilian banks.

⁷ The methodology assumes actual spreads comprise of “pure” spreads adjusted upwards or downwards by implicit interest expense (bank charges for certain classes of customer exempt), by the opportunity cost of holding reserves and by capital requirements resulting from regulatory standards and bank supervision rules.

estimated are simply the elasticity of spreads to each of these variables. The most striking about the Central Bank study is the high sensitivity of bank spreads to variations in bank overheads: from the equation estimated by the Central Bank, a 1.0 percent reduction in bank overheads would yield a 1.55 percent reduction in spreads charged by banks. Also, banks' net interest margins contribute substantially to spread composition. The analysis by BCB (2007) complements our analysis, and comes to similar conclusions on the determinants of the spreads.

Furthermore, Demirguc-Kunt, Laeven and Levine (2003) examines the impact of bank regulations, market structure, and national institutions on bank net interest margins and overhead costs using data on over 1,400 banks across 72 countries ranging from 1995-1999 while controlling for bank-specific characteristics. Two dependent variables are examined in order to gauge the cost of financial intermediation: the NIM and overhead expenditures. Peria and Mody (2003) investigate the impact of foreign bank participation and concentration on bank spreads in a sample of developing Latin American countries during the late 1990s.⁸

Maudos and de Guevara (2004) perform an analysis that extends the data coverage from Saunders and Schumacher (2000). Maudos and de Guevara still use the NIM as the dependent variable in their estimations of the determinants of spreads, but also derive the pure margin along the lines of Saunders and Schumacher (2000). Their model shows that the "pure" interest margin depends on the competitive conditions of the market, the interest rate risk, the credit risk, the average operating expenses and the risk aversion of banking firms, as well as on other variables not explicitly introduced into the model (opportunity cost of reserves, payment of implicit interest and quality of management).⁹ Their starting point is the methodology developed in the original study by Ho and Saunders (1981) and Saunders and Schumacher (2000) but it is expanded to explicitly account for banks operating costs.

The Maudos and de Guevara (2004) study differs from Saunders and Schumacher (2000) in several aspects: (a) they introduce the influence of operating costs into the modeling of the interest margin; (b) use direct measurements of market power; (c) the determinants of the interest margin are analyzed in a single stage; (d) it extends the period of study until the year 2000, though it is centered on the principal European countries (Germany, France, United Kingdom, Italy and Spain); and (e) the sample consists of a panel data of 1,826 banks (in 2000), as opposed to the 614 of Saunders and Schumacher's study. However, the study by Maudos and de Guevara (2004) does not perform the analyses on the pure spread but rather on the NIMs as Saunders and Schumacher (2000) do.

Moreover, Gelos (2006, 2009) finds that intermediation spreads in Latin America are high by international standards. The paper examines the determinants of bank interest margins in the region using bank and country-level data from 85 countries, including 14 Latin American economies, for the period 1999–2002. The focus is on ex-post net interest margins, as opposed to ex-ante spreads between deposit and loan rates, which allows for a broader examination of the costs of financial intermediation.

⁸ Using bank-level data for Argentina, Chile, Colombia, Mexico, and Peru, they examine a number of hypotheses. Their econometric analysis is on the impact of concentration and foreign bank presence on bank spreads; they particularly study the effect of market structure changes on bank spreads, while controlling for a host of bank characteristics and macroeconomic variables.

⁹ They study the NIM in the main European banking systems (Germany, France, the United Kingdom, Italy and Spain) during the period 1993-2000 using a panel of 15,888 observations and identify the fundamental elements affecting this margin.

3. Methodology

In this section we discuss and present the methodological framework used to estimate the main drivers of bank spreads across various countries throughout the world. We adopt the method devised by Saunders and Schumacher (2000) who built on Ho and Saunders (1981) to construct a multi-country framework for decomposing bank margins into (i) an institutional and regulatory component, (ii) a market structure component conveying the degree of banking market competition, and (iii) a macroeconomic risk premium component.

Saunders and Schumacher (2000) do not directly disaggregate the share of the spreads, into three groups of factors, however it is possible and that is what we do in this paper. Initially, we derive the share of the spreads that are attributed to institutional and regulatory factors; secondly, the share of the spreads that are attributed to banking market competition; and thirdly, the share of the spreads that are attributed to macroeconomic factors. These three shares will be derived and compared across all the countries in our sample. Then we rank in terms of the different types of drivers of the spreads and we proceed to analyze the main drivers of the spreads in Brazil thoroughly.

The estimation procedure consists of three steps; the first two following Saunders and Schumacher (2000) and a third step to derive the share each factor contributes to the bank spread as follows:

1. In Step 1, we regress a cross section of NIMs on banks specific variables such as (i) the ratio of non-interest bearing assets to total assets, (ii) the ratio of non-performing loans to total loans, and (iii) the capital asset ratio. In the regression, the three explanatory variables convey the importance of institutional and regulatory factors and leave the constant term of the regression to convey the unexplained part of the spreads. In that sense the constant term is, in the literature, called a “pure” spread, which then contains information about macroeconomic factors and the degree of banking competition, as interpreted by Saunders and Schumacher (2000). From this exercise, the pure spreads should theoretically be equal across all banks in any country at any point in time. However, pure spreads can be shown to vary across countries (and over time) according to the degrees of bank competition and interest-rate volatility in each country.
2. In Step 2 of the estimation procedure, the constant term from the regression in Step 1 (the pure spread) is regressed against macro variables, such as the volatility of interest rates and economic growth rates. In Step 2, the constant term captures the effect of market structure on the determination of the pure spread. This market structure is, in the literature, generally interpreted as the degree of market competition; i.e. the higher the constant term is in Step 2 regressions, the lower the degree of banking competition.
3. We add a third step to the estimation procedure. While Saunders and Schumacher (2000) provide the methodology, we exploit the framework to derive, in a systematic way across countries, the level and the percentage share of the spreads that are explained by (i) institutional and regulatory factors, (ii) banking competition, and (iii) macroeconomic factors, respectively.

Step 1. Estimating the Impact of Institutional and Regulatory Factors on Spreads

We control the NIM for (a) implicit interest expense (π); (b) the opportunity cost of required reserves (μ); and (c) capital requirements for credit-risk exposure (K/A)¹⁰. All other institutional and regulatory effects and frictions are reflected in a residual variable u . In its general form the following equation is estimated,

$$NIM = f\left\{s\left(\frac{\alpha}{\beta}, R, Q, \sigma\right), \pi, \mu, \frac{K}{A}, u\right\} \quad (1)$$

where s is the pure spread:

$$s = s\left(\frac{\alpha}{\beta}, R, Q, \sigma\right) = \frac{\alpha}{\beta} + \frac{1}{2}R\sigma^2Q \quad (2)$$

As long as banks in any given country share similar attitudes to risk (R), and size of transactions (Q), as well as face the same market structure (α/β), and interest-rate volatility (σ^2), their pure spread (s) will be the same for each country. However, over time, as *market structure* and *volatility* change the pure spread (s) changes as well.

The first term in equation (2), α/β , measures the bank's risk neutral spread and is the ratio of the intercept (α) and the slope (β) of the symmetric deposit and loan arrival functions of the bank (Ho and Saunders, 1981). A large α and a small β will result in a large α/β and, hence, large spread (s). The second term is a first-order risk-adjustment term and depends on three factors: (i) R , the bank management's coefficient of absolute risk aversion; (ii) Q , the size of bank transactions; and (iii) σ^2 , the instantaneous variance of the interest rate on deposits and loans. The second term implies that, *ceteris paribus*, the greater the degree of risk aversion, the larger the size of transactions and the greater the variance of interest rates, the larger the bank margins.

Saunders and Schumacher (2000) next derive an empirical specification that will allow them to identify the sensitivity of bank margins to bank market structure and intermediation risk. The specification is the following, where the regression is estimated each year for each country in the sample,

$$NIM_{ic} = \gamma_c + \sum_j \delta_j X_{jic} + u_{ic} \quad (3)$$

and where NIM_{ic} is the published NIM of bank i in country c in some period t , X_{jic} is a vector of control variables (π , μ , and K/A) for each bank i in country c in some time period t , u_{ic} is the residual, and γ_c is the regression constant, i.e. the estimate of the pure spread (s) component of the NIM for all i banks in country c at time t . By repeating this cross-sectional regression for all the years we have data for (1995-2009), 14 estimates of the pure spread (s) for each country.

¹⁰ These effects can be viewed as proxies for institutional costs, regulatory costs, and credit risk exposure costs (Saunders and Schumacher, 2000).

Step 2. Estimating the Impact of Competition and Macroeconomic Volatility on Spreads

Now we separate the effects on NIMs for which macro-economic policies are responsible (such as interest-rate volatility), and components of the margin for which market structure (monopoly power) is responsible. The variable of interest is γ which is the estimate of the pure spread,

$$\gamma_{tc} = \theta_o + \theta_1 \sigma_c^2 + \varepsilon_i \quad (4)$$

where γ_{tc} is a time series of pure spreads ($t=1...15$) for 197 countries ($c=1...197$), which are also the intercepts of the regressions in Step 1 above; θ_o is a constant that reflects the average effect of market structure on the pure spread across 197 countries; θ_1 is the sensitivity of the pure spread to intermediation risk changes (interest-rate volatility) over time; and ε_i is the residual. Saunders and Schumacher (2000) performed Step 2 jointly for all countries (panel approach) in order to identify common effects, but since we are interested in international comparisons, we use standard regressions.

At any moment in time, actual NIMs comprise of a *pure spread* that is constant across banks in any country in any given year, reflecting bank market structure and interest-rate risk plus markups or adjustments for implicit interest expense, the opportunity cost of required reserves, and capital requirements for credit-risk exposure. All other institutional and regulatory effects and frictions are reflected in the residual variable u .

Step 3. Decomposing the Net Interest Margin into Its Determinants

Each of the three factors behind the spread for a given country can be derived using the approach described below, where Institutional and Regulatory drivers are denoted as IR; Banking Market Competition factors are as BC; and Macro-Economic factors are labeled as ME.

In levels, the factors are:

$$IR_{tc} = NIM_{tc} - \gamma_{tc}$$

$$BC_{tc} = \theta_o$$

$$ME_{tc} = \gamma_{tc} - \theta_o$$

In shares as a percentage of NIM, the factors are:

$$\frac{IR_{tc}}{NIM_{tc}} = \frac{NIM_{tc} - \gamma_{tc}}{NIM_{tc}}$$

$$\frac{BC_{tc}}{NIM_{tc}} = \frac{\theta_o}{NIM_{tc}}$$

$$\frac{ME_{tc}}{NIM_{tc}} = \frac{\gamma_{tc} - \theta_o}{NIM_{tc}}$$

4. Data

For Step1 of the regression we use data from the BankScope database for the years 1995-2009. We have collected individual bank data on net interest margin, non-interest expense, other operating income over average assets, total assets, non interest earning assets and total capital ratio. We use these data to calculate the four variables used in our estimation namely the net interest margin, the implicit interest payments/total average assets (non-interest expense – other operating income), the cost of reserves (non interest earning assets/total assets) and the extra capital held, total capital/total assets. We have data for 197 countries and areas, a total of 231,834 bank observations.

For Step2 we use data from Thomson Reuters' DataStream regarding interest rates for 47 countries. We are using weekly data from 1995-2009 to calculate the volatility of interest rates measured as the yearly standard deviation of the weekly observations. For Step2 we use short term interest rates defined as three month or 90 days interest rates. We use yearly data for the gross domestic product growth, and inflation from the International Monetary Fund's *World Economic Outlook* database.

For many countries we have data that span fifteen years (1995-2009), but some of the countries do not provide data for all of the years assessed. We present findings for these countries by concentrating on the most recent years. For most countries we present results for 2009 in this paper, but for countries that we do not have data for 2009, we present results for the year immediately preceding 2009.

For Step1 we used countries with 5 or more bank observations per year to make sure we had enough observations to make reasonable conclusions about the micro and macro situation in the country. The dataset adds significant value to the literature since there is no previous attempt to calculate spreads in as many countries and offer comparisons among countries, regions, degrees of development and reforms. The dataset is very extensive with a wide coverage and comparable data. The data have been collected from BankScope.

In terms of representativeness of the data, it is important that a large share of the assets in the banking sector is accounted for. If that was not the case, the results for a given country would be less reliable as the sample would not be a good representation of the banking sector in that country. As a result, we evaluate the assets of the banks in our sample as a percent of total assets in each country's banking system (Figure 15b).

