The real impact of ratings-based capital rules on the finance-growth nexus

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ABSTRACT

We investigate whether ratings-based capital regulation has affected the finance-growth nexus via a foreign credit channel. Using quarterly data on short to medium term real GDP growth and cross-border bank lending flows from G-10 countries to 67 recipient countries, we find that since the implementation of Basel 2 capital rules, risk weight reductions mapped to sovereign credit rating upgrades have stimulated short-term economic growth in investment grade recipients but hampered growth in non-investment grade recipients. The impact of these rating upgrades is strongest in the first year and then reverses from the third year and onwards. On the other hand, there is a consistent and lasting negative impact of risk weight increases due to rating downgrades across all recipient countries. The adverse effects of ratings-based capital regulation on foreign bank credit supply and economic growth are compounded in countries with more corruption and less competitive banking sectors and are attenuated with greater political stability.

JEL: E44, F34, G21, H63.

Keywords: finance-growth nexus, cross-border banking, sovereign credit ratings, Basel 2, ratings-based capital regulation, capital requirements.

1. Introduction

Various episodes of financial crises on the global scale (the Global Financial Crisis, GFC, of 2007 and the Eurozone debt crisis of 2010) highlighted the inadequacies of the global banking regulatory architecture that had previously been in place. It sparked a renewed interest in reforming banking regulation worldwide. One contentious aspect of the global banking regulatory architecture remains is the ongoing adjustment of minimum risk-based capital requirements that are tied to borrower credit ratings to enhance financial resilience within banking systems. Most of the OECD countries implemented the regulatory risk-weights for determining increasing capital requirements under Basel 2 capital accord shortly before the GFC. Financial regulators have been criticized for their reliance on credit rating agencies as delegated information intermediaries for regulatory purposes. Moreover, Basel 2 was blamed, at least in part, as a potential cause of the GFC (Moosa, 2010 and Lall, 2009) which led to Basel 3 being promptly proposed in 2010. Since the core aspects of Basel 2 are retained in Basel 2, there is an urgent need to better understand the effects of the ratings-based capital rules on global banks' lending behavior.

Credit ratings have been used in determining minimum capital requirements for banks under the Standardized Approach to Credit Risk (Pillar 1) since the Basel 2 Accord. The ratings-based capital framework was first agreed to in 2004 by the regulators of the world's most active banks in G-10 countries, but the impetus for formally implementing the rules came at different times starting from January 2007.[2] The growth of international banks' foreign claims climbed to a peak of 34 trillion US dollars in 2007 before the GFC and became an

[2] The revised Basel 2 accord was an attempt to level the playing field and push convergence in capital standards for banking systems around the world as internationally active banks became more complex in their activities. The Basel Committee on Banking Supervision (BCBS) published a recommended regulatory framework consisting of three pillars of banking regulation. Pillar 1 specifically developed guidelines for the measurement of regulatory capital and risk-weighted assets. However, Basel 2 serves only as a recommended framework and national prudential regulators could choose *when* to implement the rules within their domestic banking systems. Furthermore, larger banks also had the option of utilising their own internal rating based (IRB) approaches for calculating capital requirements.

important source of financing as banks became increasingly globalized, and risks became more readily transmitted across borders (Cetorelli and Goldberg, 2012). However, this credit channel dried up significantly during the GFC when international banks retrenched and pulled back on their foreign bank lending as they faced major funding shortages (Claessens, 2017; Gianetti and Laeven, 2008; De Haas and van Horen, 2013; Udell and Popov, 2012). Thus, it is important to examine the effects of the use of ratings-based capital rules on the foreign credit channel with on-going debates over the effectiveness of higher risk-weighted bank capital requirements coming under the Basel 3 reforms to be fully implemented by 1 Jan 2022.

