Basel III Banking Reforms: Potential Impacts on Cross-Border Banking Claims on Emerging Countries.

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Abstract

Reacting to an unremitting succession of banking crises, the Basel Committee has increased the scope of the regulation. This paper is based on the literature on cross-border capital flow determinants and on a GMM between 1999-2010. It analyses the potential impact of Basel III as push factors on claims held by international banks on 30 emerging countries. We show how important the capital cost of banks is for their balance sheet management, and how the leverage ratio could threaten their lending capacity. Our results show that the regulatory framework could have a significantly negative impact on cross-border banking claims.

Keywords: Basel III, cross-border bank lending, capital flows, emerging market economies.
*JEL classification***:** E51, F34, G18

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1. Introduction.

The Basel III capital regulatory framework is intended to strengthen international banks' resilience to financial shocks by means of adequate capitalization, thereby allowing those banks to pursue their essential role in financing the economy. The financial crisis that began in 2007 has, however, demonstrated their inconstancy and inability to absorb such shocks, triggering State intervention, and finally resulting in a contraction of bank lending to non-financial agents, thereby slowing down economic growth (IMF, 2012). The authorities have responded by setting up a new regulatory framework, the Basel III Accord, applicable by banks by 2019[1]. This Accord aims at increasing both the solvency of banks and also introduces new requirements concerning their liquidity. The overall aim is to improve the resilience of banks, enabling them to absorb financial and economic shocks with their own resources (Basel Committee on Banking Supervision (BCBS), 2010).

Implementation of the Basel III framework, however, raises the question both of its ability to adequately respond to future financial shocks, and also of its impact on lending, a question we have chosen to focus on here. More specifically, we evaluate whether the new regulatory framework will have positive or negative consequences on the external banking claims on emerging market economies, which are particularly dependent on such funding (CGFS, 2009). Between 1980 and 2010, bank capital flows increased by 8.5, rising from 8.86 to 75.86 billion US dollars, which represents, on average, 18% of the GDP of the emerging countries considered here[2].

The 'Total Capital' in Basel III remains set at a minimum of 8% of bank's credit, market and operational risk-weighted assets. The new Accord implies a major change in the numerator and denominator of the capital ratio (coming into force by the 1st January 2015), and is thus potentially expensive for banks. For the numerator, a stricter definition of banking capital must be respected, with the reinforcement of Tier 1 ratio, which must represent at least 6% of risk-weighted assets, and must be primarily composed of Common Equity Tier 1 (common shares, retained earnings, preferred shares) with a marginal proportion of additional Tier 1 capital (perpetual subordinated notes…). Tier 1 is designed to ensure going-concern loss absorbency, whereas Tier 2 capital (2% of risk-weighted assets), deals with bank's insolvency (gone-concern capital).

Credit risk assessment, however, remains unchanged (BCBS, 2010), and is still calculated with IRB (*Internal Rating Based*) models. The increased stringency of the regulatory framework also incorporates a conservation buffer equal to 2.5% of risk-weighted assets. The latter is designed to

[1] It should be noted that some requirements are still under debate and observation.
[2] Sources : BIS, *Locational banking statistics*, IMF, *World Economic Outlook*, authors' own calculations.

ensure that banks build up an adequate cushion of capital above a regulatory minimum to be reduced during periods of stress. Greater solvency is also ensured by the introduction of a non-risk based leverage ratio and a countercyclical capital buffer. The minimum Tier 1 leverage ratio, calculated by dividing Tier 1 capital by the bank's on and off-balance sheet items, is aimed at limiting the use of debt financing by banks and obliging them to fund at least 3% of their assets with their own capital. As the capital ratio does not completely offset the bank's ability to understate their risk assessment via regulatory arbitrages, the leverage ratio is designed to complement this (Blum, 2008). To avoid banks' pro-cyclical bias, which is also inherent to regulation, a countercyclical buffer (2.5% of the risk-weighted assets) can be deployed. This can be done when the national jurisdictions consider that growth in the aggregate credit/GDP ratio is generating excessive levels of credit expansion, thereby triggering an unacceptable accumulation of risks. Lastly, Globally Systematically Important Banks (G-SIBs) will be required to hold additional loss absorbing capacity (ranging from 1-3.5% of risk-weighted assets) in order to offset the risks due to their size and interconnectedness, requirement that might well be considered as restrictive for international banking. A recent test carried out by the European banking authority (EBA, 2012), on a sample of 152 European institutions, indicates that the bank capital shortfall, if banks are to comply with the various ratios by the end of 2018, represents more than 500 billion euros.

As the crisis of 2007 was characterized by a money market freeze, even for highly-capitalized banking institutions, the Basel Committee responded to this hitherto unprecedented situation by setting up two liquidity ratios (BCBS, 2010): a short-term ratio (to be implemented from 1st January 2015); the other, a long-term ratio (to be implemented from 1st January 2018). The short-term liquidity ratio (Liquidity Coverage Ratio, LCR[3]) is designed to ensure that banks have sufficient unencumbered, high-quality liquid assets to cope with their liquidity needs over a 30-day period in a major (idiosyncratic and market-wide) liquidity stress scenario. To respect this ratio, banks will have to rebalance their loans and deposits, along with repurchase and reverse repurchase agreements for liquid assets.

The long-term liquidity ratio or Net Stable Funding Ratio (NSFR[4]) will force banks to fund long-term assets with long-term resources, in order to avoid excessive contractual maturity mismatches. The NSFR modifies the maturity transformation role played by banks (long-term lending and short-term refinancing). If the transformation margin were to disappear, this could have an impact on credit by making it increasingly more costly and difficult to obtain[5]. The EBA (2012) estimates that, for 152 European banks, the liquidity shortfall for compliance with the LCR represents about 1,170 billion euros for the LCR, and 1,400 billion euros for the NSFR. Thus, compliance with these ratios clearly represents a substantial cost for banking institutions.

[3] LCR= (Stock of high-quality liquid assets / Total net cash outflows over the next 30 calendar days) ≥ 100%
With Total net cash outflows over the next 30 calendar days = outflows – Min{inflows; 75% of outflows}
[4] NSFR = (Available amount of stable funding / Required amount of stable funding) > 100%
[5] Bank liabilities have been strongly rebalanced with a noticeable increase of secured funding, which could complexify bank balance sheets.

Within this regulatory framework, the aim of this paper is two-fold. Firstly, in the light of existing literature on the subject, we define variables to be used in econometric tests which, from the macroeconomic standpoint, can express the impact of the new requirements introduced in Basel III, over and above the mere question of changes in bank interest rate spreads. Secondly, we will study the question of the role that the probable cost for banks of compliance with regulation will play in determining bank capital inflows into emerging market economies. More specifically, it represents a push factor, linked to the global economic situation, rather than that specific to the borrower country and therefore impacting upon that country's ability to obtain credit on international markets. As no specific data is yet available for some of the capital and liquidity ratios introduced in Basel III, the present paper therefore examines the cost associated with compliance with the ratios, rather than the ratios themselves. Consequently, we first define a set of variables corresponding to the cost of implementing the different aspects of Basel III, and then proceed to study the progression of these variables between 1999 and 2010. The aim is to assess the potential impact of shortfalls in regulatory capital and liquid assets on the flows of cross-border claims held by international banks on emerging market economies. Similarly to this paper, Weder and Wedow (2002) attempted to evaluate *ex-ante* the impact of the Basel requirements (compliance required for 2006-08). They work on the basis that banks already applied modern risk management techniques that were close to those of the regulatory framework in the period 1993-2001[6]. Our paper, just like the MAG (2010), also adopts the implicit hypothesis that banks will not change their behaviour despite the introduction of Basel III. Neither the transitional arrangements, nor any potential synergies between the various regulatory requirements have been considered here.

To conduct our empirical analysis, we use banking statistics provided by the Bank for International Settlements (BIS), the locational banking statistics. This specific data provides comprehensive and consistent details on cross-border banking claims. We have also explored two strands of literature on the subject - quantification of the effect of the different Basel requirements on international banks and the determinants of capital inflows to emerging market economies within the analytical push & pull framework. A System GMM estimator, covering the period from 1999 to 2010, has been used on a sample of 30 emerging market economies to provide an empirical assessment of the determinants of cross-border banking claims, including *inter alia* Basel variables.

This paper is structured as follows. Part 2 reviews the literature on the subject. Part 3 presents the data and the expected mechanisms. Part 4 discusses the models and results. Part 5 presents our conclusions.

[6] Using a different method to ours by calculating the banks' theoretical regulatory capital charge.