We find that our data set shows an overwhelming degree of representativeness since 100 percent of assets are accounted for in almost all countries in the sample. For countries where this is not the case, the country is excluded from the analysis in order to ensure reliability of the cross-country (world-wide) analysis. In many countries especially developing countries the banking sector owns much of the financial assets in the country, which is a key ingredient in ensuring the representativeness of the data set. The total data set is displayed in Annex 3.

5. Baseline Results

The high cost of financial intermediation in Brazil in absolute terms, and in comparison to other countries, is a key source of policy concern. The difference between bank lending and deposit interest rates measured by the IFS spreads illustrates that Brazil has one of the highest interest spreads in the world, well above 30 percent in 2009 (see Figure 2).

Figure 2. Link between IFS and SELIC rate is weak but link between NIM and SELIC rate is strong

Source: Banco Central do Brasil, BankScope and IMF (IFS); *Note:* NIM vs. SELIC Rate

The high cost of intermediation, as measured by the IFS spreads, has been reduced considerably in Brazil from 58.4 percent in 1998 to 35.4 percent in 2009 (Figure 2). However, the IFS spread remains very high compared to other countries as well as compared to the SELIC rate (the official BCB rate), which has declined to less than 10 percent in 2009 (Figure 2). Brazil experienced very high inflation incidents in the past but has successfully brought inflation under control. Nevertheless, there has not been a sufficient reduction in interest spreads to moderate levels even as the fiscal and monetary environment has improved in recent years.

Improving the performance of the financial system is a main concern for development policy in Brazil because it is inhibiting investment and growth despite the impressive performance of the Brazilian economy. In that vein, there has been a substantial amount of policy and academic research in recent years led by the BCB and others. There were two important studies done to address these issues, the first by Afanasieff, Lhacer and Nakane (2002) and the second by de la Torre, et al. (2006). Despite the insights provided by the studies there remains considerable disagreement as to which methods should be used to tackle the issue and to the nature and causes of the high spreads in Brazil. Our paper attempts to separate the spreads into the macro and micro components.

De la Torre, et al. (2006) first established a link between the SELIC rate and interest spread. They calculate the adjusted SELIC rate measured by multiplying the SELIC rate with one minus the probability of default. Then macroeconomic variables are used as explanatory variables to explain the

‘adjusted’ SELIC rate. Their study finds that macroeconomic variables are significant and explain a substantial part of the adjusted SELIC rate ($R^2=0.86$). Then they investigate various microeconomic factors in an effort to explain the remainder of the spread not previously explained by macroeconomics factors. Their analysis finds that the macroeconomic factors are the most significant drivers of interest spreads in Brazil. We use a different methodology, a larger dataset and a longer time period to evaluate the results of de la Torre et al. (2006) and gauge the effects of the significant growth in Brazil in the middle of the 2000s and the subsequent global crisis.

Research by Afanasieff, Lhacer and Nakane (2002) use the technique developed by Ho and Saunders (1981), to estimate the variables affecting spreads in Brazil measured as the difference between loan and deposit rates in Brazilian banks. The study uses several variables such as the number of bank branches, operating costs, bank leverage and the ratio of non interest-bearing deposits to total operational assets to calculate the pure spread or the macro part of the total spread. They use an unbalanced panel excluding misreported and outliers data, which possibly diminishes the power of their results. Furthermore, the definition of the spread, defined as the difference between the loan rate measured by the average rate charged on fixed-rate free-allocated operations and the deposit rate measured by the rate paid on 30-day certificates of deposits, is not wholly representative of the spreads faced by banks.

The loan interest rate is the average rate charged on fixed rate free-allocated operations, which excludes floating rates. Therefore, the spread calculated is not representative of the spreads in Brazil, in terms of maturity and fixed or floating rates. We evaluate their finding that spreads in Brazil are mainly caused by macroeconomic factors by using a dataset that extends to 2010, and includes the global crisis.

Our approach uses the same methodology used by Afanasieff, Lhacer and Nakane (2002) first introduced by Ho and Saunders (1981) and expanded by Saunders and Schumacher (2000). We use the Net Interest Margin (NIM) as a proxy to interest spreads in Brazil. Three institutional and regulatory (micro) variables are used to explain the variation in the NIM leaving the rest to be explained by macroeconomic and competition factors. These variables are consistently collected by BankScope and are comparable between banks, countries and regions. Hence, the methodology adds significant value making the analysis of spreads more consistent and comparable across banks and countries.

- The first variable is payments by banks of implicit interest on deposits through service charge remissions and other forms of savers subsidy because of regulatory restrictions on explicit interest payments. Implicit interest payments are measured by non-interest expense minus other operating income divided by total average assets.
- The second variable is the bank’s opportunity cost of depositing reserves with the monetary authorities. The economic cost of holding reserves is calculated by the ratio of non-interest earning assets to total assets variable.
- The third variable is capital reserves that banks decide to hold to protect themselves against anticipated and unanticipated credit risk. Consequently, banks that have high capital ratios for regulatory or credit reasons are likely to pass on the cost to borrowers. We proxy the extra capital held by banks using the equity over total assets variable.

5.1 Micro and Macro Drivers of Bank Spreads in Brazil

Our results suggest that Institutional and Regulatory (micro) factors are the main drivers of the NIM spreads in Brazil from 1995-2009 (Figure 3a) and that a high correlation exists between Institutional and Regulatory (I&R) factors and the NIM (Figure 3b). This is contrary to what Afanasieff, Lhacer and Nakane (2002) and de la Torre, et al. (2006) find. Both studies highlight *macroeconomic* variables as the most relevant factors in explaining interest spreads in Brazil. In particular, de la Torre, et al. find that macro-factors play an important role in the determination of spreads and a systematic relationship between spreads and the SELIC rate in the period ranging from 1994 to 2005. Our result therefore suggests a new perspective for interpreting bank spreads in Brazil—indicating a move from macro to micro drivers.

Figure 3a. I&R factors a large part of NIM

Source: Authors' calculations based on BankScope data

Figure 3b. Correlation between NIM and I&R

Source: Authors' calculations based on BankScope data

Contrary to previous studies, we find that I&R factors are the most significant factors in determining NIM spreads, when examining the period 1995-2009. On the other hand, our analysis complements the study by de la Torre, et al. (2006) which, too, suggests that micro-factors play a significant role. We differ in the magnitude of I&R factors but we agree with de la Torre, et al. (2006) in the sense that there are high administrative costs in the Brazilian banking system. The high administrative costs reflect the lack of competition in Brazil, resulting in high I&R factors. Moreover, the argument for the importance of micro-factors is supported by the low position of Brazil in the Doing Business Report (2010) in the Enforcing Contracts category ranking 98th out of 183 countries (Table 1).

De la Torre, et al. (2006) point out that as the SELIC rate decreases micro-factors become *more* significant. We have witnessed the SELIC rate declining from 19percent in 2005 to under 10 percent in 2009, which might imply that during this period micro-factors became much more prominent. As the SELIC rate decreases, I&R factors progressively become more binding and constrain further declines in intermediation spreads. In 2009, 7.21 percentage points of the NIM were accounted for by I&R and only 1.94 percentage points by macro-factors (Figure 4). This shows that I&R factors continue to be the most significant component of the NIM.

Table 1. Doing Business Report 2010

Ease of Doing Business Rank	124
Getting Credit Rank	87
Protecting Investors Rank	73
Enforcing Contracts Rank	98

Source: Authors' calculations based on BankScope data

Figure 4. Brazil Spread Breakdown (2009)

Source: Authors' calculations based on BankScope data

Our analysis suggests a positive correlation between NIM and I&R factors in Brazil (Figure 3b). This positive correlation is an additional indication that there is a strong case for institutional and regulatory reforms in Brazil. Our results presented in Figure 3a and Figure 5a show that, despite the falling significance of I&R factors, they clearly remain the dominant components of the NIM.

Figure 5a. Summary breakdown of NIM Spread

year	Obs. per Year	R2	NIM	I&R	Pure spread (macro)
1995	99	0.831	15.8	16.91	-1.11
1996	111	0.374	13.12	9.5	3.62
1997	119	0.588	11.06	12.14	-1.08
1998	123	0.448	11.68	7.56	4.12
1999	119	0.489	15.25	12.86	2.39
2000	129	0.682	11.53	9.46	2.07
2001	154	0.061	7.96	11.83	-3.87
2002	162	0.299	15.01	13.17	1.84
2003	143	0.677	13.09	12.24	0.85
2004	137	0.833	12.53	12.71	-0.18
2005	140	0.794	13.58	12.79	0.8
2006	142	0.446	14.59	11.28	3.31
2007	153	0.576	13.96	11.83	2.13
2008	124	0.825	9.33	7.87	1.46
2009	106	0.761	9.14	7.21	1.94

Source: Authors' calculations based on BankScope data

Figure 5b. NIM and I&R Vs Actual SELIC rate

Source: Authors' calculations based on BankScope data, Banco Central do Brasil

We observe that the level of the NIM is consistently lower than the SELIC rate (Figure 5b). This means that the returns of banks are lower than by just lending to the government, which is theoretically risk free. This is counter-intuitive because theory suggests that by taking risk, lending to the individuals and corporations, banks should theoretically earn a higher return than by lending to the government. A possible explanation for this is that banks underestimate default risk and the realized default rates are higher than the anticipated default rates. However, the fact that the SELIC rate is consistently higher than NIM is of concern. A risk-averse bank would choose to lend risk free to the government and get higher returns. There is an arbitrage opportunity that is not being exploited by the banking sector.¹¹

Even when we take out the competition factors from the pure spread, in our Step 2 regression, we see that macro-factors are still a very small part of the NIM in 2009 (Figure 6a and 6b). This supports our argument that macro-factors only play a small part in the determination of spreads in Brazil and micro-factors are the most significant (Figure 6b).

Figure 6a. Breakdown of NIM Spread in Brazil (2009)

Source: Authors' calculations based on BankScope data

Figure 6b. Breakdown of NIM Spread as % in Brazil (2009)

Source: Authors' calculations based on BankScope data

5.2 Brazil's Bank Spreads in an International Context

Many studies have concluded that spreads in Brazil are the highest in the world (generally as measured by the data provided by IMF's IFS). We find that Brazil's IFS spreads are the highest among the countries we investigate in the paper (Table 2) for 2009. However, when we further investigate the measurement of these spreads we find they are not comparable across countries. The IFS spreads cannot reliably be used for cross-country comparison because of the disparate rates reported by countries. Some countries report the difference between lending and borrowing prime rates, while others report interest rates of different maturities.

¹¹ Another possibility would be that the banks believe that the government would not repay its debts. Nevertheless, this rationale is improbable given that the Brazilian government's debt ratings have improved significantly and the debt to GDP ratio has decreased.

Using the methodology developed by Saunders and Schumacher (2000) and data from BankScope we are able to consistently measure and compare spreads across countries. We present our findings for 2009 in Table 2, and for 2008 in Annex 2, Table 1. We find that despite the fact the Brazil ranks at the top of table with the highest IFS spreads, it ranks 15th in terms of the highest NIM out of 121 countries, 17th in terms of I&R factors and 56th in terms of macro-factors (Table 2) in 2009. These findings show that Brazil's intermediation costs are overestimated when simply looking at IFS spreads and arguing that most of Brazil's spreads are explained by I&R factors.

In 2009, 79 percent of Brazil's spreads come from I&R factors. Our findings for Brazil are robust, with the R^2 of our regression measuring at 0.76 in 2009. Therefore, the I&R factors for Brazil are very significant in explaining the NIM in 2009. In addition, we find the macro-factors for Brazil, meaning the constant of our regression, to be significant in the 5 percent interval. This points to the robustness of our macro-factors findings and their statistical significance. In terms of I&R factors Brazil ranks 17th, much higher than Russia, ranked 49th, India, ranked 119th, China, ranked 85th and the U.S., ranked 107th out of 121 countries in 2009.

It is not surprising that in 2009, Brazil ranks 56th in terms of spreads attributed to macro-factors, which is lower than the U.S. which ranks 21st, Russia that ranks 8th, India that ranks 31st and only slightly higher than China that ranks 59th. These rankings indicate that Brazil's I&R factors explain most of the total spread (NIM) but are very high compared to other BRICs and the U.S. Therefore, Brazilian authorities should focus on reducing the impact of I&R factors in order to reduce spreads but also to improve the country's ranking in the global tables of spreads.