It is important to understand the behavior induced by ratings-contingent regulation as it can potentially create perverse incentives for banks to engage in correlated asset choices ex-ante (Acharya et al., 2012). Specifically, there is a risk that ratings-based regulation can induce banks to over-weight their lending portfolios to sovereign borrowers with relatively low risk weights for regulatory capital charge purposes. Consistent with this idea, Acharya and Steffen (2015) show that the under-capitalized European banks had engaged in regulatory arbitrage and exploited the low risk weighting of peripheral European sovereigns under Basel 2 and also the Capital Requirements Directive within the European Union. They revealed that European banks strategically borrowed from wholesale short-term funding markets to fund purchases of higher yielding sovereign bonds issued by GIIPS (Greece, Italy, Ireland, Portugal and Spain) governments in the lead up to the European Sovereign Debt Crisis.

Under the current financial regulatory structure, credit rating agencies (CRAs) serve a major public function. They play a crucial regulatory role in the international financial system due to the reliance on their credit ratings for regulatory purposes. The role of CRAs in financial regulatory frameworks has expanded in recent decades, especially as a result of an international

agreement initiated by the G-10 countries[3] to assess the riskiness of bank portfolios and to set capital requirements accordingly. This formed the basis of the Basel 2 Accord and sought to better align regulatory capital standards with actual risks taken by banks. A key justification for the incorporation of rating agencies' credit assessments was the belief that they offered a more dynamic approach that better linked capital adequacy to credit risks than did the simpler regulatory practices of basing capital requirements on either a fixed percentage of total assets or the economic development of countries proxied by OECD membership - the approaches in the earlier Basel 1 Accord, which allowed for much less differentiation in the credit risk of financial institutions. The benefits of using ratings-based regulation include the reduction in regulation costs and greater efficiency and objectivity. On the other hand, there are potential costs in terms of the well-known deficiencies of agency credit ratings, such as the pro-cyclical and backward-looking nature of the ratings assessments. The amount of economic capital that institutions are required to hold to guard against insolvency would increase as the credit assessments made by rating agencies on their asset holdings are downgraded.

We study the impact of bilateral ratings-contingent bank flows from the 11 major creditor banking systems in the G-10 countries to borrowers in 67 recipient countries from Q4:1999 to Q2:2013 on the economic growth of the recipient countries over the next quarter to up to five years ahead (Q1:2000 to Q2:2018). We use the implementation of the Basel 2 capital rules by individual G-10 countries as a natural policy experiment to investigate the effects of ratings-based capital regulation on international lending activities and its impact on the finance-growth

[3] The Group of 10 (G-10) countries represent the most advanced and economically developed countries in the world and was formed post-World War 2. The original 10 members of this group are Canada, France, Germany, Italy, Japan, United Kingdom, United States, Belgium, Netherlands and Sweden. The group was subsequently expanded in 1964 to include Switzerland as the 11th member but retained the 'G-10' name to the present day.

nexus.[4] From a regulatory perspective, we are interested in the channel through which exogenous changes in risk-weights induced by credit rating changes under the Basel 2 accord may affect cross-country rate of real GDP growth. This is an important issue given that it has previously been shown that regulation in banks' home country affects their cross-border bank lending and risk-taking decisions (Aiyar et al., 2014 and Ongena et al., 2013). Yet, there is a dearth of attention on the impact of the Basel capital framework on the finance-growth nexus in recipient countries that are affected by changes in bank lending behavior when bank financing is critical for stimulating economic growth (Beck and Levine, 2004; Levine, Loayza and Beck, 2000; Levine and Zervos, 1998). As Claessens (2017) highlights, shocks to global banks and their home countries can be transmitted internationally, including to foreign bank affiliates, and negatively affect local lending and economic activity abroad. The use of credit ratings in global capital rules as part of the Basel Accord exposes international banks to frequent and on-going regulatory capital shocks. However, the implications for aggregate economic growth remains unclear despite recent evidence provided by Drago and Gallo (2017) who show that downgrades under rating-based capital rules directly work to increase bank financing costs for European firms.

We address two key research questions. (1) Did the introduction of risk-weights for minimum capital measurement under Basel 2 directly affect the finance-growth nexus in recipient countries and/or lender countries via the foreign credit channel? (2) Are the effects of ratings-contingent capital regulation on economic growth dependent on institutional quality?