2. Literature review.

Papers on the consequences of the Basel regulatory framework have hitherto seldom explored the question of international bank loans granted to emerging countries. According to Van Hoose (2007), the Basel I and II Accords lead to an increase in the cost of bank lending and a decrease in the volume of loans worldwide. The literature also shows that the impact of the first two versions of Basel was mainly felt in terms of funding currency, interest rates and maturities. For Bisignano (2003), the Basel I framework did not encourage long-term financing for emerging market economies, as it conduces international banks to grant short-term loans in dollars. Moreover, few research papers have carried out empirical tests on the impact of the Cooke ratio on international capital flows, or their tests have been confined to Japanese banks. Montgomery (2005) shows that Japanese banks began to dramatically reduce risky positions from 1988 onwards, notably loans to national companies and international loans, but does not identify the borrowers involved. Peek and Rosengren (1997) go one step further by demonstrating empirically that, after implementation of the Cooke ratio, Japanese banks reduced international lending to their American clients. As for the question of cutting lending to clients in emerging market economies, King (2001) indicates that Japanese banks were partly responsible for triggering the financial crisis in Asia by causing, as a common creditor, substantial levels of credit restriction, although no empirical evidence supports this argument. Brana and Lahet (2009) do provide econometric evidence and stress the importance of an international channel fostering shock transmission. From a microeconomic point of view, the aforementioned studies use the ratio declared by the banks themselves, available in some databases. From a macroeconomic standpoint, those studies use a proper leverage ratio.

Due to the financial crisis, the Basel II Accord, phased in at the end of 2006, has not been subject to a great deal of empirical investigation regarding its impact on the funding of emerging market economies. However, using an accounting-based approach, Reisen (2001) and Griffith-Jones and Spratt (2001) posit, *ex-ante*, that emerging market economies would see a rise in the cost of credit with the transition from Basel I to II. They estimate that the spreads of B-rated borrowers would increase by 350 basis points (bp) in the standardised approach, and by 3,709 bp in the IRB approach. Borrowers rated AA would benefit from a downward trend in interest rate spreads of 16 to 18 bp, in the standardised and IRB approach respectively. Weder and Wedow (2002) estimate that the uptrend in credit rate spreads for high-risk borrowers (CCC rated) would be 350 bp in the standardised approach and 2,041 bp in the IRB approach, and that the contraction for A-rated borrowers would be 40 bp (standardised) and 43 bp (IRB). Then, taking economic and regulatory capital as equal, these authors calculate the theoretical regulatory capital charge for banks, over the 1993-2001 period, by using probability of default, loss given default and exposure at default. They econometrically conclude that regulatory capital framework or modern risk-management techniques have had little impact on the funding of emerging market economies. Claessens et al. (2008) adopt the IRB approach and calculate

that the surge in interest rate spreads for CCC-rated borrowers would rise to 1,837 bp. The 'winners' would be BB+ rated clients who would benefit from a decline in interest rate of 178 bp. Low-risk borrowers (A rated) would not be affected at all. Generally speaking, Weder and Wedow (2002), Liebig et al. (2007) and Claessens et al. (2008) consider that the overall impact of transition to Basel II would be negligible, or even nil, as far as loans to emerging market economies are concerned, and this thanks to the prior implementation of modern risk-management strategies. In addition, Figuet and Lahet (2007) provide empirical proof that short-term loans would remain predominant in emerging market economies. This has indeed been confirmed by the facts: from 2000 to 2010, the percentage of short-term claims (less than one year) in the total foreign banking claims on emerging market economies rose from 50 to 60%[7].

What about the consequences of Basel III? Until today, most research has focused on the increase in the cost of lending as a proxy for the effects of Basel III and on the drop in the volume of bank loans slowing economic growth (BCBS, 2010; Macroprudential Assessment Group (MAG), 2010; Frenkel and Rudolph, 2010; Cosimano and Hakura, 2011; Slovik and Cournède, 2011; Slovik, 2011). The IIF (2011) forecasts that interest rate spreads would rise by 3.5% on average, slowing world GDP by 3.2%. The MAG (2010), Cosimano and Hakura (2011) and Slovik and Cournède (2011) all conjecture a rise of 15 basis points in spreads per additional percentage point of regulatory requirements. In a report published by the IMF, Santos and Elliot (2012) forecast that the cost of bank loans will rise on average by 28 bp in the USA, 17 bp in Europe and 8 bp in Japan. From a long-term perspective, the MAG (2010) anticipates that the yearly drop in world GDP for the period between 2012 and 2019 will be 0.03%, and beyond this period forecasts a yearly upward trend of 0.2 to 0.6%, thanks to the decreased probability of a banking crisis. The European Commission (2011) anticipates that increased regulation of the banking system will bring 0.3 to 2 additional points of GDP to the European Union. As for the impact of Basel III on cross-border lending to emerging market economies, Ghosh et al. (2011) forecast that a drop of 100 bp in the interest rate differential would cause a 3 % decrease in banking inflows. The IIF (2010) conjectures a similar outcome, without the support of empirical evidence. Other papers argue that the overall effect of Basel III will be negligible (Kashyap et al., 2010; Miles et al., 2011). To our knowledge, no global test concerning the impact of Basel III on the volume of banking claims on emerging market economies has been carried out, hence the purpose of this paper.

The second strand of literature concerns the determinants of international capital flows, whose factors are traditionally divided into two categories (Calvo et al., 1993; Fernandez-Arias, 1996). The push factors, or global factors, are external to the emerging market economies borrowing the capital – they include the real, economic, commercial and financial conditions specific to the investors' home

[7] Sources: BIS, Consolidated Banking Statistics, authors' own calculations.

countries, which encourage lenders to invest in emerging countries. The seminal papers on this subject investigate the external determinants of portfolio investments (Calvo et al. (1993) study Latin America in the 1980s), but concentrate mainly on interest rates and economic growth in developed countries, notably the USA.[8] Later studies (Hernandez and Rudolph, 1995; Fernandez-Arias, 1996; Chuhan et al., 1998) test simultaneously the respective role of push & pull factors on samples of emerging countries. These pull factors are specific to the recipient countries considered, i.e. the favourable fundamentals which attract international capital. In the wake of the 1997 financial crisis in Asia, and the global crisis of 2007-2008, research focuses on the contagion effect and on investors' risk appetite/aversion indicators. Such variables as high yield spread, TED spread, or VIX… are tested alongside traditional factors, and appear to have a significantly negative effect, as exterior/push factors, in explaining the lending flows to emerging market economies (Jeanneau and Micu, 2002; Takats, 2010; Herrmann and Mihaljek, 2010[9]; Ghosh et al., 2011; Fratzscher, 2011). Finally, in the wake of the global financial crisis of 2007-2008, in which some international banking institutions (usually parent banks of subsidiaries in emerging countries) experienced major issues with liquidity and solvency, research focuses primarily on the determinants of international bank loans,[10] integrating banking variables within both global factors (bank quality in lender country) and country-specific factors (country's openness to foreign banks and local banks' health) (Garcia-Herrero and Martinez-Peria, 2005; McGuire and Tarashev, 2008; Herrmann and Mihaljek, 2010). Ferrucci et al. (2004) and Broto et al. (2008) demonstrate that, during the 2000s, the importance of global factors continued to rise steadily. Up to date, very little research has investigated the Basel regulatory framework as an underlying factor in international bank lending.[11] The first paper on this subject, published by Buch (2000), points out the positive impact of Basel regulation on the flow of international capital via the use of a dummy variable after 1988 and within a push & pull framework. Jeanneau and Micu (2002) also use the push & pull framework and a dummy variable for lender countries whose banks complied with the Cooke ratio between the last quarter of 1988 and 1992. They conclude that there was no impact on loan supply, with the exception of a very slight positive effect in 1992 if interbank lending alone is considered. However, we might argue that a dummy variable is of relatively little explanatory power. Ghosh et al. (2011), in the wake of their tests on the determinants of cross-border capital flows within a push & pull framework, simulate the impact of Basel III by using a single push variable: a rise in the effective interest rate in America, thus accompanied by a drop in the interest rate

[8] First results show the negative impact of these variables – a drop in growth and low interest rates stimulate investment in emerging market economies. Later, Jeanneau and Micu (2002) provide evidence that the impact of these traditional variables is positive and therefore that growth in developed countries acts procyclically.

[9] Within a gravity model, even if the authors adopt the traditional classification of global/country-specific factors.

[10] On the basis of banking data provided by the BIS: 1- Consolidated banking statistics measuring international banking claims from home country, including those of foreign affiliates, along with foreign currency and local currency claims. Transactions between parent banks and subsidiaries are compensated for in these statistics or, 2- Locational banking statistics measuring cross-border banking claims. For more information, see McGuire and Wooldridge (2005).