Brazil's IFS spreads are high compared to the rest of the LAC region. Nevertheless, the region has 13 countries in the top 30 with the highest IFS spreads, with Brazil at the top with the highest IFS spreads in 2009. Moreover, the region has 12 countries in the top 30 with the highest NIM but this time Brazil does not rank at the top but it is replaced by Ecuador being ranked 3rd among 121 countries. In terms of I&R factors LAC has 11 countries in the top 30 with the highest spreads with Ecuador ranked 3rd, Jamaica 4th and Brazil ranked 17th among 121 countries in 2009. On the other hand, in terms of macro-factors LAC has 6 countries in the top 30 with the highest spreads with Costa Rica ranking 4th, Paraguay 7th, while Brazil is not ranked in the top 30 countries in 2009. It appears that the region and Brazil in particular, are doing well in terms of macro-factors but poorly in terms of I&R.

5.3 Brazil and International Trends

Our findings suggest that I&R factors are the main drivers of NIM spreads across the world. We observe a high positive correlation between NIM and I&R factors (Figure 7a) in 2008 as well as in 2009. Brazil follows this global trend of where I&R are highly correlated with NIM, where the profitability of the banks is mainly determined by I&R factors (Figure 3b). In many countries around the world, banks seem to place more significance on I&R factors when determining their lending and borrowing spreads. However, the opposite should occur. Banks should have a tendency towards basing their spreads partly according to macro-factors because they lend to a broad spectrum of firms and individuals whose ability to repay is largely based on the health of the macro-economy and the markets they operate. Brazil's banks place greater significance on I&R factors accounting for 79 percent of the NIM in 2009.

Table 2. Ranking of Countries by Spreads in 2009

Rank	IFS (2009)	Nim (2009)	Institutional and Regulatory (2009)	R2	Macro & Competition (2009)
1	<u>BRAZIL</u>	ZAMBIA	ZAMBIA	0.66	MOZAMBIQUE**
2	PARAGUAY	SOUTH AFRICA	SOUTH AFRICA	0.38	SIERRA LEONE
3	MALAWI	ECUADOR	ECUADOR	0.99	UKRAINE***
4	PERU	GUATEMALA	JAMAICA	0.91	COSTA RICA***
5	GEORGIA REP. OF	MOZAMBIQUE	PAKISTAN	0.75	KENYA***
6	ZAMBIA	GHANA	PERU	0.82	ALGERIA
7	SIERRA LEONE	JAMAICA	GUATEMALA	0.99	PARAGUAY**
8	COSTA RICA	PERU	AZERBAIJAN	0.93	RUSSIA***
9	UGANDA	UGANDA	COLOMBIA	0.60	DOMINICAN REPUBLIC*
10	URUGUAY	MALAWI	ALBANIA	0.98	HONDURAS
11	MAURITIUS	AZERBAIJAN	UGANDA	0.51	CAMBODIA**
12	DOMINICAN REPUBLIC	ARGENTINA	VENEZUELA	0.45	MOLDOVA REP. OF**
13	ARMENIA	DOMINICAN REPUBLIC	UZBEKISTAN	0.83	MALAWI
14	JAMAICA	SIERRA LEONE	GHANA	0.63	SERBIA**
15	BOLIVIA	<u>BRAZIL</u>	ARGENTINA	0.80	GHANA
16	KENYA	ARMENIA	BELARUS	0.86	NEPAL***
17	TRINIDAD AND TOBAGO	PARAGUAY	<u>BRAZIL</u>	0.76	INDONESIA***
18	CROATIA	VENEZUELA	PHILIPPINES	0.90	NAMIBIA***
19	HONDURAS	URUGUAY	ARMENIA	0.76	ETHIOPIA
20	GUATEMALA	BELARUS	MALAWI	0.62	YEMEN**
21	LATVIA	GEORGIA REP. OF	SAUDI ARABIA	0.98	USA***
22	ANGOLA	HONDURAS	GEORGIA REP. OF	0.54	BANGLADESH***
23	MOROCCO	EL SALVADOR	EL SALVADOR	0.83	CAYMAN ISLANDS
24	AZERBAIJAN	SERBIA	ROMANIA	0.67	URUGUAY
25	ICELAND	RUSSIA	NIGERIA	0.58	TANZANIA**
26	UKRAINE	UKRAINE	URUGUAY	0.61	SUDAN
27	TANZANIA	KENYA	DOMINICAN REPUBLIC	0.33	BOLIVIA**
28	ECUADOR	TURKEY	ANGOLA	0.68	OMAN***
29	GERMANY	PAKISTAN	BOSNIA-HERZEGOVINA	0.91	QATAR***
30	COLOMBIA	UZBEKISTAN	BOTSWANA	0.73	KAZAKHSTAN**
31	RUSSIA	NIGERIA	TURKEY	0.38	INDIA***
32	BANGLADESH	TANZANIA	MEXICO	0.40	TUNISIA***
33	BAHRAIN	MEXICO	SWEDEN	0.99	GEORGIA REP. OF
34	NEW ZEALAND	BOTSWANA	UNITED KINGDOM	0.14	POLAND***
35	ALGERIA	COSTA RICA	ICELAND	0.51	EGYPT***
36	BOTSWANA	ALGERIA	PARAGUAY	0.39	TRINIDAD AND TOBAGO
37	MOZAMBIQUE	ALBANIA	TANZANIA	0.67	SRI LANKA*
38	PAKISTAN	NAMIBIA	MACEDONIA (FYROM)	0.76	TURKEY**
39	ALBANIA	SRI LANKA	SRI LANKA	0.42	THAILAND***
40	PHILIPPINES	SUDAN	SWITZERLAND	0.15	KUWAIT**
41	MOLDOVA REP. OF	CAMBODIA	NEW ZEALAND	0.90	IRAN**
42	NEPAL	ROMANIA	BULGARIA	0.44	MONTENEGRO
43	EGYPT	MOLDOVA REP. OF	HONDURAS	0.53	BERMUDA
44	MONTENEGRO	SAUDI ARABIA	SERBIA	0.15	ARMENIA**
45	ROMANIA	BOSNIA-HERZEGOVINA	MOROCCO	0.87	SLOVAKIA**
46	INDONESIA	TRINIDAD AND TOBAGO	SINGAPORE	0.23	GREECE***
47	CHILE	COLOMBIA	CZECH REPUBLIC	0.81	EL SALVADOR
48	BULGARIA	BULGARIA	MONTENEGRO	0.90	MEXICO
49	MACAU	MONTENEGRO	RUSSIA	0.24	BULGARIA
50	BELGIUM	INDONESIA	TRINIDAD AND TOBAGO	0.42	NIGERIA
51	MEXICO	BOLIVIA	CYPRUS	0.65	ARGENTINA
52	SINGAPORE	MACEDONIA (FYROM)	SUDAN	0.07	BOTSWANA
53	SRI LANKA	KAZAKHSTAN	NAMIBIA	0.98	MAURITIUS
54	NIGERIA	SWEDEN	CROATIA	0.64	VIETNAM***
55	HONG_KONG	ANGOLA	JORDAN	0.79	UAE**
56	ITALY	PHILIPPINES	GERMANY	0.04	<u>BRAZIL**</u>
57	THAILAND	ETHIOPIA	CHILE	0.53	HONG_KONG**
58	NAMIBIA	NEPAL	PANAMA	0.63	PANAMA***
59	PANAMA	YEMEN	VIETNAM	0.89	CHINA***
60	DENMARK	OMAN	PORTUGAL	0.63	MACEDONIA (FYROM)

Table continues

61	CZECH_REPUBLIC	VIETNAM	SYRIA	0.62	MALAYSIA***
62	EL SALVADOR	PANAMA	DENMARK	0.32	MACAU
63	ESTONIA	TUNISIA	UAE	0.43	SPAIN***
64	UAE	CZECH_REPUBLIC	LEBANON	0.31	JORDAN***
65	FRANCE	USA	SIERRA LEONE	0.89	DENMARK***
66	GREECE	UAE	BOLIVIA	0.69	CHILE
67	JORDAN	CROATIA	LATVIA	0.50	CROATIA*
68	BOSNIA-HERZEGOVINA	JORDAN	KAZAKHSTAN	0.40	FINLAND***
69	ARGENTINA	CHILE	MALAYSIA	0.26	BAHRAIN
70	SYRIA	DENMARK	NORWAY	0.56	ITALY***
71	LITHUANIA	BANGLADESH	INDONESIA	0.50	FRANCE***
72	VENEZUELA	POLAND	KENYA	0.15	LITHUANIA*
73	KUWAIT	UNITED KINGDOM	KOREA	0.24	MALTA*
74	AUSTRIA	MOROCCO	NETHERLANDS	1.00	CZECH_REPUBLIC
75	POLAND	MALAYSIA	MOLDOVA REP. OF	0.74	AUSTRIA***
76	OMAN	THAILAND	CAMBODIA	0.66	ISRAEL
77	CYPRUS	SINGAPORE	ESTONIA	0.85	CANADA***
78	AUSTRALIA	QATAR	ITALY	0.28	KOREA**
79	SOUTH AFRICA	HONG_KONG	BELGIUM	0.71	AUSTRALIA***
80	CHINA	CYPRUS	ISRAEL	0.91	GUATEMALA
81	VIETNAM	EGYPT	HONG_KONG	0.07	ROMANIA
82	MALAYSIA	SLOVAKIA	MONACO	0.31	JAPAN***
83	MACEDONIA (FYROM)	SYRIA	AUSTRIA	0.54	BOSNIA-HERZEGOVINA
84	QATAR	NEW ZEALAND	CANADA	0.22	BELARUS
85	PORTUGAL	CHINA	CHINA	0.39	SYRIA
86	SWITZERLAND	ITALY	ALGERIA	0.29	TAIWAN***
87	FINLAND	PORTUGAL	BAHRAIN	0.03	LIECHTENSTEIN***
88	UNITED KINGDOM	ICELAND	JAPAN	0.38	LEBANON
89	IRELAND	LEBANON	TUNISIA	0.23	BELGIUM***
90	ISRAEL	KOREA	ETHIOPIA	0.47	ESTONIA
91	MALTA	IRAN	AUSTRALIA	0.54	UGANDA
92	SWEDEN	ISRAEL	SPAIN	0.19	LUXEMBOURG***
93	CANADA	GERMANY	TAIWAN	0.25	MONACO
94	LEBANON	LATVIA	LUXEMBOURG	0.26	LATVIA
95	KOREA	SPAIN	FRANCE	0.26	PORTUGAL
96	NORWAY	BAHRAIN	LITHUANIA	0.62	IRELAND***
97	SPAIN	AUSTRIA	OMAN	0.95	NORWAY***
98	JAPAN	BERMUDA	COSTA RICA	0.57	SAUDI ARABIA
99	BELARUS	CANADA	THAILAND	0.10	CYPRUS
100	ETHIOPIA	SWITZERLAND	IRELAND	0.18	SWEDEN
101	NETHERLANDS	MAURITIUS	MALTA	0.55	MOROCCO
102	IRAN	ESTONIA	YEMEN	0.78	SINGAPORE
103	SERBIA	NORWAY	SLOVAKIA	0.07	GERMANY
104		GREECE	POLAND	0.12	NETHERLANDS
105		BELGIUM	NEPAL	0.04	ANGOLA
106		FRANCE	MAURITIUS	0.76	NEW ZEALAND
107		LITHUANIA	USA	0.02	VENEZUELA
108		AUSTRALIA	UKRAINE	0.08	UNITED KINGDOM
109		JAPAN	LIECHTENSTEIN	0.39	SWITZERLAND
110		KUWAIT	EGYPT	0.17	UZBEKISTAN
111		MALTA	FINLAND	0.31	ICELAND
112		MACAU	MACAU	0.83	PHILIPPINES***
113		TAIWAN	IRAN	0.91	AZERBAIJAN
114		NETHERLANDS	BANGLADESH	0.53	PERU
115		FINLAND	QATAR	0.63	ALBANIA
116		INDIA	BERMUDA	0.02	COLOMBIA**
117		LUXEMBOURG	GREECE	0.70	ECUADOR
118		MONACO	KUWAIT	0.07	JAMAICA
119		IRELAND	INDIA	0.78	SOUTH AFRICA
120		LIECHTENSTEIN	CAYMAN ISLANDS	0.97	PAKISTAN**
121		CAYMAN ISLANDS	MOZAMBIQUE	0.84	ZAMBIA

Source: Authors' calculations based on BankScope data and IFS (IMF).