We adapt Hasan et. al (2015)'s methodology for investigating the effect of Basel 2 risk weight changes on international bank flows. They use an effective modelling strategy for sovereign rating changes that cause risk weights and those that did not during pre- and post-

[4] Implementation occurred first in Japan and Switzerland during Q1:2007, followed by Canada's adoption of the rules in Q4:2007. The European Union (EU) members also followed suit in Q1:2008 and the U.S. adopted some aspects of Basel 2 a year later in Q1:2009.

Basel 2 periods. We adapt their methodology to investigate the effect of rating change induced bank flows on the economic growth of the borrower countries. Using data on real GDP growth per capita and cross-border bank lending from G10 countries to 67 recipient countries between 1999 to 2018, we find that since the implementation of ratings-based Basel 2 capital rules, risk weight changes mapped to sovereign credit rating revisions have exerted an asymmetric effect on economic growth. Moreover, we find that the practice of global banks in increasing their foreign credit supply to non-investment grade countries offering risk weight reductions (following rating upgrades) significantly hampers economic growth in the recipient countries in the short term (up to two years) but stimulate longer-term growth (up to five years). Whereas, additional foreign capital following a risk weight reduction significantly increases economic growth in the investment-grade borrowers in the short-term but reduces growth in the longer-term. This result suggests that the lower regulatory capital burden presented by rating upgrades that are large enough to reduce risk weights are likely to create incentives for additional risk-taking and also may reduce banks' efforts in screening and monitoring borrowers in upgraded recipient countries.

On the other hand, rating downgrades large enough to raise risk weights have an unequivocal negative impact on economic growth in the downgraded recipient countries. Our identification strategy relies upon the changes in sovereign credit ratings for recipient countries as these are documented to serve as sovereign ceilings for the credit assessments of all borrowers (including banks and corporates) within a given country and in practice, impacts borrowing costs and credit supply throughout the economy (Adelino and Ferreira, 2016; Williams, Alsakka and ap Gwilym, 2013).

Our study is important and timely given the on-going debates surrounding the reliance on ratings-based risk-weightings for assessing credit risk and the continued need to risk-weight bank assets in the revised but as yet to be fully implemented (Acharya et al., 2012; Flannery,

2014). Basel 3 guidelines advocate higher capital charges (2.5% additional capital buffer on top of 8% of total risk-adjusted assets) and place new emphasis on a bank's capital adequacy in mitigating the adverse impacts of financial crises. Hence, credit ratings-based capital regulation affects international banks' capital management and their lending decisions and ultimately the credit supply in the international financial system. Yet, the implications for global prosperity are not clear and we aim to address this shortfall in the literature.

We make important contributions to several major strands of the finance literature. First, we provide a better understanding of the role of ratings-based capital rules in financial development and growth. There are many studies documenting that financial development is important for economic growth (King and Levine, 1993; Levine and Zervos, 1998; Atje and Jovanovic, 1993). We add to this literature by uniquely examining the impact of ratings-based capital regulation on not only growth in the recipient countries. We show that the adverse effects of capital regulation on bank credit supply and economic growth is compounded in less developed countries with more corruption and less competitive banking sectors but ameliorated with greater government stability. The key policy implication is that policy makers involved in banking regulatory reforms should be aware of the unintended impacts on both short- and long-term global prosperity in striving to enhance resilience within financial intermediaries.

Second, we extend the extant literature on the role and transmission of bank regulation in cross-border lending. In particular, we provide new evidence to show that ratings-based capital regulation can create incentives for global banks to reduce their screening and monitoring efforts abroad when it becomes less costly for banks to lend to countries with improved ratings. Our study presents an important departure from the prior research that focuses on either the pull or push effects of domestic banking regulation in foreign bank lending (Houston, Lin and Ma, 2012; Ongena et al., 2013). It also deviates from the country-specific study on UK banks by Aiyar et al. (2014) that examines how changes in capital requirements

in the creditor banking system can spillover to affect other countries via the reduction in their foreign credit supply. Similarly, Adelino and Ferreira (2016) show that sovereign rating downgrades in the creditor system can also curb bank lending abroad. In contrast, this study highlights the changes in international credit supply brought on by the explicit use of sovereign credit ratings in global banking regulation introduced under Basel 2 and assesses the impact of its adoption on the finance-growth nexus. To date, there has been a lack of attention paid to understanding how the use of ratings-based capital rules have influenced economic growth through the foreign credit supply channel despite a growing awareness of the dangers of the regulatory use of credit ratings. Overall, this study advances current knowledge on recent banking sector developments in the global financial system and on the use of credit ratings in financial regulation.