[11] In the conclusions of its report on the bank lending flows to emerging economies in Europe (without econometric test), the European Commission (2010) forecasts that greater financial supervision (more demanding capital adequacy ratio) may well reduce the appetite and capacity of EU banks for risk-taking (and therefore lending) to Eastern European borrowers.

differential with emerging market economies, all other things being equal.[12] They conclude that a drop of 100 bp in the interest rate differential results in a 3% drop in bank lending flows. Bruno and Shin (2012) examine changes in the structure of bank balance sheets as push factors on cross-border lending from the perspective of two variables - the leverage ratio and the volume of the banks' equity. The VIX is taken as an inverse proxy for the banks' leverage ratio, based on observation of the diverging historical paths of those two variables in two major internationally active banks (Goldman Sachs and Morgan Stanley), and this may be seen as a limitation of their paper. The authors argue that an increase in the capital of international banks leads to a rise in international bank lending flows, and that an upward trend in the VIX (a drop in the leverage ratio) causes a subsequent decline in lending.

In this light, this paper aims to determine the impact of both global and country-specific factors on cross-border banking claims on a sample set of emerging market economies between 1999 and 2010. More specifically, we intend to assess the potential impact of the Basel III regulatory framework and of its cost as push factors. In order to encompass all the aspects of the new Accord, six variables are used: the cost of bank capital, the cost of bank debt, the leverage ratio, the Tier 1 ratio and the cost of short-term and long-term liquidity.

3. Methodology.

3.1. Model.

These estimations are based on annual data over the 1999-2010 period. The panel includes 30 major emerging market economies[13], chosen to provide a representative description of emerging market economies, both on aggregate and region wise (IIF, 2010), on which banks, operating in 16 developed countries[14], hold cross-border claims. All 16 countries are considered as 'developed' by the BIS and members of the Basel Committee.

The empirical model is specified as follows:

$$K_{i,t} = \alpha K_{i,t-1} + \beta X_{i,t} + \mu_i + \varepsilon_{i,t} \qquad (1)$$

Where $K_{i,t}$ are the international banking claim flows from developed countries on an emerging market economy i, at time t, $K_{i,t-1}$ is the lagged dependent variable, $X_{i,t}$ the push & pull explanatory variables, μ_i the country unobserved fixed effect and $\varepsilon_{i,t}$ the observation specific errors.

Autocorrelation between the lagged dependent variable and the fixed effect disturbance term, known as 'dynamic panel bias' (Nickell, 1981), prevents the use of usual estimation models, particularly with not strictly exogenous variables since they are endogenized when differentiated. For dynamic panel data models, the generalized method of moments (GMM) is the best designed estimator, particularly

[12] The authors of the latter paper point out that these results must therefore be taken with caution.

[13] Africa/Middle East: Egypt, Lebanon, Morocco, Nigeria, Saudi Arabia, South Africa, United Arab Emirates.
Latin America: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Venezuela.
Emerging Asia: China, India, Indonesia, Malaysia, Philippines, South Korea, Thailand.
Emerging Europe: Bulgaria, Czech Republic, Hungary, Poland, Romania, Russia, Turkey, Ukraine.

[14] Australia, Belgium, Canada, France, Germany, Hong Kong SAR, Italy, Japan, Luxembourg, Netherlands, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States.

for ‘small T, large N’ panels and instrumentalized lagged endogenous explanatory variables (Roodman, 2006). With finite and small cross-sectional samples, the System GMM estimator is more efficient than the Difference GMM estimator (Blundell and Bond, 1998; Soto, 2009). Simultaneous and distinct instrumentation of equations in levels and differences renders instruments exogenous from fixed effects. This reduces finite sample bias and estimator inaccuracy, even with non-normal and heteroskedastic errors. Finally, one-step System GMM is as efficient as two-step System GMM for small panels, even considering the Windmeijer correction (2005) (Blundell and Bond, 1998; Soto, 2009).

After Breusch-Pagan/Cook-Weisberg (1979, 1983) and Koenker (Koenker and Bassett, 1982) tests, a heteroskedastic structure of the residuals is retained[15]. This covariance matrix correction[16] also considers autocorrelation within panels, revealed by Wooldridge test (2002).

Regarding the ‘too many instruments’ problem, we follow Roodman’s (2008) recommendations by limiting the lag length (here, to one period) and by collapsing the instrument set[17]. This allows us to respect the hypothesis of non-correlation between first-differenced instrumentalized variables and fixed effects.

In order to validate the model, three specification tests are performed:

- The Arellano-Bond test for autocorrelation in first and second-differences, testing the validity of not strictly exogenous instruments.
- The Hansen J statistic test for one-step System GMM, robust to heteroskedasticity and autocorrelation. This test for over-identifying restrictions analyses the exogeneity of the instruments group.
- The difference-in-Sargan/Hansen test of instrument subsets exogeneity, respectively exogenous and not strictly exogenous instruments (Not reported).

Initially, unit roots have been investigated for all variables with second generation tests - Maddala and Wu (1999) and Pesaran (2007). No cointegration test is required, since no series contains unit root.

3.2. Variables.

The data tested in the central model are defined in the Appendix, Table A.1.

The flow of lending is measured using the amount outstanding on international claims from BIS reporting banks, vis-à-vis all sectors of activity in a given country. These are referred to as locational banking statistics (in million $, external position of banks, 6A) and this variable enables cross-border banking claims as a whole to be measured with great precision (Takats, 2010; BRI, 2012). This is consistent with the principles underlying national accounting, the construction of

[15] This structure of the residuals has been retained due to the low significance of tests.
[16] The ‘robust’ option calculates a sandwich-type covariance matrix of the estimated parameters, asymptotically efficient without hypothesis about its distribution or the model validity.
[17] The ‘collapse’ option reduces the number of instruments by creating an instrument for each variable and lag, instead of each period, variable and lag.

balance of payments and external debt statistics, and includes international transactions between parent banks and their affiliates. Explanatory variables are divided into two categories - pull and push.

3.2.1. The pull factors.

Growth and economic cycles in emerging countries are measured in terms of GDP per capita (*GDP/capita*) which is often considered as a country development indicator (Broto et al., 2008; Ghosh et al., 2011). GDP per capita is a useful indicator because it eliminates the size effect of a given country, compared to gross GDP. This structural variable allows for fine distinctions to be made between countries with similar growth rates. A higher level of economic development should attract capital.

The Standard and Poor's ratings (*Rating*) are used as a proxy for the economic fundamentals of each emerging countries. As a global indicator of a country's solvency, ratings are based both on quantitative and qualitative analyses, and provide a better overview of the general economic situation of a country than GDP, as they are less sensitive to cyclical factors. A higher rating must attract investors. In addition to this, ratings are common knowledge for investors, and, as specified in the regulatory framework, may be used to calculate the regulatory requirements. From a technical point of view, this also enables us to reduce the number of explanatory control variables and, incidentally, to limit potential issues relating to endogeneity and multicollinearity (Brana and Lahet, 2010).

From the financial point of view, we test the real interest rate differential (*differential*) between emerging market economies and the USA. This variable also serves to measure the carry trade strategies of national and international investors (Jeanneau and Micu, 2002). It may not be considered as a 'pure' pull factor as it has an international dimension. However, the relative stability of interest rates in the USA compared with those in emerging market economies allows us to classify it as a pull factor. Traditionally, an increase in this differential represents a greater relative return for investments in a given emerging market, and therefore attracts investments. Yet, at the same time, a surge in the differential also can be seen as a lower level of relative creditworthiness of the borrower country and, consequently, a potentially higher cost for servicing its debt. This therefore leads to a drop in the borrower's creditworthiness and a subsequent decline in lending inflow. The sign is therefore ambiguous.

Finally, a dummy variable (*BCBS*) of a value of 1 for Basel Committee member emerging countries is integrated into our regression analysis. Its sign is expected to be positive, as a reflection of the power of attraction engendered by the implementation of a regulatory framework in emerging market economies. Increased stability and regulation of the banking system in these countries would boost investor confidence, encouraging them to grant loans to Basel Committee member countries.[18]

[18] This variable has relatively low significance, or none at all, in the regressions as a whole.

3.2.2. The push factors.

The GDP of developed countries (*Developed Countries GDP*) represents the economic cycle of those countries as potential lenders. If the cycle improves, indicating that wealth has been created, then those countries find themselves in a better position to offer cross-border lending to emerging market economies (Jeanneau and Micu, 2002; Ferrucci et al., 2004; Broto et al., 2008; Ghosh et al., 2011). In addition to this, robust economic activity in developed countries provides a strong basis for greater risk-taking on the part of banking institutions, due to their increased loss absorbing capacity.