Note: We rank countries according to their spreads in descending order. In the first column we rank countries according to their IFS spreads (lending-deposit rates). In the second column we rank countries according to the NIM. In the third column we rank countries according to I&R (micro) factors and include the R² measure for our regression used to measure I&R factors. In the fifth column we rank countries according to their macro spreads (*=10% significance, **=5% significance, ***=1% significance).

Figure 7a. I&R vs. NIM (2009) – Brazil in red

Source: Authors' calculations based on BankScope data

Figure 7b. Macro vs. NIM(2009) - Brazil in red

Source: Authors' calculations based on BankScope data

Figure 7c. I&R vs. NIM (2008) – Brazil in red

Source: Authors' calculations based on BankScope data

Figure 7d. Macro vs. NIM (2008) – Brazil in red

Source: Authors' calculations based on BankScope data

On the other hand, we observe that there is globally little correlation between macro-factors and NIM in 2009 and in 2008 (Figures 7b & 7d). The global trend is that micro-factors are positively correlated with NIM spreads, suggesting that micro-factors are very important in the determination of NIM spreads. In 2008 and 2009, despite the global crisis, we still observe a high positive correlation between micro-factors and NIM and an almost non-existent correlation between macro-factors and NIM. It seems Brazil is not an exception to the general trend that macro-factors are not a very significant part of the total spreads. Our analysis suggests that authorities around the world should concentrate on reducing micro-factors and increasing competition in their banking sectors. The authorities can have more success in reducing total spreads by targeting micro-factors despite the high variation among countries, and by reforming their financial sector regulations and increasing competition.

5.4 Brazil and Regional Trends

We find that in 2009 and 2008, Brazil had higher NIM spreads than the LAC average, while the LAC average was higher than all other regions except Sub-Saharan Africa (Figures 8a & 8b). This indicates a LAC region wide problem of high NIM spreads. Despite LAC's robust growth in the last few years NIM spreads remain the second highest of all regions in the world. Moreover, LAC had the highest micro-factors in the world and the second lowest macro behind South Asia in 2009. On the other hand, Brazil in 2009 had lower I&R spreads than the average in LAC but higher than the average macro spreads. In 2008, on average, LAC had the third highest micro spreads behind East Asia and Sub-Saharan Africa and the 6th highest macro spreads in 2008. However, in 2008, Brazil had higher I&R spreads than the LAC average but lower macro spreads.

Figure 8a. Average I&R and macro (2009)

Source: Authors' calculations based on BankScope data

Figure 8b. Average I&R and macro (2008)

Source: Authors' calculations based on BankScope data

In 2009 Sub-Saharan Africa had the highest NIM, perhaps because of the fragility of states, the uncertainty regarding repayments, and a much smaller banking sector. In 2008, Eastern Europe had the highest macro spreads because of the crisis in Eastern Europe resulting from the global crisis. Developed Asia has the lowest NIM in both 2008 and 2009. The year 2008 is the year of the crisis with all regions, except East Asia & Pacific, and marginally the Middle East & North Africa, having higher NIM compared to 2009. In Brazil, where the government in the latter part of 2008, and through 2009, introduced measures to help the flow of credit as explained by Takeda and Dawid (2010), helping smaller banks sell their credit portfolios and relaxing larger banks regulations it experienced a marginal decrease in the NIM from 2008 to 2009.

The high R^2 of our regression results, show that our findings regarding the importance of micro-factors are robust. R^2 s are generally high and when they are low this can be interpreted that micro-factors are not important in explaining the total NIM (Figure 9a & 9b). In this case, the residual constant term (macro-factors) becomes more significant. This is the case for some developed countries, because the main drivers behind the NIMs are macro-factors since they have more competitive banking sectors.

Figure 9a. Average R^2 is high in Brazil (2009)

Source: Authors' calculations based on BankScope data

Figure 9b. Average R^2 is high in Brazil (2008)

Source: Authors' calculations based on BankScope data

5.5 Brazil and the United States

We have already mentioned that Brazil's micro spreads are the dominant determinants of NIM between 1995 and 2009 (Figure 10a) but the opposite is true for the U.S. NIMs. We observe that I&R factors started decreasing in the U.S. at the end of the 1990s, when the Clinton administration allowed the banking sector to consolidate by permitting commercial banks to acquire or develop investment banking arms. We see a steady decline in the U.S. I&R spreads, becoming almost non-existent in 2003-2004 and increasing again from 2005 to 2007 before they decrease dramatically during the crisis in 2008-2009 (Figure 10b). Our results show that macro-factors are driving the spread in the U.S. over the last decade. At the same time the NIM did not change dramatically, even during the two recessions of 2001 and 2007-2009, while micro-factors decrease and macro-factors increase at the same time.

Despite the greater volatility of NIM in Brazil, I&R remain the dominant factors in the determination of the spread and there is no clear trend during recessions. It appears that attempts to reform the banking sector in Brazil are not noticeable in terms of changing the amount of the spread determined by micro-factors. We observe that I&R determine the trend and the strength of the NIM (Figure 10a).

We find that Brazil's macro spreads are surprisingly lower in absolute terms than in the U.S. in 2009 but also for several years between 1995 and 2009 (Figure 10a). Banks in Brazil place less emphasis on macro-factors when making investment decisions than their counterparts in the U.S. U.S. banks' macro-factors account for a large percent of the total spread. When making lending and borrowing decisions, U.S. banks take into account mostly macro-factors that affect their borrowers' and the banks' ability to repay the loans. We observe that macro-factors account for an average of 75 percent of the total spread of U.S. banks, while for Brazilian banks macro-factors account for 9 percent between 1995 and 2009 (Figure 11b).

Figure 10a. Brazil, NIM and I&R (1995-2009)

Source: Authors' calculations based on BankScope data

Figure 10b. U.S., NIM and I&R (1995-2009)

Source: Authors' calculations based on BankScope data

Our results in 2009 are robust since for micro-factors we have an R^2 of .76 and macro-factors are significant at the 5 percent level. In 1995, 1997 and 2001 in Brazil we observe a negative spread for macro-factors. These are odd results but can be interpreted as an underestimation of macro-factors and overestimation of micro-factors when banks make lending and borrowing decisions. The decisions made by banks in those years were not in line with the fundamentals of macro and micro-factors. Interestingly in 1998-1999 Brazil faced a crisis and again in 2002, just before the Lula administration came to power. These crises happened one year after we see massive underestimation of macro-factors.

Figure 11a. Brazil, NIM and macro

Source: Authors' calculations based on BankScope data

Figure 11b. U.S.A., macro as a percent of NIM

Source: Authors' calculations based on BankScope data

Macro signals should be the most important factor in banks' NIM, in a well-functioning competitive banking market. Banks should be mainly taking into consideration what is happening in the general economy and not simply what their competitors are doing. Additionally governments should refrain

from establishing barriers to an efficient banking system by reducing I&R factors. However, as we have seen in the recent crisis, the inter-connectedness of the banking system and its capital allocation role, have been misjudged by banks and policy makers alike.

Therefore, the lower spreads in the U.S. might have been the result of underestimating the macro risk as well as the micro, or counterparty risk in the banking sector. Perhaps there was a structural problem or a miscalculation of the inter-connectedness between the banking sector (micro) and the economy in general (macro).

5.5 Brazil and the BRIC Countries

Brazil consistently had higher micro spreads than the NIM of each BRIC country. Figure 12 shows that Brazil's micro-factors in all years, except in 1996, are higher than the total spread in the other BRICs. Spreads in Brazil are unlikely to come down significantly unless the micro-factors are addressed. In absolute terms, macro spreads in Brazil are just a little higher than China's macro-factors in line with their high growth rates and growth potentials.

We observe from Figure 12 that India had similar NIM spreads as Brazil in 1995 but by 2007 it had almost half the spreads as in Brazil. However, we detect that during the crisis in 2008 and 2009 spreads in India and Brazil converge. Perhaps banks in both countries measured risk in similar ways since both countries are part of the BRICs bloc and their growth is perceived to move in tandem.

Figure 12. BRICs NIM and Brazil's I&R

Source: Authors' calculations based on BankScope data

Furthermore, we observe that Brazil's macro-factors play a smaller role in 2009 (Figure 13a) than in 2008 (Figure 13b), but not significantly. At the same time, China's macro and micro-factors remained more or less constant in 2008 and 2009. The crisis did not seem to affect significantly spreads in China, perhaps because the Chinese government had tighter control over the financial sector and the overall

economy. Most of the NIM spread in Brazil is due to I&R factors, and changes in I&R are highly correlated with changes in NIM changes. China on the other hand, appears to be different and I&R factors are less significant in the determination of the NIM spreads.

Figure 13a. BRICs - I&R and macro (2009)

Source: Authors' calculations based on BankScope data

Figure 13b. BRIC - I&R and macro (2008)

Source: Authors' calculations based on BankScope data

India is an interesting case, where both in 2008 and 2009 it experiences negative micro spreads. It seems that banks in India have underestimated micro-factors and have overestimated macro-factors. This is exactly the opposite of what happened in Brazil in 1995, 1997 and 2002. In India the macroeconomic situation in both 2008 and 2009 turned out to be better than the banks had anticipated. Banks in India were too pessimistic about the macroeconomic situation, while at the same time banks were too concerned with the microeconomic situation in their industry when making lending and borrowing decisions.

In the case of China and Russia we observe almost no movement in the spreads both in terms of micro and macro-factors in both 2008 and 2009. This might be the case because the banking sectors are tightly controlled and a large part of the banking sector is controlled by the state. A further reason for the stability of the spreads in China and Russia might be the presence of large state-sponsored corporations, which borrow a significant amount of money from the domestic banking sector.

The amount of borrowing by these large state-sponsored corporations is generally stable because they have a high degree of bargaining power with the banks. Hence, the interest rates these large corporations borrow are generally fairly stable and primarily based on inflation. Inflation in both China and Russia was generally stable or decreasing because of the collapse in commodity prices and the global economic activity.

Overall, BRIC countries seem to be doing better than other developing countries. They seem to have weathered the financial crisis without major volatility in both micro and macro-factors. Compared to all developing countries, BRIC countries saw less volatility in terms of NIM in 2008 and 2009 (Annex 1 Figures 1a & 1b). The fact that Russia's spreads have remained constant is surprising given the sharp devaluation of the Ruble and the large drop in financial assets' prices in 2009. Perhaps the considerable

reserves held by the government helped the banks retain their confidence in the macro and micro fundamentals in Russia.

Figure 14. BRICs and the Development of NIM and I&R (1995-2009)

Source: Authors' calculations based on BankScope data

We depict the behavior of the NIM and I&R factors in all four BRICs in Figure 14. The immediate observation is that in all four countries micro-factors play a significant role in the determination of the spreads. The banking sector in all four countries is dominated by a few large banks and competition is limited. Moreover, the significant growth rate of all BRIC countries has pushed banks to take economic growth for granted when making their lending and borrowing decisions.

It would be interesting to see if this trend continues after the crisis. Despite the significant capital outflows from all four countries, banks seem to not have significantly changed their behavior in terms of NIM, micro or macro-factors. This fact speaks to the confidence in BRICs' economies and their growth potential.

6. Robustness and Discussion

We have performed several robustness checks to test the reliability of our results. First, we checked our data for the coverage they provide in terms of the total banking market in each country. Second, we checked how many countries have the representativeness that would enable cross country comparisons. We observe that we have a more complete dataset in the last few years, as almost all the countries had 100 percent of their banking sector, in terms of assets, represented in the sample (Figure 15b).

Figure 15a. Assets of banks/total Assets

Source: Authors' calculations based on BankScope data

Figure 15b. Countries with 100% of total Assets

Source: Authors' calculations based on BankScope data

For Brazil, we had a representative sample of the banking system in terms of total banking assets, for all years. From 2004-09 we had a completely representative sample (Figure 15a), which makes us confident of the robustness of our results. Since financial assets in Brazil are mainly held by the banking sector, our sample is consequently strongly representative of the whole financial sector.