Third, our study contributes to the recent literature on the sovereign-bank nexus. It has become all too evident that when there are significant sovereign credit rating downgrades there can be considerable negative cross-border spillovers of sovereign credit risk as the lending international banks' capital adequacy ratios deteriorate. The two most recent financial crises have illustrated only too well the intricate relationship between the government and financial sectors and the significant amplification effects of the two during periods of financial instability (Bolton and Jeanne, 2011). In light of the European sovereign debt crisis caused by zero-risk weights for capital adequacy requirements and European banks' carry trade risk taking behavior (Acharya and Steffen, 2015), understanding the feedback between banks' and governments' actions induced by the regulatory reforms that have taken place is of vital importance in avoiding future financial crises. As Reinhart and Rogoff (2011) show, there are adverse consequences from debt accumulation for economic growth. Our study provides direct evidence on the growth implications of the use of Basel 2 risk-weighting schemes in tying bank credit provision to sovereign creditworthiness.

Finally, our paper contributes to the broader literature on the optimal design and impact of bank regulation. Bank regulation is generally designed to limit bank failure given the negative externality of individual bank failures on the health of other financial intermediaries. A capital adequacy requirement has long been at the core of prudential regulation and the Basel system of capital regulation has calibrated the minimum capital requirements to increase with bank risk. Flannery (2014) argues that the Basel system of capital regulation has failed to keep banks safe as it is focused on book capital, which does not adequately capture banks' solvency. Jakovljevic, Degryse and Ongena (2015) highlight that the impact of any new bank regulation may depend on the existing regulatory architecture in place, bank-specific characteristics and the institutional development of the country where the regulation is introduced. Our study not only complements but also extends the literature on bank regulation by showing that the impact of risk-based capital regulation is also conditional on the quality of the institutional environment and the level of financial development of other countries that are impacted via the foreign bank credit channel. It provides additional evidence on the unintended consequences of bank regulation and our findings have direct implications for policy makers as they should be mindful of these complexities when designing international standards on banking regulation.

The paper is organized as follows. Section 2 will discuss the related literature. Section 3 will detail the data used and Section 4 will detail the empirical models used. Section 5 will provide a discussion of the key results. Finally, Section 6 concludes.

2. Related literature

Our paper contributes directly to the extant literatures on the use of ratings-based financial regulation, the determinants of cross-border bank lending, the finance-growth nexus and the optimal design and impact of bank regulation. We briefly review these major strands of literature related to our study.

2.1 Finance-Growth Nexus

There are many studies documenting that financial development is important for economic growth as it enhances the access to external financing for funding more productive investments (King and Levine, 1993; Levine and Zervos, 1998; Atje and Jovanovic, 1993). Moreover, Beck (2002) finds that financial development allows particularly manufacturing firms which are more capital intensive to become more active in international trade thereby significantly boosting aggregate economic growth. Furthermore, financial intermediation activities supported by well-developed financial sectors have been documented to increase growth whilst reducing growth volatility in the long run (Beck et al., 2014). However, Beck et al. (2008) reveal that firms in less developed markets with poor institutional environments tend to find it more difficult to access external bank financing. Additionally, there is firm-level evidence provided by Beck et al. (2005) to show that in under-developed financial systems with poor legal protection, growth of smaller firms can be more severely hampered than larger firms. Overall, the extant literature indicates that aggregate economic growth is closely related to the access to external financing and the level of financial and institutional development, and this is commonly known as the 'finance-growth nexus'.