The value of the Standard & Poor's 500 index (*S&P 500*) is considered as a proxy of the overall financial environment in developed markets (Broto et al., 2008). Strong, profitable markets facilitate business in the banking sector as a whole and foster increased funding of banking activity itself. This in turn boosts credit availability and, *in fine,* increases the inflow of international bank lending into emerging market economies.

Analysis of the push variables relating to the cost of implementing Basel III is the new ground this paper aims to cover. We define variables enabling us to measure the content of the Basel III Accord and its effects with greater accuracy than that provided by a mere dummy variable (Buch, 2000; Jeanneau and Micu, 2002) or the interest rate spreads of bank lending (BCBS, 2010; MAG, 2010; Kashyap et al., 2010; Ghosh et al., 2011; Slovik and Cournède, 2011). We thus strive to define a proxy for the cost of each component of the new regulation when a ratio is not available, and investigate them over the period between 1999 and 2010. This enables us to set forward an assessment of the potential impact each new requirement could have once Basel III comes into force.

We should first point out that the question of the cost of bank capital and debt is in direct line with existing studies on the impact of Basel III, which take the cost of bank credit as a consistent proxy for the effects of the regulatory framework (BCBS, 2010). Kashyap et al. (2010) discuss the hypothesis that the cost of capital is superior to that of debt and so increases the cost of banking intermediation. They conclude that an increase in capital would only ever affect the cost of loans by a small amount, which they estimate at 6 basis points. Miles et al. (2010) go so far as to question the relationship between equity and the cost of loans. Indeed, the cost of loans is not solely linked to the question of regulation and banks can take a wide range of actions to reduce it (Elliot, 2009; Santos and Elliot, 2012). Confirmation of this idea may be found in the paths taken by interest rate spreads on bank loans in the wake of implementation of the two previous Basel Accords, since spreads dropped by 10%[19] between 1990 and 2010, even though a number of studies had predicted dramatic rises (Reisen, 2001; Griffith-Jones and Spratt, 2001; Figuet and Lahet, 2007). Thus, instead of examining the cost of assets (the interest rates on bank loans), we focus on the cost of liabilities distributed

[19] Source: World Bank, World Development Indicators. Authors' own calculations.

between capital and debt, in other words, the cost of financing the banking activity. This in turn enables us to differentiate between the dynamics of these two variables.

The cost of capital is the keystone of this paper, in that it is connected not only with the capital ratio, but also with the conservation and countercyclical capital buffers and the capital surcharge required for Globally Systemically Important Banks. In this paper, the cost of capital (*Cost of capital*) is approximated by using the Return On Average Equity of the 500 largest banking institutions in developed countries.[20] We work on the basis of a positive relationship between the cost of capital and ROE, in line with Berger (1995), Nier and Baumann (2006) and Flannery and Rangan (2008). A consensus seems to converge on a fall in the cost of capital, and therefore of ROE, due to a decline in bank risk or profitability in the wake of compliance with the new requirements (Elliot, 2009; BRI, 2010; Kashyap et al., 2010; MAG, 2010; Cosimano and Hakura, 2011; Miles et al., 2011; Santos and Elliot, 2012). Still, we might also see a surge in the cost of bank funding since capital is more risky than other alternative funding resources and does not qualify for similarly advantageous tax breaks. Yet this would be overlooking the decrease in the level of individual and collective risk of banks, due to the restructuring of their balance sheets. An increase in the cost of bank activities does, however, seem likely, and remains dependent on the difference between the marginal cost of capital stock, cheaper in the short run, and the marginal cost of the inflow (i.e. the raising) of capital, in the wake of the increase in both the quantity and quality of regulatory requirements (Myers and Majluf, 1984; Kashyap et al., 2010; Cosimano and Hakura, 2011; Ghosh et al., 2011). How the cost of capital will progress in the wake of Basel III seems uncertain. In this light, what could be the impact of the new regulatory requirements on the volume of banking claims held on emerging countries?

An increase (or decrease) in the cost of capital, and therefore in the cost of bank liabilities, means that a bank will be looking out (or not) for more profitable and therefore more risky strategies, in order to maintain a balance between the cost of its assets and liabilities. This endeavour might profit emerging market economies, as the spreads there are on average 4.5% higher than in developed countries over the same period of time.[21] The sign of the relationship between the cost of capital (ROE) and the volume of bank claims on emerging markets economies is therefore positive. This might run contrary to the regulator's aim, in that it heightens the level of risk undertaken by banks. The latter argument is consistent with banking theory, as the objective function of a bank is to minimise risks on its equity under a return constraint (Markowitz, 1952).

We then test the average cost of debt (*Cost of debt*) to address the second main component of bank liabilities, by using the ratio of 'interest expense on average interest-bearing liabilities' of the

[20] Until now, in literature on the determinants of the bank lending flows, and notably FDI to Eastern European countries, ROE, which measures the capacity of a business to generate return on its own equity, has generally been considered as a sign of good health in banks (Cosimano and Hakura, 2011; Bruno and Shin, 2012; ECB, 2010; just like the ROA). An increase in this variable is the sign of greater return for a bank and should therefore have a positive effect on the supply of lending in general, including to emerging market economies.
[21] Source: World Bank, World Development Indicators. Authors' own calculations.

500 largest banking institutions in developed countries.[22] This variable is directly tied to the cost of capital as, in both cases, we focus on the cost of bank liabilities (divided between capital and debt). A positive effect on claims held on emerging market economies is dependent on the relation between risk/return/cost being respected. An increase (or decrease) in the cost of debt leads to more (or less) risky investments in order to maintain bank profitability. Its sign is therefore expected to be positive.

Finally, we combine the push factors with the international banks' leverage ratio (*leverage ratio*), based on data from Bankscope. This variable corresponds to the average leverage ratio (= Equity/Total Assets) of the 500 largest banking institutions in developed countries. Its expected sign is negative, and this for two reasons. Firstly, a rise in the leverage ratio should result in a drop in bank risk-taking (Kashyap et al., 2010; Miles et al., 2011; Slovik, 2011), and should therefore trigger a fall in credit supply. Secondly, as we are dealing here with a ratio, adjustments can be made by both the numerator and/or denominator. This can be dramatic in a period of economic stress, as deleveraging is often seen as the easiest way to bring ratios back into compliance with regulatory requirements. An increase (or decrease) in the ratio may subsequently be caused by a decrease (or increase) in assets, and more particularly in terms of international claims, notably on emerging market economies.

We also test the regulatory Tier 1 capital ratio (*Tier 1 ratio*) of the 500 largest banking institutions in developed countries. Tier 1 ratio is a cornerstone of Basel requirements and is used to measure a given bank's level of solvency. As it is closely correlated with the leverage ratio, we decide to test these variables separately. From the technical point of view, this variable corresponds to former definitions of Tier 1 ratio available from Bankscope.[23] Barely 20 to 40% of the banks analysed publish their ratios. We might therefore suppose that the banks which do make data available have the best Tier 1 ratio, since in 2010, the median ratio was 12%, with a mean exceeding 13.5%. This is twice the level required by Basel III, which demands compliance with a ratio of 6% for 2015. A higher Tier 1 ratio, more demanding in terms of quantity and quality, would be expected to have a negative impact on credit allocation.

Finally, concerning the two liquidity ratios set by Basel III (LCR and NSFR) for which no data is yet available, the first proxy we use is the effective Federal Funds rate (*Cost of liquidity ST*). Generally speaking, this variable is tested as a traditional push factor. This assumption holds true for this study, but this variable is specifically included among other Basel III variables. The rate of the Fed Funds represents the cost at which American banks lend short-term liquidities to each other, on the basis of their reserve requirements deposited with the Federal Reserve. The Basel Committee (BCBS, 2010) considers eligible assets deposited with the Central Bank as high-quality liquid assets. The Fed Funds rate may therefore be interpreted as the cost of regulatory requirements in terms of short-term liquid assets. American interest rates are usually considered as a proxy for international

[22] Demirgüç-Kunt and Huizinga (2004) use this ratio as a dependent variable seen as representative of the cost of bank debt, and this to study the impact of market discipline and insurance deposit mechanisms on the cost of bank liabilities. They withdraw the sovereign interest rate to eliminate the risk-free interest rate.