Furthermore, we use the R^2 test to check the robustness of our regressions. We find that a high R^2 for our regressions means that micro-factors play a significant role in the total spread (NIM), such as in Brazil. In general R^2 s are high, but when they are not, this means micro-factors are not important in explaining the NIM (Table 2); in this case we test the significance of the residual constant term, the macro-factors. This is the case for quite a few developed countries, since they have already dealt with many micro issues. In these countries the main drivers of NIM spreads are macro-factors, for example Denmark with an R^2 of 0.32 and macro-factors significance at the 1% interval in 2009. However, having a competitive banking sector, such as the one in the U.S. (R^2 of 0.02 in 2009), and significant macro-factors does not prevent the whole banking sector from entering into a crisis by underestimating the total risk it is taking.

7. Conclusion and Policy Implications

Our main findings are: (i) I&R (micro) factors are the main drivers of spreads across the world; there is a high positive correlation between I&R and NIM; (ii) Brazil follows this global trend of I&R driving the NIM spreads but both the level of the I&R and the correlation between I&R and NIM are higher; (iii) Brazil follows this global macro trend and we find that the macro part of the spread is very low—even compared to developed countries; and (iv) macro-factors are not significantly linked to the NIM as a driver of spreads.

In developing countries I&R factors lead to higher NIM spreads and I&R and NIM are highly and positively correlated. NIM and micro-factors are more volatile in developing countries and at the same time we observe that in absolute terms spreads in developing countries are generally higher when compared to developed countries. For developed countries macro-factors do, in fact, lead to higher spreads and are usually the most significant part of the total spread.

When we compare Brazil against the other BRICs we find that Brazil has higher I&R spreads than the NIM of each BRIC. This means that the part of the spread that is only accounted for by I&R factors is bigger than the total spread in the other BRICs. Moreover, when we compare Brazil with the U.S. and we find that Brazil macro spreads are at even lower levels than the U.S. in 2009. This suggests banks perceived that there is lower macro-risk in Brazil than in the U.S. and reinforces our view that the main problem of high spreads in Brazil is a result of the lack of competitiveness in the banking sector.

We conclude that spreads in Brazil cannot be reduced significantly unless micro-factors are addressed. Brazil's macro-factors are a small part of the total spread and therefore do not significantly affect the level of the total spreads. Macro signals should be the most important determinants in banks NIM, since banks should be taking into consideration what is happening in the general economy and not by the herding behavior of the banking system. Therefore, we suggest a closer look at the banking sector in Brazil and potential reforms that could assist in the reduction of spreads.

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Annex 1

Figure 1a. Developing Countries (2009)

Source: Authors' calculations based on BankScope data

Figure 1b. Developing Countries (2008)

Source: Authors' calculations based on BankScope data

Annex 2

Table 1. Ranking of Countries by Spreads in 2008

Rank	IFS (2008)	Nim (2008)	Institutional and Regulatory (2008)	R2	Macro & Competition (2008)
1	BRAZIL	SOUTH AFRICA	THAILAND	0.60	TAJIKISTAN
2	CONGO, DEMOCRATIC REP. OF	ZAMBIA	SOUTH AFRICA	0.33	MOZAMBIQUE**
3	PARAGUAY	MOZAMBIQUE	ZAMBIA	0.99	ESTONIA
4	MALAWI	SIERRA LEONE	IRAQ	1.00	BAHAMAS***
5	PERU	GUATEMALA	NIGERIA	0.95	CONGO, DEMOCRATIC REP. OF
6	TAJIKISTAN	GHANA	SIERRA LEONE	0.97	BELIZE***
7	KYRGYZSTAN	THAILAND	PERU	0.91	NICARAGUA
8	SIERRA LEONE	AZERBAIJAN	GUATEMALA	0.99	CAMBODIA**
9	ZAMBIA	GEORGIA REP. OF	JAMAICA	0.94	MALI
10	COSTA RICA	PERU	IVORY COAST	1.00	KENYA***
11	MAURITIUS	HONDURAS	AZERBAIJAN	0.91	INDONESIA***
12	GEORGIA REP. OF	CONGO, DEMOCRATIC REP. OF	PAKISTAN	0.65	YEMEN***
13	SERBIA	UGANDA	UZBEKISTAN	0.68	UGANDA*
14	ARMENIA	TAJIKISTAN	CZECH_REPUBLIC	0.48	BULGARIA***
15	RWANDA	NIGERIA	GEORGIA REP. OF	0.54	HONDURAS*
16	UGANDA	NICARAGUA	HUNGARY	0.18	INDIA***
17	DOMINICAN REPUBLIC	KYRGYZSTAN	NETHERLANDS ANTILLES	1.00	RWANDA
18	JAMAICA	MEXICO	BOTSWANA	0.54	TANZANIA***
19	MONGOLIA	SERBIA	UNITED KINGDOM	0.13	MALAWI
20	BOLIVIA	IRAQ	ECUADOR	0.58	GHANA
21	URUGUAY	BRAZIL	BRAZIL	0.83	PARAGUAY***
22	KENYA	IVORY COAST	BELARUS	0.68	BOLIVIA**
23	HONDURAS	ARMENIA	COLOMBIA	0.57	UKRAINE***
24	ARGENTINA	BOTSWANA	DOMINICAN REPUBLIC	0.57	MONGOLIA*
25	GUATEMALA	COSTA RICA	TURKEY	0.44	SUDAN*
26	IRAQ	DOMINICAN REPUBLIC	GHANA	0.64	NAMIBIA***
27	SRI LANKA	PARAGUAY	URUGUAY	0.75	RUSSIA***
28	MOROCCO	UZBEKISTAN	SERBIA	0.32	SRI LANKA***
29	BOTSWANA	TURKEY	EL SALVADOR	0.90	VENEZUELA***
30	AZERBAIJAN	KENYA	ICELAND	0.31	TOGO
31	UKRAINE	ECUADOR	MACEDONIA (FYROM)	0.94	POLAND***
32	COLOMBIA	ARGENTINA	COSTA RICA	0.78	EGYPT***
33	MOZAMBIQUE	JAMAICA	KYRGYZSTAN	1.00	ARGENTINA***
34	ICELAND	CAMBODIA	HONG_KONG	0.24	MEXICO
35	CROATIA	TANZANIA	ARMENIA	0.76	SYRIA**
36	ECUADOR	MALAWI	MEXICO	0.41	USA***
37	GERMANY	MONGOLIA	JORDAN	0.97	NEPAL***
38	TANZANIA	BELARUS	PHILIPPINES	0.79	KYRGYZSTAN*
39	BANGLADESH	MOLDOVA REP. OF	BOSNIA-HERZEGOVINA	0.79	QATAR**
40	NICARAGUA	KAZAKHSTAN	SENEGAL	0.81	BANGLADESH***
41	BAHRAIN	VENEZUELA	SWEDEN	0.92	CHILE***
42	RUSSIA	NETHERLANDS ANTILLES	MONTENEGRO	0.45	KAZAKHSTAN***
43	BULGARIA	MACEDONIA (FYROM)	HONDURAS	0.86	GREECE***
44	ALGERIA	RUSSIA	SAUDI ARABIA	0.98	CROATIA***
45	VENEZUELA	UKRAINE	MOROCCO	0.93	AZERBAIJAN
46	NETHERLANDS ANTILLES	UNITED KINGDOM	UGANDA	0.50	ARMENIA**
47	ANGOLA	EL SALVADOR	KOREA	0.63	GEORGIA REP. OF
48	PAKISTAN	HONG_KONG	ARGENTINA	0.89	KUWAIT*
49	CHILE	NAMIBIA	TRINIDAD AND TOBAGO	0.82	ANGOLA
50	BELIZE	ESTONIA	KAZAKHSTAN	0.51	ROMANIA**
51	EGYPT	MALI	ALGERIA	0.46	SERBIA
52	MEXICO	BELIZE	BENIN	0.59	CHINA***
53	NEPAL	SUDAN	OMAN	0.88	SWITZERLAND
54	LATVIA	BOLIVIA	SINGAPORE	0.28	UAE***
55	ROMANIA	BOSNIA-HERZEGOVINA	VENEZUELA	0.65	COSTA RICA*
56	MONTENEGRO	URUGUAY	DENMARK	0.60	IRAN**
57	NAMIBIA	MONTENEGRO	PARAGUAY	0.86	TUNISIA***
58	BELGIUM	COLOMBIA	ANGOLA	0.35	LATVIA***
59	TRINIDAD AND TOBAGO	TRINIDAD AND TOBAGO	RUSSIA	0.34	ETHIOPIA
60	INDONESIA	PHILIPPINES	MONGOLIA	1.00	PANAMA***
61	SAN MARINO	ANGOLA	LIBYAN ARAB JAMAHIRIYA	0.76	BAHRAIN
62	SINGAPORE	SAUDI ARABIA	ROMANIA	0.21	ITALY***
63	ITALY	SRI LANKA	ETHIOPIA	0.70	CYPRUS*
64	NEW ZEALAND	RWANDA	MOLDOVA REP. OF	0.64	VIETNAM***
65	DENMARK	PAKISTAN	NAMIBIA	0.98	BERMUDA
66	EL SALVADOR	ROMANIA	SLOVAKIA	0.65	GERMANY***
67	CZECH_REPUBLIC	INDONESIA	MALAWI	0.51	CANADA***
68	THAILAND	JORDAN	CONGO, DEMOCRATIC REP. OF	1.00	MACAU***
69	PANAMA	ALGERIA	LITHUANIA	0.72	NEW ZEALAND
70	HONG_KONG	SENEGAL	SAN MARINO	0.70	NORWAY***
71	UAE	BULGARIA	SLOVENIA	0.67	AUSTRIA***