2.2 Use of Credit Rating Agencies (CRAs)

The use of credit ratings in banking regulation has received much interest since the GFC. Whilst the literature generally finds that CRAs are active monitors and the credit ratings they provide serve important functions as information anchors within financial systems (Boot et al., 2009) there are also concerns with CRAs serving as delegated monitors of regulators due to the procyclical nature of their rating assessments (Altman et al., 2002). CRAs are shown to be slow in updating their credit assessments and employ a 'rating through the cycle' approach meaning that they will not revise credit ratings until they are convinced that there is a permanent

change in the credit quality of a borrower. This slow response of the CRAs to changing conditions results in tardy rating changes given market perceptions. This is understood to amplify the boom-bust cycle as CRAs usually provide upgrades (downgrades) late in the piece during economic upswings (downturns) and this works to prolong the periods of boom (bust).

Strahan and Kisgen (2009) have shown that a AAA rating label is economically valuable due to the regulatory investment restrictions imposed by risk-weights. In this way, banks are faced with regulatory constraints that are contingent upon the ratings of the assets (loans) that they generate.[5]

Specific to the effects of Basel 2, Van Roy (2005) provided evidence from simulated bank portfolios to show that there are minor regulatory capital incentives for banks to strategically select credit ratings that are used in calculating risk-weights for capital adequacy assessments. Under Basel 2, the value of all bank assets are risk-weighted according to their credit quality and there is a minimum 8% capital requirement on the total risk-weighted asset value of a given bank.[6],[7] Although most banks meet the minimum regulatory requirements, this ratings contingent regulation will induce strategic behavior in profit maximizing banking institutions given there is a significant opportunity cost in having to hold regulatory capital.

The use of sovereign credit ratings provided by CRAs in banking regulation is reliant on their accuracy as a measure of a sovereign borrower's ability and willingness to repay their

[5] The use of solicited credit ratings for regulatory purposes has received renewed attention. Opp et al. (2013) have highlighted the incentives for credit rating agencies (CRAs) to inflate their ratings on structured credit products in the lead-up to the recent International Financial Crisis. In particular, Opp et al. (2013) demonstrate theoretically that the regulatory benefits of high ratings in an issuer-pays business model leads CRAs to reduce their information acquisition efforts and to simply inflate ratings, leading to the provision of uninformative ratings. These potential problems are not directly applicable to the use of ratings on sovereign debt as these are generally provided by CRAs free of charge and hence not subject to the same set of incentives (see Opp et al., 2013, p.56).

[6] The exception to the Basel rules applies to the US in which only the largest banks have to comply. In all creditor banking systems, banks can choose either to use their own internal rating based (IRB) models or the standardized approach to assess credit risk. By assuming that all lenders choose to use the standardized approach, our results represent a lower bound on the significance of sovereign credit rating (and consequential risk-weight) changes when alternative approaches are used in practice.

[7] Furthermore, minimum tier 1 capital is set at 4% of risk weighted assets. Nonetheless, prior to the actual implementation of Basel 2, Van Roy (2005) found the dispersion in the resulting capital requirement from various combinations of CRAs' credit assessments to be small. For related details in quantifying and explaining parameter heterogeneity in the capital regulation as it relates to bank risk taking, see, Delis et al. (2012).

debts. Yet, sovereign credit ratings are known to perform poorly as an early crisis warning tool due to rating agencies' rating 'through the cycle' approach (Mora, 2006). There is also much variation documented across rating agencies in their sovereign rating assessments, in terms of how active they are and how quickly they update their ratings (Alsakka and ap Gwilym, 2013 and Hill and Faff, 2010). This often results in split ratings and presents room for regulatory arbitrage when they are used for risk-weighting purposes in capital regulation.

However, to date there has been little empirical evidence on the specific use of sovereign credit ratings in banking regulation and the special zero risk status given to certain sovereign debt holdings. Hence, we contribute new knowledge to this literature by examining whether there has been a structural shift in how banks have conducted cross-border lending since the official implementation of the Basel 2 standardized framework in their home countries.

2.3 Regulatory arbitrage in cross-border bank lending

There is substantial evidence in the existing cross-border banking literature to suggest that regulation can influence cross-border lending activities. In a recent study, Houston, Lin and Ma (2012) reported that there is much incentive for international banks to engage in regulatory arbitrage when they are based in countries where banks are more tightly regulated whilst Aiyar et al. (2014) have shown that changes in capital requirements can affect the supply of foreign lending abroad.