[23] Common Equity Tier 1 ratio would doubtless have been a more interesting variable, but no data is available to date. This is also why it does not figure in the central regression.

returns in developed countries. Calvo et al. (1993) obtained a negative sign for the flow of lending into emerging market economies - higher returns in the US maintain investments in the country. Yet Jeanneau and Micu (2002) obtained a positive sign, revealing the procyclicality of the economic situation in the lender country involved in granting credit to foreign borrower countries. Here, we analyse this variable as a cost for the lender bank. An increase in interest rates indicates a rise in the cost of liquidity, and therefore an uptrend in the cost of 'resources,' leading to a drop in the volume of credit. This might also reflect a period of financial stress on the money market, and a subsequent decline in investments associated with a higher level of risk, including those in emerging markets. We also test the 3-year Treasury yield curve rates[24] (*Cost of liquidity LT*), taken as a proxy of the cost of the available amount of stable funding and so, a clear expression of the effects of NSFR. As the aim of the NSFR is to bring the maturity of liabilities into line with that of bank assets, the rate of T-Notes may therefore be interpreted as the cost of the bank emitting longer dated assets in order to achieve this. It is important to point out that this would be the minimum cost the bank could achieve to finance its long-term activities, since bank equities and debt securities are more risky and are therefore more costly than American bonds. As liquidity has a cost, a negative sign is expected, as for the Fed Funds rate. We should also remember that this goes against findings to date in the literature, for which a positive coefficient is obtained (Hernandez and Rudolf, 1995; Fernandez-Arias, 1996), given that T-Notes are generally used as a proxy for international return on investments. From a technical point of view, variables relating to the cost of short-term and long-term liquidity are closely correlated, both to the variable relating to the cost of debt and to each other – they are not, therefore, regressed together. We also test the only liquidity ratio presently available – 'liquid assets/ total sum of deposits and borrowings', even if this constitutes an unsatisfactory measure of liquidity ratios as it does integrate equity.

We would have liked to test other traditional push variables, but owing to difficulties relating to correlation, this was not possible. As for the money supply of developed countries, the main problem here arises from its inertia. Current value depends inherently on lags and this problem may only be eliminated after a double differentiation, divesting the variable of associated information. Moreover, the money supply and Fed Funds rates are closely correlated. This may be explained by their cyclical nature and, in research carried out hitherto, they are alternately used as proxies for global liquidity. We prefer to consider the Fed Funds rates as a variable of Basel III. Nor should we forget the VIX, which is used to measure the extent of economic/financial stress and/or the appetite for risk-taking (Takats, 2010; Comelli, 2012). As a variable, the VIX is a measure of market stress and is correlated with other variables that are also sensitive to these effects. In this paper, these variables mainly include the S&P 500 index (itself used as a basis for calculating the VIX), the Fed Funds rates

[24] The 1-year Treasury yield curve rate was also tested, but the results obtained were less conclusive.

and the leverage ratio. The latter two present the greatest interest, as they are used as proxies for the Basel III requirements. The Fed Funds rates are also good captors of tension in banking markets, and this too is pertinent for our research. Moreover, the strong presence of unit roots diminishes the information available when the necessary double differentiation of the volatility index is carried out. For Bruno and Shin (2012), the VIX is used as a proxy for the converse effect of the international banks' leverage ratio due to the latter's procyclicality and their empirical relationship. This might explain the correlations uncovered in our study. We opt to include in our tests a leverage ratio corresponding to that specified by the Basel Committee.

4. Empirical results.

4.1. Baseline estimations.

We conduct our empirical investigation in successive steps and by groups of variables. We begin with traditional push & pull variables (column: GMM PP) and then, one by one, with each variable representing the effects of Basel III in turn (columns: GMM Cost of capital to GMM BCBS). The GMM Central regression column contains all the core variables and provides the basis for discussion of our results. The columns entitled GMM Alter1, GMM Alter2 and GMM Alter3 offer alternatives to the central model as a means of accounting for the correlation between specific variables that cannot be regressed together. The GMM Alter1 model therefore replaces the variable corresponding to the leverage ratio with that corresponding to Tier 1 ratio; the GMM Alter2 model replaces the variable corresponding to the cost of debt with that corresponding to the cost of short-term liquidity (Fed Funds rate); the GMM Alter3 model replaces the variable of the cost of debt with that corresponding to the cost of long-term liquidity (3-year Treasury yield curve rate).

Table 1. One-step System GMM.

Variable	GMM PP	GMM Cost of capital	GMM Cost of debt	GMM Leverage ratio	GMM Tier 1 ratio	GMM Cost of liquidity ST	GMM Cost of liquidity LT	GMM BCBS	*GMM Central*	GMM Alter1	GMM Alter2	GMM Alter3
Lagged variable	0.3038***	0.5055***	0.3128***	0.2994***	0.3193***	0.2954***	0.1480**	0.3193***	*0.5109****	0.5400***	0.5351***	0.6119***
	3.98	7.69	4.47	3.61	4.15	3.82	2.23	4.42	*7.27*	7.81	6.87	8.38
GDP/capita	0.3339**	0.3999**	0.3449**	0.330**	0.3279**	0.3638**	0.3654**	0.3180**	*0.2938***	0.3292**	0.3514**	0.3675**
	2.27	2.63	2.15	2.23	2.28	2.24	2.19	2.19	*2.11*	2.29	2.25	2.62
Rating	0.0754***	0.0503***	0.0738***	0.0755***	0.0766***	0.0740***	0.0898***	0.0687***	*0.0467***	0.046***	0.0457**	0.0355**
	3.95	2.92	3.63	3.9	4.44	3.72	3.70	3.42	*2.68*	2.78	2.72	2.06
Differential	-0.0008	-0.0005	-0.0007	-0.0008	-0.0013	-0.0008	-0.0017	-0.0009	*-0.0005*	-0.0013	-0.0003	0.0019
	-0.39	-0.26	-0.38	-0.39	-0.61	-0.39	-0.62	-0.46	*-0.3*	-0.63	-0.2	1.34
Developed countries GDP	0.6717**	1.2293***	0.7365***	0.5832	0.5172**	0.8579***	0.8886***	0.8297***	*0.3163*	1.0378***	0.6621	1.3893***
	2.65	4.63	2.86	1.65	2.11	3.16	3.26	2.9	*0.87*	3.83	1.66	3.26
S&P 500	0.2744***	0.1088**	0.3047***	0.2925***	0.2274***	0.3310***	0.2125***	0.2737***	*-0.1028*	-0.1357	0.1097	0.2949***
	6.46	2.52	4.55	4.49	4.77	6.1	3.59	6.4	*-1.15*	-1.64	1.49	4.2
Cost of capital		0.0431***							*0.0672****	0.0516***	0.0516***	0.1015***
		7.45							*13.8*	8.55	8.69	9.56
Cost of debt			-0.0271						*0.2451****	0.1368*		
			-0.54						*4.42*	1.74		
Leverage ratio				-0.0746					*-0.6428****		-0.4279*	-0.4712*
				-0.35					*-2.76*		-1.74	-1.86
Tier 1 ratio					-0.3190**					-0.3910**		
					-2.57					-2.08		
Cost of						-0.0232					0.0287	

liquidity ST					-1.32						1.44	
Cost of liquidity LT							0.0278 1.11					-0.2136*** -6.81
BCBS								0.0945** 2.21	*0.0750* *1.57*	0.1282** 2.53	0.0386 0.82	-0.0304 -0.68
Constant	-2.1054*** -6.93	-0.9191*** -2.96	-2.3231*** -4.96	-2.2279*** -4.88	-1.7531*** -5.02	-2.5202*** -6.57	-1.6937*** -3.76	-2.0978*** -6.83	*0.663* *1.07*	0.8571 1.49	-0.8747* -1.7	-2.2352*** -4.55
ar1p	0.0008	0.0008	0.0009	0.0007	0.001	0.0011	0.0002	0.0007	*0.0008*	0.0005	0.0008	0.0007
ar2p	0.1343	0.2559	0.1545	0.11	0.1943	0.1702	0.18433	0.1277	*0.1838*	0.1438	0.212	0.1411
Hansenp	0.4972	0.4493	0.4446	0.4815	0.468	0.4156	0.4904	0.5157	*0.6817*	0.4242	0.5075	0.8790
N° instru.	36	36	36	36	36	36	37	37	*37*	37	37	37
N° obs.	360	360	360	360	360	360	360	360	*360*	360	360	360

Notes: *, ** and *** represent significance respectively at 10, 5 and 1% level. Coefficients and t-statistics are reported. Are also reported p-statistics for Arellano-Bond AR(1), AR(2) and for Hansen-Sargan tests. The null hypothesis for Arellano-Bond AR(1) test is the absence of first-order residual autocorrelation. The null hypothesis for Arellano-Bond AR(2) test is the absence of second-order residual autocorrelation. The null hypothesis for Hansen-Sargan test is the validity of instruments.

In the central regression (column: GMM Central), the volume of claims can be explained by claims received in the previous year, pointing to an underlying continuity and pattern in the supply of funds provided by international banks. This points to the fact that pre-existing financial ties and familiarity with the borrower play a role in determining whether a project is funded or not.