72	FRANCE	CZECH_REPUBLIC	CAYMAN ISLANDS	0.91	FINLAND***
73	MACAU	ETHIOPIA	MAURITIUS	0.22	FRANCE***
74	GREECE	MOROCCO	SUDAN	0.09	MALAYSIA***
75	PHILIPPINES	BAHAMAS	TANZANIA	0.71	ALGERIA
76	QATAR	OMAN	ISRAEL	0.92	BELGIUM***
77	MACEDONIA (FYROM)	BENIN	UKRAINE	0.12	TRINIDAD AND TOBAGO
78	AUSTRALIA	QATAR	VIETNAM	0.57	BRAZIL*
79	SYRIA	SWEDEN	MOZAMBIQUE	0.84	PORTUGAL**
80	JORDAN	NEPAL	SRI LANKA	0.36	SPAIN***
81	LIBYAN ARAB JAMAHIRIYA	LIBYAN ARAB JAMAHIRIYA	PANAMA	0.58	LEBANON***
82	BOSNIA-HERZEGOVINA	TOGO	PORTUGAL	0.31	MALTA*
83	NIGERIA	YEMEN	NICARAGUA	0.87	LIBYAN ARAB JAMAHIRIYA
84	SOUTH AFRICA	CROATIA	LEBANON	0.65	SLOVAKIA
85	AUSTRIA	PANAMA	MALAYSIA	0.25	NETHERLANDS***
86	ETHIOPIA	USA	JAPAN	0.61	OMAN
87	CYPRUS	SYRIA	CYPRUS	0.37	BENIN
88	POLAND	VIETNAM	NEW ZEALAND	0.37	DOMINICAN REPUBLIC
89	CANADA	DENMARK	LATVIA	0.66	MAURITIUS
90	SWITZERLAND	SLOVAKIA	MONACO	0.86	LIECHTENSTEIN***
91	MOLDOVA REP. OF	ICELAND	TUNISIA	0.32	AUSTRALIA***
92	VIETNAM	LATVIA	ITALY	0.21	TAIWAN***
93	CHINA	TUNISIA	KENYA	0.47	SAN MARINO
94	MALAYSIA	CYPRUS	CROATIA	0.13	IRELAND***
95	ESTONIA	BANGLADESH	BAHRAIN	0.13	LITHUANIA
96	ISRAEL	POLAND	QATAR	0.51	DENMARK
97	KUWAIT	ITALY	SPAIN	0.55	BOTSWANA
98	PORTUGAL	CHILE	BOLIVIA	0.80	TURKEY
99	FINLAND	BAHRAIN	UAE	0.40	MONTENEGRO
100	UNITED KINGDOM	UAE	AUSTRALIA	0.26	LUXEMBOURG
101	MALTA	CHINA	MALTA	0.59	SAUDI ARABIA
102	OMAN	MAURITIUS	LUXEMBOURG	0.42	JAPAN***
103	SLOVENIA	NEW ZEALAND	CHINA	0.32	CAYMAN ISLANDS
104	IRELAND	SAN MARINO	NEPAL	0.16	BOSNIA-HERZEGOVINA
105	SWEDEN	MALAYSIA	BERMUDA	0.11	GUATEMALA
106	LEBANON	KOREA	AUSTRIA	0.27	SLOVENIA
107	NORWAY	PORTUGAL	GERMANY	0.19	HONG_KONG
108	SPAIN	LITHUANIA	NORWAY	0.31	SIERRA LEONE
109	BAHAMAS	SINGAPORE	FINLAND	0.58	MACEDONIA (FYROM)
110	KOREA	LEBANON	TAIWAN	0.12	ECUADOR
111	JAPAN	IRAN	IRAN	0.79	ISRAEL
112	LITHUANIA	BERMUDA	FRANCE	0.14	MONACO
113	HUNGARY	CAYMAN ISLANDS	NETHERLANDS	0.06	BELARUS
114	NETHERLANDS	EGYPT	TOGO	0.58	PHILIPPINES
115	BELARUS	SLOVENIA	USA	0.02	SINGAPORE
116	IRAN	GERMANY	IRELAND	0.34	EL SALVADOR
117		GREECE	BELGIUM	0.23	MOROCCO
118		SPAIN	CANADA	0.10	MOLDOVA REP. OF
119		AUSTRIA	CHILE	0.72	SENEGAL
120		NORWAY	MACAU	0.12	JORDAN
121		KUWAIT	BANGLADESH	0.41	URUGUAY
122		FINLAND	SYRIA	0.15	UNITED KINGDOM
123		MALTA	LIECHTENSTEIN	0.37	SWEDEN**
124		FRANCE	CAMBODIA	0.66	PERU
125		CANADA	POLAND	0.35	KOREA**
126		HUNGARY	GREECE	0.42	COLOMBIA
127		ISRAEL	KUWAIT	0.06	UZBEKISTAN
128		MACAU	RWANDA	1.00	IVORY COAST**
129		JAPAN	MALI	0.56	NETHERLANDS ANTILLES
130		INDIA	SWITZERLAND	0.01	ICELAND
131		AUSTRALIA	EGYPT	0.12	JAMAICA**
132		BELGIUM	BULGARIA	0.19	PAKISTAN
133		TAIWAN	INDONESIA	0.11	CZECH_REPUBLIC
134		NETHERLANDS	BELIZE	0.36	NIGERIA***
135		SWITZERLAND	YEMEN	0.56	ZAMBIA**
136		LUXEMBOURG	INDIA	0.66	SOUTH AFRICA
137		LIECHTENSTEIN	BAHAMAS	0.92	HUNGARY*
138		MONACO	ESTONIA	0.89	IRAQ*
139		IRELAND	TAJIKISTAN	1.00	THAILAND***

Source: Authors' calculations based on BankScope data

Annex 3

Step 1 Estimations by Country - Main Table (2009)

Region	Development	country	Year	Obs in Year	Total Obs	Number of years	IFS	R2	NIM (latest year)	Macro & Competi	Institutional and Regulatory (latest year)	Macro (latest year)	Competition (latest year)
Europe and Central Asia	Developing	ALBANIA	2009	7	43	13	5.90	0.98	6.24	-5.04	11.28		
Middle East and North Africa	Developing	ALGERIA	2009	6	129	15	6.30	0.29	6.37	5.54	0.84		
Sub-Saharan Africa	Developing	ANGOLA	2009	12	124	15	8.10	0.68	4.56	-0.05	4.61		
Latin America and the Caribbean	Developing	ARGENTINA	2009	77	1295	15	4.10	0.80	9.99	2.12	7.87		
Europe and Central Asia	Developing	ARMENIA	2009	22	147	15	10.10	0.76	8.95	2.69	6.25		
Asia	Developed	AUSTRALIA	2009	50	566	15	3.20	0.54	1.75	1.17	0.58	5.35	-4.18
Europe	Developing	AUSTRIA	2009	220	2898	15	3.40	0.54	2.11	1.22	0.89		
Europe and Central Asia	Developing	AZERBAIJAN	2009	16	199	15	7.80	0.93	10.09	-2.81	12.90		
Midde East	Developing	BAHRAIN	2009	44	404	15	6.40	0.03	2.15	1.42	0.73		
South Asia	Developing	BANGLADESH	2009	38	472	15	6.40	0.53	3.40	3.72	-0.31		
Europe and Central Asia	Developing	BELARUS	2009	17	168	14	1.00	0.86	8.45	0.97	7.49		
Europe	Developed	BELGIUM	2009	33	1013	15	5.20	0.71	1.92	0.79	1.13		
North America	Developed	BERMUDA	2009	15	141	15	NO	0.02	2.08	2.71	-0.63		
Latin America and the Caribbean	Developing	BOLIVIA	2009	11	191	15	8.90	0.69	5.23	3.61	1.62		
Europe and Central Asia	Developing	BOSNIA-HERZEGOVINA	2009	12	259	15	4.30	0.91	5.55	0.99	4.56		
Sub-Saharan Africa	Developing	BOTSWANA	2009	13	114	15	6.30	0.73	6.67	2.12	4.55		
Latin America and the Caribbean	BRIC	BRAZIL	2009	106	1961	15	35.40	0.76	9.14	1.94	7.21	0.39	1.55
Europe and Central Asia	Developing	BULGARIA	2009	23	285	15	5.20	0.44	5.32	2.31	3.02		
East Asia and Pacific	Developing	CAMBODIA	2009	9	77	10	NO	0.66	6.00	4.80	1.20		
North America	Developed	CANADA	2009	85	1062	15	2.30	0.22	2.08	1.22	0.86	0.62	0.60
North America	Developed	CAYMAN ISLANDS	2009	7	240	15	NO	0.97	0.35	3.70	-3.35		
Latin America and the Caribbean	Developing	CHILE	2009	25	204	15	5.20	0.53	3.64	1.54	2.10	0.10	1.44
East Asia and Pacific	BRIC	CHINA	2009	76	905	15	3.10	0.39	2.68	1.84	0.84	2.16	-0.33
Latin America and the Caribbean	Developing	COLOMBIA	2009	21	434	15	6.90	0.60	5.38	-6.52	11.90	4.18	-10.70
Latin America and the Caribbean	Developing	COSTA RICA	2009	68	694	15	12.80	0.57	6.51	6.12	0.39		
Europe	Developed	CROATIA	2009	22	457	15	8.40	0.64	3.72	1.50	2.22	0.71	0.79
Europe	Developed	CYPRUS	2009	15	259	15	3.30	0.65	2.96	0.49	2.48		
Europe	Developing	CZECH_REPUBLIC	2009	22	400	15	4.70	0.81	3.85	1.24	2.62	0.92	0.32
Europe	Developed	DENMARK	2009	118	1404	15	4.70	0.32	3.44	1.57	1.86	0.55	1.02
Latin America and the Caribbean	Developing	DOMINICAN REPUBLIC	2009	31	456	15	10.30	0.33	9.57	4.85	4.72		
Latin America and the Caribbean	Developing	ECUADOR	2009	16	310	15	7.10	0.99	18.30	-8.02	26.32		
Middle East and North Africa	Developing	EGYPT	2009	21	523	15	5.50	0.17	2.91	3.01	-0.10		
Latin America and the Caribbean	Developing	EL SALVADOR	2009	9	173	15	4.60	0.83	7.54	2.56	4.98		
Europe	Developed	ESTONIA	2009	6	108	15	4.60	0.85	1.97	0.78	1.18		
Sub-Saharan Africa	Developing	ETHIOPIA	2009	9	123	15	0.00	0.47	4.43	3.82	0.61		
Europe	Developed	FINLAND	2009	22	177	15	2.70	0.31	1.32	1.48	-0.16	0.11	1.37
Europe	Developed	FRANCE	2009	298	5097	15	4.40	0.26	1.85	1.36	0.49	-0.09	1.45
Europe and Central Asia	Developing	GEORGIA REP. OF	2009	9	127	14	15.20	0.54	8.40	3.26	5.13		
Europe	Developed	GERMANY	2009	1434	26566	15	7.00	0.04	2.31	0.21	2.10	0.57	-0.36
Sub-Saharan Africa	Developing	GHANA	2009	24	153	15	NO	0.63	12.22	4.35	7.87		
Europe	Developed	GREECE	2009	20	195	15	4.30	0.70	1.93	2.62	-0.69	-3.11	5.74
Latin America and the Caribbean	Developing	GUATEMALA	2009	18	415	15	8.30	0.99	15.01	1.09	13.92		
Latin America and the Caribbean	Developing	HONDURAS	2009	12	221	15	8.30	0.53	7.85	4.84	3.02		
Asia	Developed	HONG_KONG	2009	43	848	15	5.00	0.07	2.98	1.92	1.06	0.41	1.51
Europe	Developed	ICELAND	2009	7	177	15	7.20	0.51	2.54	-1.52	4.06		
South Asia	BRIC	INDIA	2009	87	1085	15	NO	0.78	1.24	3.41	-2.16	0.00	3.40
East Asia and Pacific	Developing	INDONESIA	2009	52	942	15	5.20	0.50	5.27	3.87	1.40	-1.17	5.04
Middle East and North Africa	Developing	IRAN	2009	10	150	15	-1.10	0.91	2.45	2.74	-0.28		
Europe	Developed	IRELAND	2009	35	480	15	2.60	0.18	0.88	0.57	0.31	-0.18	0.75
Midde East	Developed	ISRAEL	2009	8	218	15	2.60	0.91	2.33	1.22	1.12	1.37	-0.15
Europe	Developed	ITALY	2009	444	4577	15	4.90	0.28	2.59	1.42	1.17	-0.38	1.80
Latin America and the Caribbean	Developing	JAMAICA	2009	11	116	14	9.50	0.91	11.86	-9.31	21.17		
Asia	Developed	JAPAN	2009	624	8363	15	1.30	0.38	1.70	1.00	0.70	0.37	0.63