In an extension of earlier works that show that sovereign credit ratings and the regulatory environment have significant influences on foreign bank financing, Acharya and Steffen (2015) demonstrate that European banks exploited the low risk weights on sovereign debt holdings in both the lead up to and during the European Debt Crisis and borrowed from wholesale money market funds to lend increasing amounts to governments in peripheral Eurozone countries (Greece, Italy, Ireland, Portugal and Spain: the GIIPS) in a carry-trade strategy. They suggested

that regulatory capital arbitrage by European banks was at the heart of the European Debt Crisis. On the other hand, Gianetti and Laeven (2012) showed that there was a global flight home effect during the GFC when global risk appetite waned.

In this study we provide comprehensive international evidence, especially from G-10 creditor countries, on the impact of the ratings-based capital regulation on the sensitivity of banks international lending behavior across regulatory risk-weight thresholds based on the sovereign credit rating changes made by independent credit rating agencies. In doing so, we shed new light on the impacts of international bank flows induced by the capital regulation on the finance-growth nexus. It can be expected that the level of financial development would influence the growth effects of the Basel capital rules.

2.4 The optimal design and impact of banking regulation

There is a vast literature on the design of optimal bank regulation and much evidence exists on the direct influence of banking regulation on banks. As discussed by Bhattacharya et al. (1998) amongst others, there is a wide-range of regulatory interventions used by banking regulators aimed at controlling different aspects of banking activities (capital requirements, restrictions on bank entry and banking activities, deposit insurance, liquidity requirements, supervisory actions, and so on).

Risk-sensitive capital regulation is a specific regulatory tool widely used in prudential regulation (the legal framework focused on the financial safety and stability of financial institutions and the overall financial system in which they operate). A minimum capital adequacy requirement has been at the core of prudential regulation and the Basel system of capital regulation has by design, calibrated the minimum capital requirements to increase with bank risk. The capital rules are designed to limit bank failure given the negative externality of individual bank failures on the health of other financial intermediaries. However, Flannery

(2014) argues that the Basel system of capital regulation has failed to keep banks safe as it is focused on book capital, which does not adequately capture banks' solvency and loss-absorbing capacity. As such, there is much ongoing debate regarding the optimal design of capital regulation (see for example, Admati et al. (2013); Miles, Yang and Marcheggiano (2012)). In surveying the empirical evidence on the impacts of bank regulation, Jakovljevic, Degryse and Ongena (2015) highlight that the impact of any new bank regulation may depend largely on the existing regulations already in place, bank-specific characteristics like the size of banks' capital buffers and the general level of institutional development in the country where the regulation is introduced.

Our study not only complements but also extends these prior studies on bank regulation by showing that the impact of risk-based capital regulation is also conditional on the quality of the institutional environment and the level of financial development of other countries that are impacted via the foreign bank credit channel. It provides additional evidence on the unintended consequences of bank regulation in that we reveal a higher regulatory burden for bank lending to riskier destinations whilst limiting bank risk-taking, may also as a side-effect, curb growth.

3. Data

We first use the log changes in real seasonally adjusted GDP per capita in recipient countries sourced from Datastream to measure economic growth in the borrowing countries. These serve as our main response (dependent) variables[8].

We employ the consolidated international banking statistics collated by the Bank for International Settlements (Table B2, consolidated banking statistics, BIS) on the immediate borrower basis. To date, this is the most comprehensive dataset on international banking claims

[8] We also considered the cross-product of log changes in real GDP per capita in both recipient and lender countries to assess the impacts on simultaneous economic growth. The estimation results are somewhat weaker but largely consistent with what we report in the paper. For brevity, we do not report these results.