As for the pull variables, GDP per capita and rating constantly prove to be significant with the expected positive sign. The differential in interest rate does not seem to play a significant role, and this suggests that the flow of bank lending serves a more essentially productive objective than a financial, or even, speculative one. The control push variables are not statistically significant in the central regression, but do have the expected sign when they are significant in other models. In fact, only the push variables representing the Basel III requirements are shown to be significant in the central model - the cost of capital and the cost of debt have the expected positive sign, and the leverage ratio has the expected negative sign. We might interpret this result as follows - the specific economic cycle of the borrower country and regulatory requirements and environment of banking institutions have more influence on the decision to hold a claim on an emerging country than the national economic situation of the lender banks' home country.

As a variation on the central model (column: GMM Alter1), we replace the 'leverage ratio' variable by the 'Tier 1 ratio' variable (as defined in Basel II). In this set-up, the sign of the variable is significantly negative, whether tested together with the push & pull control variables (column: GMM Tier 1 ratio) or in the central regression. This underlines the highly negative impact of Tier 1 ratio on the flow of claims. The lagged dependent variable, along with variables relating to GDP per capita, rating, the cost of capital and the cost of debt are all significant and maintain their sign. The GDP of developed countries becomes significant as a push factor with a positive sign, as does the pull variable 'Basel Committee member'. The low significance level of the latter within all the regressions tends to prove that being a member of the Committee is not in itself a factor of quality. One explanation for this might be that belonging to the BCBS is not synonymous with full compliance with Basel requirements, as in the case of some developed countries where the regulatory framework is not completely enforced.

When the 'cost of debt' is replaced by the 'cost of short-term liquidity' (column: GMM Alter2), the variable is not significant, as is also the case when it is added in isolation to the control push and pull factors (column: GMM Cost of Liquidity ST). The other push and pull variables also maintain their sign and significance compared to the central model.

Finally, if we replace the 'cost of debt' by the 'cost of long-term liquidity' (column: GMM Alter3), the variable is significant and its sign is negative as expected. Other variables relating to GDP per capita, rating, cost of capital and the leverage ratio remain significant and their signs are as expected. The variables corresponding to the GDP of developed countries and the S&P 500 index become significant and their sign is positive as expected.

We may observe, then, that the cost of capital is highly significant and that its sign is always positive as expected. The cost of debt is also significant in full models. The leverage ratio is always significant in these regressions and its coefficient is the highest in the central regression model (-0.6428), thereby appearing as the most restrictive regulatory requirement for international banks holding claims on emerging market economies. Tier 1 ratio is also systematically significant. The long-term cost of liquidity is only significant in the full model (column: GMM Alter3), while the cost of short-term liquidity is never significant.

The use of coefficients enables us to assess the potential impact of Basel III on cross-border banking claim flows. In its Quantitative Impact Study, the BCBS (2010) estimates that the capital shortfall of Group 1 banks will be 2.1 percentage points (pp),[25] given adjustments to the ratio (8.4% of capital already held and a target of 10.5%[26]). Yet the BCBS (2010) envisages that a 1 pp increase in capital requirements may be compensated by a 2 pp drop in ROE (cost of capital) for a 10% theoretical ROE, close to historical values for the period considered (10.11%), i.e. an overall contraction of 42%. If we consider its coefficient in the GMM Central column (0.0672), this drop in the cost of capital would trigger a 2.82% fall in the inflow of claims on emerging market economies.

The cost of debt is expected to increase by 14.22%, due to its negative correlation with the cost of capital (-33.86%[27]). Associated with the coefficient of 0.2451 relating to the cost of debt in the central regression, this would generate an inflow in banking claims on emerging countries of 3.49%.

Moreover, the QIS (2010) indicates that banks will have to increase their minimum leverage ratio by 0.2 pp (2.8% already held and a target of 3%). If we apply the leverage ratio coefficient of -0.6428 from our estimations, an increase of 7.14% in the ratio would trigger a 4.59% decline in the growth rate of banking claims on emerging market economies.

The QIS also indicates that Tier 1 ratio would need to increase by 34.92%, going from 6.3% to 8.5% in 2019, including the conservation buffer. In our analysis, this would lead to a 13.65% drop in

[25] Banks with excess Tier 1, which are well diversified and internationally active.
[26] This objective integrates the capital ratio and the conservation buffer, but not the countercyclical buffer or the capital surcharge for systemic institutions.
[27] Results not reported.

the inflow of banking claims, on the basis of a Tier 1 ratio coefficient of -0.3910 in the column GMM Alter1.

Similarly, to comply with the specifications relating to liquidity, the banks will have to increase their LCR by 17% and their NSFR by 7%. As far as LCR is concerned, the non-significance of the proxy for its cost in our estimations indicates that this requirement should not impact the inflow of international banking claims. However, compliance with the NSFR might well reduce the growth rate of claims by 1.50% in the light of the coefficient of the proxy for its cost (-0.2136, column: GMM Alter3). We postulate that the increased requirements made on banks in terms of liquid assets will be transferred entirely and equally to claims' costs. This would mean that an increase of 7% in the NSFR would result in a 7% surge in the cost of this source of funding for banks.

Ultimately, on the basis of the QIS and our own estimations, the Basel III Accord is likely to have a noticeably negative impact on cross-border banking claims on emerging market economies. Indeed, the combined effect of the new requirements would produce a potential maximum drop in the overall inflow of claims of 19.08%. Yet although this provides us with a global vision of the impact of the new regulatory requirements, these results must be taken with some caution. On the one hand, they do not take into account the potential synergies of different norms, the potential adjustments operated by banks or possible changes in the behaviour of lender institutions. The increase in capital requirement imposed for high risk assets should encourage banks to concentrate their activity on less risky, more liquid assets, thereby leading to a drop in capital and liquidity adequacy requirements. The transitional period should allow banking institutions to progressively rebalance their portfolios in order to avoid abrupt restructuring. Furthermore, the banks will be able to optimise their asset/liability management in accordance with the new requirements and play on the revenue generated by fees and consultancy activities. One might also argue that the increase in liquid asset requirements will not necessarily lead to a perfectly equal increase in their cost. In the case of the LCR, it is unlikely that the increase in demand for this type of asset will trigger an upward trend in its cost (which is consistent with the non-significance of this variable). Conversely, the increase in bank demand for long-term funding might raise its cost.

4.2. Robustness checks.

A variety of robustness checks are carried out using, among others, Generalised Least Squares, first with a static and then dynamic model,[28] with panel-specific AR1 auto-correlation structure (Appendix Table A.2 and Table A.3). The tests are applied to the central model and the 3 alternative models, and they confirm the significance and signs of the whole set of Basel III variables - cost of capital, cost of debt, leverage ratio, Tier 1 ratio and the cost of long-term liquidity - along with

[28] Even if we are fully aware of the problems connected with a model of this type, it is justified by the static model used and the corrections introduced.

traditional push & pull variables. The GDP of developed countries and the S&P 500 index are sometimes significantly positive, but the differential in interest rates and cost of short-term liquidity (model Alter2) remain non-significant. These two tests bring additional robustness to our one-step System GMM estimators. It is quite apparent in all the regressions that the specific economic cycle of the borrower country and regulatory requirements and environment of lender banks exercise greater influence on the decision to hold a claim than the banks home country's economic situation.

Then (results not reported), we modify the dependent variable and restrict the flow of claims to bank loans alone. Data is taken from the locational banking statistics of the BIS (Loans, 7A). The results hold true for the lagged dependent variable, GDP per capita, rating and some Basel variables (cost of capital, sometimes the cost of debt, the leverage ratio, with the highest coefficient (-0.8209), and the cost of long-term liquidity). Once again, the traditional push variables (GDP of developed countries and S&P 500 index) have relatively low significance and the interest rate differential is never significant. This strengthens our central model and proves that the financial cycle of a given bank's home country exerts relatively little influence on the flow of international banking claims compared with the economic situation in the borrower country and regulation.

In order to test the robustness of our 'cost of debt' variable, we replace it with the 'total interest expense' variable (Source: Bankscope). Sometimes, this variable is significantly positive, just like the variable it is replacing. This change does not alter results for the lagged dependent variable or variables of GDP per capita, rating, the cost of capital, leverage ratio and Tier 1 ratio, thus strengthening our stance. Despite its significance, the 'total interest expense' variable is not retained in the central model as it includes equity interest expenses and is, therefore, too greatly prone to correlation with the cost of capital.

Next we replace the effective Fed Funds rate by that of the 1-month Libor rate in order to measure the cost of short-term liquidity. The Libor rate does not prove to be significant either, but the Fed Funds variable appears to be more pertinent for our purpose. The lagged dependent variable and the GDP per capita, rating, cost of capital, leverage ratio and Tier 1 ratio variables maintain their significance and sign.