Middle East and North Africa	Developing	JORDAN	2009	16	261	15	4.30	0.79	3.69	1.58	2.10		
Europe and Central Asia	Developing	KAZAKHSTAN	2009	21	303	15	NO	0.40	4.95	3.42	1.53		
Sub-Saharan Africa	Developing	KENYA	2009	27	506	15	8.80	0.15	7.24	5.96	1.29		
Asia	Developed	KOREA	2009	41	674	15	2.20	0.24	2.49	1.21	0.18	1.03	
Middle East	Developed	KUWAIT	2009	27	291	15	3.40	0.07	1.66	2.75	-1.09		
Europe	Developing	LATVIA	2009	22	226	15	8.20	0.50	2.21	0.66	1.56	-0.84	1.49
Middle East and North Africa	Developing	LEBANON	2009	28	524	15	2.30	0.31	2.50	0.84	1.66		
Europe	Developed	LIECHTENSTEIN	2009	14	137	15	NO	0.39	0.81	0.85	-0.04		
Europe and Central Asia	Developed	LITHUANIA	2009	9	119	15	3.60	0.62	1.81	1.32	0.48	4.06	-2.73
Europe	Developed	LUXEMBOURG	2009	81	1525	15	NO	0.26	1.16	0.67	0.49		
Asia	Developing	MACAU	2009	6	104	15	5.20	0.83	1.46	1.68	-0.22		
Europe and Central Asia	Developing	MACEDONIA (FYROM)	2009	8	177	15	3.00	0.76	5.05	1.75	3.30		
Sub-Saharan Africa	Developing	MALAWI	2009	10	129	15	21.80	0.62	10.11	4.63	5.48		
East Asia and Pacific	Developing	MALAYSIA	2009	70	949	15	3.00	0.26	3.13	1.68	1.45	-7.26	8.95
Europe	Developed	MALTA	2009	12	123	15	2.60	0.55	1.58	1.29	0.29		
Sub-Saharan Africa	Developing	MAURITIUS	2009	14	154	15	10.80	0.76	2.07	2.02	0.05		
Latin America and the Caribbean	Developing	MEXICO	2009	38	619	15	5.10	0.40	6.86	2.50	4.36	-0.74	3.25
Europe and Central Asia	Developing	MOLDOVA REP. OF	2009	10	118	15	5.60	0.74	5.79	4.65	1.20		
Europe	Developed	MONACO	2009	6	173	15	NO	0.31	0.91	0.66	1.01		
Europe and Central Asia	Developing	MONTENEGRO	2009	7	63	8	5.50	0.90	5.30	2.71	2.59		
Middle East and North Africa	Developing	MOROCCO	2009	9	156	15	8.00	0.87	3.14	0.26	2.88		
Sub-Saharan Africa	Developing	MOZAMBIQUE	2009	12	82	15	6.20	0.84	14.32	22.82	-8.49		
Sub-Saharan Africa	Developing	NAMIBIA	2009	9	67	14	4.90	0.98	6.19	3.85	2.34		
South Asia	Developing	NEPAL	2009	28	210	15	5.50	0.04	4.32	4.23	0.09		
Europe	Developed	NETHERLANDS	2009	43	775	15	-0.60	1.00	1.37	0.09	1.27		
Asia	Developed	NEW ZEALAND	2009	17	138	15	6.30	0.90	2.79	-0.32	3.10	1.90	-2.22
Sub-Saharan Africa	Developing	NIGERIA	2009	20	614	15	5.10	0.58	7.12	2.22	4.90		
Europe	Developed	NORWAY	2009	130	955	15	2.00	0.56	1.95	0.55	1.40	-1.18	1.73
Middle East	Developed	OMAN	2009	10	182	15	3.30	0.95	4.02	3.55	0.47		
South Asia	Developing	PAKISTAN	2009	40	417	15	5.90	0.75	7.15	-12.98	20.13	-24.27	11.29
Latin America and the Caribbean	Developing	PANAMA	2009	43	721	15	4.80	0.63	3.98	1.90	2.07		
Latin America and the Caribbean	Developing	PARAGUAY	2009	15	242	15	26.80	0.39	8.73	5.02	3.71		
Latin America and the Caribbean	Developing	PERU	2009	16	295	15	18.20	0.82	11.55	-3.57	15.12	-0.37	-3.20
East Asia and Pacific	Developing	PHILIPPINES	2009	28	322	15	5.80	0.90	4.52	-1.95	6.47	-1.57	-0.38
Europe	Developing	POLAND	2009	40	456	15	3.30	0.12	3.34	3.16	0.18	-0.62	3.78
Europe	Developed	PORTUGAL	2009	30	345	15	2.80	0.63	2.58	0.65	1.94		
Middle East	Developed	QATAR	2009	11	128	15	2.80	0.63	3.02	3.52	-0.50		
Europe and Central Asia	Developing	ROMANIA	2009	18	296	15	5.30	0.67	5.93	1.03	4.90	-0.62	1.65
Europe and Central Asia	BRIC	RUSSIA	2009	877	4884	15	6.70	0.24	7.49	4.93	2.56	2.54	2.40
Middle East	Developed	SAUDI ARABIA	2009	15	195	15	NO	0.98	5.64	0.50	5.14	-0.88	1.38
Europe and Central Asia	Developing	SERBIA	2009	24	276	15	-6.70	0.15	7.54	4.59	2.95		
Sub-Saharan Africa	Developed	SIERRA LEONE	2009	6	84	15	14.80	0.89	9.38	7.73	1.65		
Asia	Developed	SINGAPORE	2009	24	379	15	5.10	0.23	3.06	0.21	2.84	-0.01	0.22
Europe	Developing	SLOVAKIA	2009	16	248	15	NO	0.07	2.89	2.64	0.26	3.20	-0.56
Sub-Saharan Africa	Developing	SOUTH AFRICA	2009	45	470	15	3.20	0.38	21.19	-10.89	32.08	-3.92	-6.97
Europe	Developed	SPAIN	2009	177	1299	15	1.80	0.19	2.19	1.66	0.53	-0.32	1.98
South Asia	Developing	SRI LANKA	2009	16	199	15	5.10	0.42	6.13	2.98	3.16		
Sub-Saharan Africa	Developing	SUDAN	2009	19	188	15	NO	0.07	6.03	3.64	2.39		
Europe	Developed	SWEDEN	2009	95	1079	15	2.50	0.99	4.75	0.40	4.35	3.72	-3.32
Europe	Developed	SWITZERLAND	2009	402	6148	15	2.70	0.15	2.08	-1.05	3.12	-2.73	1.68
Middle East and North Africa	Developing	SYRIA	2009	9	44	12	3.70	0.62	2.82	0.91	1.91		
Asia	Developed	TAIWAN	2009	74	993	15	NO	0.25	1.38	0.87	0.51	-2.17	3.04
Sub-Saharan Africa	Developing	TANZANIA	2009	21	154	14	7.10	0.67	7.10	3.67	3.43		
East Asia and Pacific	Developing	THAILAND	2009	33	486	15	4.90	0.10	3.12	2.77	0.35	15.45	-12.68
North America	Developed	TRINIDAD AND TOBAGO	2009	9	151	15	8.50	0.42	5.53	3.00	2.53		
Middle East and North Africa	Developing	TUNISIA	2009	21	329	15	NO	0.23	3.93	3.29	0.64		
Europe and Central Asia	Developing	TURKEY	2009	40	550	15	NO	0.38	7.20	2.83	4.37	2.61	0.22
Middle East	Developed	UAE	2009	30	413	15	4.40	0.43	3.77	1.95	1.82	0.26	1.69
Sub-Saharan Africa	Developing	UGANDA	2009	20	194	15	11.20	0.51	10.15	0.67	9.48		
Europe and Central Asia	Developing	UKRAINE	2009	28	466	15	7.10	0.08	7.33	7.32	0.01		
Europe	Developed	UNITED KINGDOM	2009	289	4007	15	2.70	0.14	3.19	-0.88	4.07	6.43	-7.31
Latin America and the Caribbean	Developing	URUGUAY	2009	16	377	15	10.90	0.61	8.55	3.68	4.88		
North America	Developed	USA	2009	9255	121062	15	NO	0.02	3.78	3.74	0.04	0.49	3.25
Europe and Central Asia	Developing	UZBEKISTAN	2009	7	114	14	NO	0.83	7.14	-1.15	8.29		
Latin America and the Caribbean	Developing	VENEZUELA	2009	14	615	15	3.50	0.45	8.68	-0.62	9.30		
East Asia and Pacific	Developing	VIETNAM	2009	40	270	15	3.10	0.89	4.00	1.96	2.04		
Middle East	Developing	YEMEN	2009	10	99	15	NO	0.78	4.08	3.82	0.26		
Sub-Saharan Africa	Developing	ZAMBIA	2009	11	171	15	15.00	0.66	30.32	-17.31	47.63		

Step 1 Estimations by Country - Main Table (2008)

Region	Development	country	Year	Obs in Year	Total Obs	Number of years	IFS	R2	NIM (latest year)	Macro & Competition (latest year)	Institutional and Regulatory (latest year)	Macro (latest year)	Competition (latest year)
Middle East and North Africa	Developing	ALGERIA	2008	15	129	15	6.3	0.461	4.95		1.50	3.45	
Sub-Saharan Africa	Developing	ANGOLA	2008	15	124	15	6	0.352	5.63		2.65	2.99	
Latin America and the Caribbean	Developing	ARGENTINA	2008	86	1295	15	8.4	0.885	7.91		3.52	4.38	
Europe and Central Asia	Developing	ARMENIA	2008	22	147	15	10.4	0.761	8.95		2.69	6.25	
Asia	Developed	AUSTRALIA	2008	66	566	15	3.7	0.257	1.86		1.01	0.85	5.1912
Europe	Developing	AUSTRIA	2008	276	2898	15	3.4	0.269	2.29		1.64	0.65	-4.18
Europe and Central Asia	Developing	AZERBAIJAN	2008	22	199	15	7.5	0.914	12.58		2.73	9.85	
North America	Developed	BAHAMAS	2008	10	282	15	1.6	0.924	4.57		8.99	-4.42	
Midde East	Developing	BAHRAIN	2008	49	404	15	6.6	0.134	3.24		2.17	1.07	
South Asia	Developing	BANGLADESH	2008	41	472	15	6.7	0.405	3.39		3.15	0.24	
Europe and Central Asia	Developing	BELARUS	2008	21	168	14	0	0.683	7.49		-0.23	7.71	
Europe	Developed	BELGIUM	2008	49	1013	15	5.2	0.232	1.78		1.48	0.30	
Latin America and the Caribbean	Developing	BELIZE	2008	8	57	15	5.7	0.355	6.31		8.25	-1.94	
Sub-Saharan Africa	Developing	BENIN	2008	6	66	15	NO	0.594	4.47		1.08	3.39	
North America	Developed	BERMUDA	2008	16	141	15	NO	0.111	2.57		1.83	0.74	
Latin America and the Caribbean	Developing	BOLIVIA	2008	12	191	15	9.2	0.802	6.04		5.12	0.92	
Europe and Central Asia	Developing	BOSNIA-HERZEGOVINA	2008	24	259	15	3.5	0.788	5.98		0.38	5.60	
Sub-Saharan Africa	Developing	BOTSWANA	2008	14	114	15	7.9	0.54	8.78		0.58	8.20	
Latin America and the Caribbean	Developed	BRAZIL	2008	124	1961	15	35.6	0.825	9.33		1.46	7.87	-0.0968
Europe and Central Asia	Developing	BULGARIA	2008	26	285	15	6.4	0.187	4.85		6.21	-1.36	1.55
East Asia and Pacific	Developing	CAMBODIA	2008	13	77	10	NO	0.655	7.80		7.85	-0.05	
North America	Developed	CANADA	2008	90	1062	15	3.2	0.098	2.02		1.74	0.28	1.1421
North America	Developed	CAYMAN ISLANDS	2008	11	240	15	NO	0.907	2.54		0.39	2.15	0.60
Latin America and the Caribbean	Developed	CHILE	2008	26	204	15	5.8	0.717	3.28		3.01	0.27	1.5711
East Asia and Pacific	Developed	CHINA	2008	103	905	15	3.1	0.318	3.14		2.36	0.79	2.6814
Latin America and the Caribbean	Developing	COLOMBIA	2008	23	434	15	7.4	0.567	5.91		-1.62	7.53	9.0815
Sub-Saharan Africa	Developing	CONGO, DEMOCRATIC REP. OF	2008	10	61	15	35.4	1	11.21		8.91	2.30	-10.70
Latin America and the Caribbean	Developing	COSTA RICA	2008	70	694	15	11.7	0.781	8.71		2.25	6.46	
Europe	Developed	CROATIA	2008	32	457	15	7.2	0.129	3.91		2.78	1.13	1.9879
Europe	Developed	CYPRUS	2008	22	259	15	3.3	0.372	3.48		2.00	1.48	0.79
Europe	Developing	CZECH, REPUBLIC	2008	35	400	15	4.6	0.479	4.84		-4.55	9.39	-4.8636
Europe	Developed	DENMARK	2008	130	1404	15	4.7	0.599	3.66		0.58	3.08	-0.4404
Latin America and the Caribbean	Developing	DOMINICAN REPUBLIC	2008	36	456	15	9.6	0.568	8.54		1.07	7.47	0.32
Latin America and the Caribbean	Developing	ECUADOR	2008	23	310	15	7.1	0.577	7.93		0.04	7.89	1.02
Middle East and North Africa	Developing	EGYPT	2008	34	523	15	5.7	0.122	2.44		3.65	-1.21	
Latin America and the Caribbean	Developing	EL SALVADOR	2008	15	173	15	4.6	0.901	6.64		-0.29	6.93	
Europe	Developed	ESTONIA	2008	8	108	15	2.8	0.888	6.46		11.25	-4.79	
Sub-Saharan Africa	Developing	ETHIOPIA	2008	8	123	15	3.3	0.701	4.81		2.19	2.63	
Europe	Developed	FINLAND	2008	23	177	15	2.7	0.579	2.11		1.61	0.51	0.2395
Europe	Developed	FRANCE	2008	358	5097	15	4.4	0.135	2.05		1.59	0.46	1.45
Europe and Central Asia	Developing	GEORGIA REP. OF	2008	14	127	14	10.9	0.544	12.00		2.66	9.35	
Europe	Developed	GERMANY	2008	1777	26566	15	7	0.186	2.41		1.81	0.61	2.1675
Sub-Saharan Africa	Developing	GHANA	2008	27	153	15	NO	0.642	12.65		5.26	7.39	-0.36
Europe	Developed	GREECE	2008	23	195	15	4.3	0.421	2.39		2.84	-0.45	-2.8986
Latin America and the Caribbean	Developing	GUATEMALA	2008	21	415	15	8.3	0.988	12.73		0.38	12.35	5.74
Latin America and the Caribbean	Developing	HONDURAS	2008	18	221	15	8.4	0.863	11.49		6.09	5.40	
Asia	Developed	HONG, KONG	2008	64	848	15	4.6	0.241	6.55		0.17	6.38	-1.3404
Europe	Developing	HUNGARY	2008	38	453	15	0.3	0.179	1.99		-7.26	9.25	1.51
Europe	Developed	ICELAND	2008	19	177	15	7.2	0.306	3.56		-3.24	6.80	
South Asia	Developing	INDIA	2008	94	1085	15	NO	0.663	1.91		6.07	-4.16	2.6637
East Asia and Pacific	Developing	INDONESIA	2008	63	942	15	5.1	0.111	5.04		6.77	-1.73	1.7292
Middle East and North Africa	Developing	IRAN	2008	15	150	15	-1.3	0.789	2.72		2.23	0.49	5.04
Middle East and North Africa	Developing	IRAQ	2008	15	60	13	8.1	0.998	9.39		-8.88	18.27	
Europe	Developed	IRELAND	2008	43	480	15	2.6	0.344	1.14		0.82	0.32	0.0701
Midde East	Developed	ISRAEL	2008	12	218	15	2.8	0.922	1.98		0.01	1.96	0.164
Europe	Developed	ITALY	2008	700	4577	15	4.9	0.21	3.33		2.10	1.23	0.3029
Sub-Saharan Africa	Developing	IVORY COAST	2008	11	160	15	NO	0.995	9.07		-2.14	11.21	1.80
Latin America and the Caribbean	Developing	JAMAICA	2008	13	116	14	9.3	0.938	7.84		-3.91	11.76	
Asia	Developed	JAPAN	2008	676	8363	15	1.3	0.61	1.92		0.43	1.49	-0.1919