as it covers the largest number of countries and is available on a bilateral level. This data captures the claims of banks located in source countries against all borrowers within a recipient country at a quarterly frequency. We study the sample period from December quarter 1999 to June quarter 2013 (Q4:1999 - Q2:2013) for the bank flows as this allows a balanced sample size between pre and post Basel 2 periods for each of the G10 creditor countries. The impact of the bank flows on economic growth are measured over varying horizons from one quarter to five years after the initial receipt of cross-border bank flows (up to Q2:2018) to measure both short- and longer-term impacts. We measure bilateral bank flows over time based on the changes in G-10 international banks' claims against specific recipient countries. We closely examine a panel data set on cross-border bank flows from G-10 creditor countries to 67 debtor countries from all major geographical regions around the world. The 67 countries were chosen on the basis of data availability. Starting from all the countries that the G-10 lending banks had foreign claims against, we eliminated those countries with only annual foreign claims observations. We further narrowed down by selecting only those countries that reported real quarterly GDP data for the full sample. The resulting 67 borrower countries are spread across seven regional groups (East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa) covering both investment grade and non-investment grade countries. Table 1 reports the 67 borrower countries we consider in this paper.

<Insert Table 1 here >

We employ bilateral bank flows, calculated as 100 times the log difference in total foreign claims in a recipient country for a given source country, between quarter *t-1* to *t*. Foreign claims is the broadest definition for cross-border lending and incorporates both loans from banks' headquarters to borrowing countries and the local currency loans made by bank

subsidiaries in foreign jurisdictions (see BIS, 2003). To the best of our knowledge, this is the longest time period over which international bank flows have been studied on a quarterly basis.

The dates from which the Basel 2 standardized approach came into effect in each G-10 country varied widely. Hence, we exploit the differences in the timing of the adoption of the Basel 2 rules across creditor countries in our empirical strategy to identify changes in these banks' cross-border lending behavior before and after credit ratings regulation came into play. We dated the implementation of Basel 2 capital rules in each creditor country using various Internet sources including national news reports and prudential regulatory authority and central bank websites. The post-Basel 2 periods in our sample start with Q1:2008 for EU lenders in the G-10, Q4:2007 for Canada, Q1:2007 for Japan, Q1:2007 for Switzerland, and Q1:2009 for the U.S.

We use long-term sovereign credit ratings on foreign currency denominated debt from the two major CRAs - Standard and Poor's and Moody's as the credit ratings provided by these external information intermediaries are all allowed to be used for determining risk weights under Basel 2.[9] We obtain sovereign credit ratings for the 67 borrower countries from the two major credit rating agencies, Standard and Poor's and Moody's. Consistent with other studies using sovereign credit ratings, we convert ratings to numerical scores which range from 20 for the highest grade (AAA and Aaa from the two CRAs, respectively) to 0 for defaults (SD and C, respectively, see Table 2). We create a daily variable of rating scores for each of the 67 borrower countries using the Standard and Poor's ratings. After repeating this process for the Moody's ratings, we average the two daily CRA rating variables before converting the average daily rating series to a quarterly frequency by averaging daily rating observations to suit our quarterly data sample periods.

[9] We do not use Fitch ratings as they do not provide ratings for all the countries in our sample. For Standard and Poor's and Moody's, all 67 countries are rated.

<Insert Table 2 here >

To explain economic growth, we also include various country- and country-pair-specific and global variables to account for the degrees of financial development and financial openness. We estimate growth regressions utilizing the endogenous growth framework following Barro (1991), Levine and Renelt (1992) and Temple et al. (2006) to capture specific economic links between source-recipient country pairs, we use bilateral portfolio flows from the International Monetary Fund.[10] We also use the stock market capitalization to GDP and the banking credit to GDP ratios sourced from the World Development Indicators (WDI) database to control for stock market and banking sector development, respectively. We use these control variable to account for the well-documented links between financial development and economic growth (King and Levine, 1993 and Levine and Zervos, 1998).

4. Empirical Modelling

4.1 Risk weight change-induced bank flows and economic growth in recipient countries

First, we examine the influence of bank flows that occur when recipient countries' sovereign credit ratings changes on their economic growth and in equation (1) we specifically test whether bank lending that led to risk weight changes (RWC) since the implementation of Basel capital rules have presented a significant effect on economic growth in borrowing countries.