We also replace the cost of liquidity with the only liquidity ratio hitherto available from Bankscope: Liquid Assets/Total Borrowings and Deposits. Once again, this variable is not significant and the other group of variables maintains both their significance and sign.

Moreover, we investigate the period of financial turmoil using dummies for the years 2007, 2008, 2009, 2007/2008, 2008/2009 et 2007/2009 and test them in turn. They are not found to be significant, as they are closely correlated with the cyclical variables, notably the Fed Funds rate deemed more pertinent to our study.

Other robustness checks looked at sample size (results not reported).

First, tests are carried out according to lender banks' nationality, thus obliging us to modify the variables relating to cost of capital, cost of debt, leverage ratio and Tier 1 ratio. When the sample is restricted to Japanese banks alone, the significant variables with the expected sign are: lagged dependent variable, GDP per capita, rating, GDP of developed countries and the S&P 500 index. However, only the leverage ratio (and only in the Alter2 model), the Tier 1 ratio and the dummy variable prove to be significant. Therefore, the effect of regulation is shown to be less restrictive in this area of the world because of the low level of significance of the Basel variables and the weakness of their coefficient in comparison with other regions. This is consistent with literature on the subject (Otker-Robe et al., 2010; Slovik and Cournède, 2011).

As for American banks, results are similar for the lagged dependent variable and variables of GDP per capita, rating, GDP of developed countries, cost of capital, cost of debt, leverage ratio, Tier 1 ratio and the cost of long-term liquidity. In this case, the leverage ratio is the most restrictive requirement compared to the other Basel variables (up to -0.9295 in the Alter2 model), but also compared to other geographic zones (depending on individual tests; maximum value -0.1450 in Japan and -0.2448 in Europe). This result appears consistent, as it is the only requirement American banks have applied up until today.

When we focus on international European banks, the results remain unchanged for lagged dependent variable and variables of GDP per capita, rating, GDP of developed countries, cost of capital, cost of debt, leverage ratio and the cost of long-term liquidity. It is therefore in Europe that the Basel requirements could have the greatest negative impact on the flow of claims (depending on individual tests; maximum value of cost of capital = 0.1014, of cost of debt = 0.1456, of leverage ratio = -0.2448, of cost of long-term liquidity = -0.1826). This is consistent with literature on the subject which suggests that Europe will be the area of the world in which the impact of the new regulatory framework will be most strongly felt, and that European banks will be those most greatly affected by the new Accord (Otker-Robe et al., 2010; Ghosh et al., 2011; Slovik and Cournède, 2011). Indeed, as early as 1996, European Commission directives made compliance with the Basel ratios, and notably the capital ratio, obligatory, while in Japan a whole series of exemptions were available for the first two implementations of Basel, and in the United States, Basel II was recommended for only 20 major commercial banks, and even then they were given until 2008-10 to comply. Moreover, in the years between 2000 and 2010, European banks were, on average, involved in more than 60% of the total claims on emerging countries in our sample. In this light, the regulatory requirements imposed on European banks will almost certainly reduce cross-border bank lending to emerging market economies.

Finally, when we examine the 20 core emerging countries in our sample, as defined by the MSCI (minus Taiwan)[29], the results remain stable for the lagged dependent variable, and for GDP per capita, rating, cost of capital, cost of debt, leverage ratio and long-term liquidity. In this model, neither Tier 1 ratio nor the cost of short-term liquidity are significant, no more than the BCBS dummy. Classic push variables show a low level of significance. We might argue then that the economic cycle in the borrower country and the regulatory requirements of lender banks influence the attribution of international claims more strongly than the macroeconomic or financial situation of the lender bank's home country.

Our results are, then, extremely stable for the lagged dependent variable and variables relating to GDP per capita in emerging markets, rating and cost of capital (positive sign). The leverage ratio and the cost of long-term liquidity have their negative sign. Other regularly significant variables include those relating to the cost of debt (positive sign), Tier 1 ratio (negative sign), the GDP of developed countries and the S&P 500 index (positive sign). Along with the traditional pull variables, the push variables of Basel provide ample explanation for the inflow of claims held on emerging market economies. Conversely, the economic cycle in the developed countries concerned is shown to be less important than the regulatory framework and the economic situation in the emerging countries.

5. Conclusion.

Our simulations show that reduction in the cost of bank capital linked to the drop of risk in the banking system (as the Basel Committee target) is likely to trigger a decline in the flow of banking claims on emerging market economies. To this must also be added the impact of the cost of long-term liquidity and an increase in the leverage ratio. The latter has the greatest impact on lending flow coming out of the United States (-0.9295 against -0.1450 in Japan and -0.2448 in Europe). If we take into consideration a possible drop in the cost of bank capital of 42%, as extrapolated from the QIS (2010), the inflow of banking claims on emerging markets will drop by 2.82%. This effect should however be compensated by an uptrend in the cost of debt (+14.22%), calling for an inflow of banking claims of 3.49% in order to balance the cost of assets with that of liabilities. A leverage ratio of 3% would be likely to limit the growth rate of lending flow by 4.59%. Yet the greatest impact would concern Tier 1 ratio, as covering the shortfall caused by compliance with Basel III (+34.92%) would lead to a drop of 13.65% in the inflow of cross-border claims. As for new requirements for liquid assets, compliance will (according to our proxies) lead to a drop of 1.50% in the inflow of claims. Those results come entirely from the NSFR, as compliance with LCR seems to have no effect.

[29] Brazil, Chile, China, Columbia, Czech Republic, Egypt, Hungary, India, Indonesia, Malaysia, Morocco, Peru, Philippines, Poland, Russia, South Africa, South Korea, Thailand and Turkey.

All things considered, if the new regulatory framework were applied without additional changes in banking models, a maximum potential drop of 19.08% in the inflow of banking claims on emerging markets is likely, and this without modification in bank behaviour, with no transitional period and no synergies.

Similarly, our study underlines the importance of the profitability of banking institutions not only for them to be able to fund borrowers, but also for them to pursue their activity, build up capital[30], raise equity and contract debt at satisfactory rates. Nor should we forget the importance of the leverage ratio, as our study has proven it to be the most negative impact of Basel III.

We might be led to think that the varying degree of constraint imposed by the new requirements would encourage international banks to adapt their lending strategies on the international stage by rebalancing their portfolios and subsidiary networks, variously impacting the banking sectors from one host country to another. Moreover, in the light of greater or lesser falls in the volume of cross-border claims, the emerging market economies might be tempted to seek alternative sources of funding by, for instance, developing their domestic bond market. This would be positive for their economic development, as it has been for Brazil and Mexico. As such initiatives would improve that country's rating (and even more so in years to come), they would then begin and continue to be seen as good borrowers, and all the more so in the light of the relative decline in the rating of developed countries. This might lead us to conclude that there will be less disruption in cross-border banking claims on emerging market economies than this paper at first led us to believe. The shadow banking system might also come into play, and any transfer of international bank assets to the latter would be worrying if a new crisis were to arise.

[30] Brunnermeier, Dong and Palia (2012) prove that less profitable banks contribute more to systemic risk.

APPENDIX.

Table A.1. Data description, construction and source.

Variables			Name	Construction	Source	Expected sign
Dependent variable			Cross-border banking claim inflows	Log-difference of the gross claims hold by BIS reporting banks located in developed countries on all sectors of emerging economy (i), at time t, end of period	Bank for International Settlements, Locational banking statistics	
Explanatory variables	***Pull*/domestic/ specific factors**	**Macroeconomic factors**	Emerging economy GDP per capita : GDP/capita	Log-difference of emerging economy (i) GDP per capita in current US$, at time t, end of period	International Monetary Fund, World Economic Outlook Databases	+
			Emerging economy rating : Rating	Log of emerging economy (i) Standard & Poor's rating, at time t, encoded in numerical values ranged from AAA=20 to SD=0	Standard & Poor's, Global Credit Portal, RatingsDirect®	+
		Financial factors	Emerging economy relative creditworthiness/Carry trade strategy : Differential	Difference between real interest rate in emerging economy (i) and real interest rate in the US, at time t, end of period	World Bank, World Development Indicators	+ /-
	***Pull*/domestic : Basel III**	**Dummy Basel**	Emerging economies members of the Basel Committee : BCBS	Dummy for emerging economy (i) member of the BCBS (1=BCBS; 0=otherwise), at time t		+
	***Push*/external/ global factors : classical**	**Macroeconomic factors**	Developed countries average GDP : Developed countries GDP	Log-difference of developed countries average GDP in current US$, at time t, end of period	World Bank, World Development Indicators	+
		Financial factors	International financial markets attractiveness/Business climate : S&P 500	Log of Standard & Poor's 500 adjusted closing price, in current US$, at time t	Thomson Reuters Datastream	+
	***Push*/external : Basel III**	**Solvability related Basel III factors**	Cost of bank capital : Cost of capital	Log-difference of the 500 biggest banks in developed countries in terms of net income in 2012 average ROAE, at time t, end of period	Bureau Van Djik's Bankscope Database	+
			Average cost of bank debt : Cost of debt	Log-difference of the 500 biggest banks in developed countries in terms of net income in 2012 average cost of debt (=Interest expense/average interest-bearing liabilities), at time t, end of period	Bureau Van Djik's Bankscope Database	+
			Leverage ratio : Leverage ratio	Log-difference of the 500 biggest banks in developed countries in terms of net income in 2012 average leverage ratio (=Equity/Total Assets), at time t, end of period	Bureau Van Djik's Bankscope Database	-
			Tier 1 ratio : Tier 1 ratio	Log-difference of the 500 biggest banks in developed countries in terms of net income in 2012 average Tier 1 ratio (Tier 1 regulatory capital ratio), at time t, end of period	Bureau Van Djik's Bankscope Database	-
		Liquidity related Basel III factors	Short term cost of liquidity : Cost of liquidity ST	Log-difference of the effective Federal Funds rate, at time t, end of period	Federal Reserve Bank of New York, Federal Funds Rate Data	-
			Long term cost of liquidity : Cost of liquidity LT	Log-difference of the 3 years US Treasury Notes average daily yield curve rate, at time t	U.S. Department of the Treasury, Daily Treasury Yield Curve Rates	-