Middle East and North Africa	Developing	JORDAN	2008	18	261	15	3.6	0.972	5.01	-0.97	5.98		
Europe and Central Asia	Developing	KAZAKHSTAN	2008	27	303	15	NO	0.512	6.89	2.92	3.97		
Sub-Saharan Africa	Developing	KENYA	2008	35	506	15	8.7	0.471	7.98	6.80	1.18		
Asia	Developed	KOREA	2008	47	674	15	1.3	0.626	3.03	-1.45	4.48	-2.4869	1.03
Middle East	Developed	KUWAIT	2008	31	291	15	2.8	0.057	2.17	2.65	-0.48		
Europe and Central Asia	Developing	KYRGYZSTAN	2008	6	65	12	15.9	1	9.66	3.24	6.42		
Europe	Developed	LATVIA	2008	22	226	15	5.5	0.662	3.53	2.22	1.30	0.7316	1.49
Middle East and North Africa	Developing	LEBANON	2008	33	524	15	2.3	0.648	2.76	1.24	1.52		
Middle East and North Africa	Developed	LIBYAN ARAB JAMAHIRIYA	2008	8	55	14	3.5	0.759	4.01	1.22	2.79		
Europe	Developed	LIECHTENSTEIN	2008	14	137	15	NO	0.371	1.25	1.05	0.20		
Europe and Central Asia	Developed	LITHUANIA	2008	10	119	15	0.8	0.719	3.00	0.79	2.22	3.5197	-2.73
Europe	Developed	LUXEMBOURG	2008	109	1525	15	NO	0.418	1.29	0.47	0.82		
Asia	Developed	MACAU	2008	9	104	15	4.3	0.123	1.95	1.70	0.25		
Europe and Central Asia	Developing	MACEDONIA (FYROM)	2008	16	177	15	3.8	0.942	6.82	0.14	6.68		
Sub-Saharan Africa	Developing	MALAWI	2008	13	129	15	21.8	0.508	7.70	5.28	2.42		
East Asia and Pacific	Developing	MALAYSIA	2008	76	949	15	3	0.253	3.06	1.54	1.52	-7.4095	8.95
Sub-Saharan Africa	Developing	MALI	2008	6	83	15	NO	0.56	6.45	7.22	-0.78		
Europe	Developed	MALTA	2008	13	123	15	2.6	0.586	2.08	1.23	0.85		
Sub-Saharan Africa	Developing	MAURITIUS	2008	17	154	15	11.4	0.223	3.14	1.05	2.09		
Latin America and the Caribbean	Developing	MEXICO	2008	55	619	15	5.7	0.407	9.54	3.51	6.03	0.2652	3.25
Europe and Central Asia	Developing	MOLDOVA REP. OF	2008	17	118	15	3.1	0.636	7.14	-0.46	2.55		
Europe	Developed	MONACO	2008	15	173	15	NO	0.861	1.20	0.00	1.30		
East Asia and Pacific	Developing	MONGOLIA	2008	8	91	15	9.2	1	7.63	4.74	2.90		
Europe and Central Asia	Developing	MONTENEGRO	2008	9	63	8	5.4	0.445	5.93	0.50	5.42		
Middle East and North Africa	Developing	MOROCCO	2008	20	156	15	8	0.931	4.76	-0.38	5.14		
Sub-Saharan Africa	Developing	MOZAMBIQUE	2008	14	82	15	7.3	0.837	16.25	14.42	1.83		
Sub-Saharan Africa	Developing	NAMIBIA	2008	10	67	14	5.4	0.978	6.53	4.08	2.45		
South Asia	Developing	NEPAL	2008	28	210	15	5.6	0.16	4.08	3.30	0.78		
Europe	Developed	NETHERLANDS	2008	60	775	15	0.2	0.064	1.45	1.10	0.35		
Europe	Developed	NETHERLANDS ANTILLES	2008	7	104	15	6.1	1	6.82	-2.37	9.19		
Asia	Developed	NEW ZEALAND	2008	19	138	15	4.7	0.368	3.14	1.67	1.47	3.8832	-2.22
Latin America and the Caribbean	Developing	NICARAGUA	2008	6	153	15	6.6	0.874	9.67	8.13	1.54		
Sub-Saharan Africa	Developing	NIGERIA	2008	26	614	15	3.5	0.947	10.34	-4.59	14.93		
Europe	Developed	NORWAY	2008	144	955	15	1.8	0.31	2.25	1.67	0.58	-0.0588	1.73
Middle East	Developed	OMAN	2008	13	182	15	2.6	0.881	4.47	1.09	3.38		
South Asia	Developing	PAKISTAN	2008	45	417	15	6	0.653	5.32	-4.41	9.73	-15.6976	11.29
Latin America and the Caribbean	Developing	PANAMA	2008	53	721	15	4.6	0.58	3.86	2.18	1.68		
Latin America and the Caribbean	Developing	PARAGUAY	2008	16	242	15	22.7	0.861	8.20	5.14	3.06		
Latin America and the Caribbean	Developing	PERU	2008	21	295	15	20.2	0.914	11.88	-1.40	13.27	1.8039	-3.20
East Asia and Pacific	Developing	PHILIPPINES	2008	35	322	15	4.3	0.792	5.69	-0.23	5.92	0.1481	-0.38
Europe	Developed	POLAND	2008	51	456	15	3.3	0.351	3.37	3.66	-0.29	-0.1176	3.78
Europe	Developed	PORTUGAL	2008	41	345	15	2.8	0.313	3.01	1.40	1.61		
Middle East	Developed	QATAR	2008	13	128	15	3.9	0.507	4.20	3.18	1.02		
Europe and Central Asia	Developing	ROMANIA	2008	30	296	15	5.5	0.213	5.09	2.39	2.70	0.7425	1.65
Europe and Central Asia	Developing	RUSSIA	2008	971	4884	15	6.5	0.338	6.77	3.86	2.92	1.4599	2.40
Sub-Saharan Africa	Developing	RWANDA	2008	6	62	15	9.8	1	5.43	5.93	-0.50		
Europe	Developed	SAN MARINO	2008	8	68	15	5	0.695	3.12	0.92	2.19		
Middle East	Developed	SAUDI ARABIA	2008	15	195	15	NO	0.981	5.62	0.44	5.18	-0.9412	1.38
Sub-Saharan Africa	Developing	SENEGAL	2008	7	102	15	NO	0.81	4.92	-0.61	5.53		
Europe and Central Asia	Developing	SERBIA	2008	34	276	15	10.8	0.324	9.40	2.39	7.01		
Sub-Saharan Africa	Developed	SIERRA LEONE	2008	10	84	15	14.8	0.972	14.47	0.16	14.31		
Asia	Developed	SINGAPORE	2008	32	379	15	5	0.283	2.94	-0.23	3.17	-0.4543	0.22
Europe	Developing	SLOVAKIA	2008	24	248	15	NO	0.651	3.58	1.13	2.45	1.6966	-0.56
Europe	Developed	SLOVENIA	2008	21	255	15	2.6	0.672	2.44	0.28	2.16		
Sub-Saharan Africa	Developing	SOUTH AFRICA	2008	50	470	15	3.5	0.328	28.98	-6.23	35.21	0.7394	-6.97
Europe	Developed	SPAIN	2008	182	1299	15	1.8	0.547	2.30	1.29	1.01	-0.6905	1.98
South Asia	Developing	SRI LANKA	2008	19	199	15	8	0.357	5.61	3.80	1.81		
Sub-Saharan Africa	Developing	SUDAN	2008	22	188	15	NO	0.094	6.31	4.24	2.07		
Europe	Developed	SWEDEN	2008	102	1079	15	2.5	0.923	4.13	-1.30	5.44	2.0178	-3.32
Europe	Developed	SWITZERLAND	2008	465	6148	15	3.2	0.008	1.42	2.32	-0.91	0.6446	1.68

Middle East and North Africa	Developing	SYRIA	2008	13	44	12	3.6	0.151	3.74	3.50	0.23		
Asia	Developed	TAIWAN	2008	91	993	15	NO	0.117	1.47	0.97	0.49	-2.0664	3.04
Europe and Central Asia	Developing	TAJKISTAN	2008	6	30	7	16.4	1	10.52	56.77	-46.25		
Sub-Saharan Africa	Developing	TANZANIA	2008	24	154	14	6.7	0.709	7.78	5.74	2.04		
East Asia and Pacific	Developing	THAILAND	2008	41	486	15	4.6	0.596	12.63	-28.79	41.42	-16.1092	-12.68
Sub-Saharan Africa	Developing	TOGO	2008	6	67	15	NO	0.584	4.01	3.66	0.35		
North America	Developed	TRINIDAD AND TOBAGO	2008	10	151	15	5.1	0.823	5.75	1.46	4.30		
Middle East and North Africa	Developing	TUNISIA	2008	32	329	15	NO	0.316	3.51	2.22	1.28		
Europe and Central Asia	Developing	TURKEY	2008	61	550	15	NO	0.438	7.99	0.58	7.41	0.3615	0.22
Midde East	Developed	UAE	2008	35	413	15	4.4	0.399	3.22	2.31	0.91	0.617	1.69
Sub-Saharan Africa	Developing	UGANDA	2008	20	194	15	9.8	0.497	10.90	6.37	4.53		
Europe and Central Asia	Developing	UKRAINE	2008	48	466	15	7.5	0.124	6.70	4.77	1.94		
Europe	Developed	UNITED KINGDOM	2008	375	4007	15	2.7	0.127	6.65	-1.27	7.92	6.0385	-7.31
Latin America and the Caribbean	Developing	URUGUAY	2008	20	377	15	9.2	0.752	5.95	-1.15	7.10		
North America	Developed	USA	2008	9589	121062	15	NO	0.021	3.77	3.44	0.33	0.194	3.25
Europe and Central Asia	Developing	UZBEKISTAN	2008	10	114	14	NO	0.681	8.04	-1.66	9.70		
Latin America and the Caribbean	Developing	VENEZUELA	2008	38	615	15	6.2	0.652	6.87	3.78	3.09		
East Asia and Pacific	Developing	VIETNAM	2008	40	270	15	3.1	0.567	3.73	1.84	1.89		
Midde East	Developing	YEMEN	2008	11	99	15	NO	0.563	3.94	6.59	-2.65		
Sub-Saharan Africa	Developing	ZAMBIA	2008	15	171	15	12.5	0.99	19.30	-4.70	24.00		