Table A.2. Feasible Generalized Least Squares static central.

	FGLS PP	FGLS Cost of capital	FGLS Cost of debt	FGLS Leverage ratio	FGLS Tier 1 ratio	FGLS Cost of liquidity ST	FGLS Cost of liquidity LT	FGLS BCBS	FGLS Central	FGLS Alter1	FGLS Alter2	FGLS Alter3
GDP/capita	0.3132***	0.3615***	0.3083***	0.3115***	0.3031***	0.3399***	0.3186***	0.3055***	0.2970***	0.3146***	0.3552***	0.3198***
	4.42	5.12	4.2	4.38	4.33	4.62	4.39	4.30	4.21	4.45	4.90	4.63
Rating	0.1314***	0.1318***	0.1316***	0.1310***	0.1372***	0.1290***	0.1319***	0.1282***	0.1308***	0.1346***	0.1310***	0.1276***
	6.48	6.39	6.49	6.54	6.76	6.29	6.47	6.23	6.56	6.50	6.52	6.49
Differential	-0.0004	-0.0007	-0.0004	-0.0004	-0.0006	-0.0005	-0.0005	-0.0005	-0.0007	-0.0007	-0.0007	-0.0003
	-0.63	-0.90	-0.62	-0.60	-0.80	-0.72	-0.68	-0.71	-0.93	-0.98	-0.89	-0.47
Developed countries GDP	0.9377***	1.4649***	0.9053***	0.8554***	0.8180***	1.0998***	0.9472***	0.9888***	0.7594**	1.3080***	1.1105***	1.4634***
	4.13	5.57	3.51	2.74	3.59	4.29	4.10	4.18	2.35	4.95	3.48	4.7
S&P 500	0.2737***	0.1463**	0.2631***	0.2896***	0.2221***	0.3227***	0.2632***	0.2700***	-0.0678	-0.0694	0.1845**	0.2719***
	5.16	2.35	4.02	4.37	3.91	5.23	4.17	5.07	-0.75	-0.76	2.13	4.07
Cost of capital		0.0233***							0.0487***	0.0329***	0.0284***	0.0625***
		4.02							6.10	4.43	4.00	6.35
Cost of debt			0.0114						0.2210***	0.1309**		
			0.27						4.18	2.39		
Leverage ratio				-0.0722					-0.5361***		-0.3199*	-0.4056**
				-0.45					-3.12		-1.91	-2.51
Tier 1 ratio					-0.3838***					-0.2609*		
					-2.83					-1.68		
Cost of liquidity ST						-0.0225					0.0055	
						-1.49					0.33	
Cost of liquidity LT							0.0074					-0.1537***
							0.35					-4.68
BCBS								0.0348	0.0069	0.0382	-0.0157	-0.0544
								0.83	0.16	0.84	-0.37	-1.28
Constant	-2.2304***	-1.3524***	-2.1528***	-2.3362***	-1.8514***	-2.5886***	-2.1568***	-2.2007***	0.2339	0.2043	-1.5957***	-2.2354***
	-5.92	-3.08	-4.58	-5.06	-4.57	-5.85	-4.83	-5.82	0.36	0.32	-2.61	-4.79
Chi2	172.3836	191.5118	172.7201	174.9787	186.4825	172.0054	172.4031	168.3539	227.0544	212.3820	200.0002	231.6744

Notes: *, ** and *** represent significance respectively at 10, 5 and 1% level. Coefficients and t-statistics are reported. A panel-specific first-order autocorrelation is considered. Chi2 is reported with the null hypothesis that coefficients are zero.

Table A.3. Feasible Generalized Least Squares dynamic central.

	FGLSD PP	FGLSD Cost of capital	FGLSD Cost of debt	FGLSD Leverage ratio	FGLSD Tier 1 ratio	FGLSD Cost of liquidity ST	FGLSD Cost of liquidity LT	FGLSD BCBS	FGLSD Central	FGLSD Alter1	FGLSD Alter2	FGLSD Alter3
Lagged variable	0.3002***	0.3935***	0.3022***	0.2971***	0.2991***	0.2929***	0.3113***	0.3080***	0.4067***	0.4201***	0.4091***	0.4306***
	6.83	9.16	6.82	6.76	6.81	6.63	7.05	6.98	9.94	10.05	9.56	10.63
GDP/capita	0.3821***	0.4514***	0.3859***	0.3720***	0.3835***	0.3966***	0.3982***	0.3717***	0.3747***	0.4123***	0.4153***	0.4095***
	5.52	6.73	5.43	5.34	5.58	5.56	5.67	5.35	5.74	6.23	6.19	6.51
Rating	0.0872***	0.0723***	0.0865***	0.0866***	0.0914***	0.0865***	0.0862***	0.0822***	0.0670***	0.0693***	0.0686***	0.0615***
	4.72	4.01	4.66	4.71	4.93	4.63	4.65	4.38	3.89	3.89	3.90	3.72
Differential	-0.0001	-0.0002	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	-0.0001	-0.0003	-0.0003	-0.0002	0.0002
	-0.12	-0.28	-0.13	-0.11	-0.33	-0.15	-0.2	-0.26	-0.46	-0.58	-0.31	0.30
Developed countries GDP	0.6685***	1.2023***	0.6975***	0.3967	0.5276**	0.7876***	0.6644***	0.7553***	0.1484	0.9714***	0.4572	1.2362***
	2.97	5.12	2.76	1.23	2.26	3.06	2.95	3.24	0.47	4.09	1.42	3.81
S&P 500	0.2580***	0.1125**	0.2712***	0.3122***	0.2232***	0.2996***	0.2274***	0.2563***	-0.0872	-0.1497	0.1568*	0.3207***
	4.95	2.02	3.82	4.49	4.03	4.60	3.82	4.91	-0.95	-1.63	1.84	4.91
Cost of capital		0.0359***							0.0623***	0.0489***	0.0444***	0.0876***
		6.00							8.40	6.66	6.62	8.79
Cost of debt			-0.0116						0.2421***	0.1519***		
			-0.27						4.91	2.63		
Leverage ratio				-0.2188					-0.7159***		-0.5592***	-0.5874***
				-1.18					-3.84		-2.93	-3.19
Tier 1 ratio					-0.3129**					-0.2961*		
					-2.40					-1.90		
Cost of liquidity ST						-0.0155					0.0243	
						-1.02					1.54	
Cost of liquidity LT							0.0227					-0.1947***
							1.08					-6.04
BCBS								0.0549	0.0354	0.0702*	0.0070	-0.0361
								1.49	0.99	1.84	0.19	-1.06
Constant	-2.0261***	-0.9926**	-2.1207***	-2.3923***	-1.7669***	-2.3298***	-1.8052***	-2.0094***	0.5162	0.9066	-1.2468**	-2.4543***
	-5.49	-2.52	-4.18	-4.96	-4.49	-4.99	-4.27	-5.44	0.80	1.39	-2.07	-5.39
Chi2	267.6274	346.6093	266.7268	271.1167	279.3125	261.9817	273.9880	263.1048	425.6168	404.1790	377.1586	446.3896

Notes: *, ** and *** represent significance respectively at 10, 5 and 1% level. Coefficients and t-statistics are reported. A panel-specific first-order autocorrelation is considered. Chi2 is reported with the null hypothesis that coefficients are zero.

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