Endogeneity is a concern in our growth equation as first there are time-invariant country characteristics (fixed effects) which are likely to be contained in the error term given in equation (1), such as geography or demographics that may be correlated with the explanatory variables. Second, the ratings-based and bank flow variables are likely to present the reverse

[10] Unlike other studies, we did not overwhelm our estimations with too many country-level governance and information asymmetry variables as many are highly correlated with our chosen proxies. Additionally, we use quarterly bank flows to improve the identification of rating effects so we do not find other proxies to be as significant in explaining our dependent variable as evidenced in studies using annual frequency data.

causality effect as both are often derived from the state of the economy with a higher (lower) growth prospect leading to a rating upgrade (downgrade) and associated bank inflows (outflows). To address the potential endogeneity concerns, we use internal instruments following the method of Arellano and Bond's (1991) difference Generalized Method of Moments (GMM) estimator. The GMM estimators employ orthogonality restrictions or moment conditions to derive valid instruments. The key aspect underlying these methods is that the panel structure of the data provides a large number of instrumental variables in the form of lagged endogenous and exogenous variables. The use of lagged levels of the endogenous regressors as instruments make the endogenous variables pre-determined and therefore, not correlated with the error terms. In estimating equation (1) with GMM estimator we have used the lagged level of all four rating variables as instruments. A typical concern associated with the Arellano and Bond (1991) method is that it may lead to the use of too many instruments that may overfit the endogenous variables. However, Roodman (2009) suggested a solution to this problem that was related to limiting the number of lags. Hence, we follow Roodman's approach in this paper and set the maximum lags at 2 for the Arellano-Bond type instruments in the GMM estimations. It is expected that the instruments get weaker as the lag increases so using a maximum lag option to cut out distant lags efficiently reduces the instrument set size. Moreover, to avoid having perfect collinearity between the instruments and some the explanatory variables, we use a single instrument for each possible lag value, thus reducing the number of instruments to $T-2$.

We follow the methodology of Hasan et. al (2015) to specify the forms of independent variables. Specifically, we split the rating change induced bankflows into those that cause risk weight changes and those that did not. Also, we investigate pre- and post Basel 2 periods impacts separately by using the Basel 2 dummies.

$$\Delta LogGDP_{j,t+N} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} \quad (1)$$
$$+\alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t}$$
$$+\alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The dependent variable is economic growth (log changes in real GDP in the recipient country *j*) measured over varying horizons between quarter t to quarter t+N, where N ranges from 1, 4, 8, 12, 16 and 20 for one quarter, one, two, three, four and five-year growth.[11] We consider upto five years of GDP growth to ascertain how quickly the impact of rating change induced bank flows are incorporated into the GDP growth and whether the impact is permanent of transitory. The real GDP for county *j* for quarter t, $LogGDP_{j,t}$, is seasonally adjusted and cover the periods from Q4:1999 to Q2:2018.

Our key country-specific variables of interest in this model specification are the sovereign credit rating changes and their interactions with the time indicator variables for the pre- and post-Basel 2 implementation quarters (*preB2* and *postB2*, respectively) as well as the indicator variables for whether the sovereign rating changes lead to risk-weight changes (RWC) or not (NRWC) under the Basel capital rules in the *postB2* period. In the pre-Basel 2 era, it did not matter whether the rating changes corresponded with risk-weight changes for capital adequacy purposes or not as those rules were not yet enforced within national prudential regulatory systems. Thus, in our modelling strategy, we consider a breakdown between RWC and NRWC only in the *postB2* period. We then interact these different types of rating changes with bank flows to recipient countries.[12]

[11] In unreported estimations, we also consider the balance of growth (measured as the cross-product of the lender and recipient countries' real GDP growth) as an alternative dependent variable and we find the results are qualitatively the same as those for the recipient countries' growth alone. These results are available upon request.
[12] We checked the robustness of our results using rating and bank flows at *t* as well as at *t-1* and the results are qualitatively similar. These results are available upon request.

Our measure of bank flows, $BF_{j,t}^{i}$, is defined as 100 times the log change in quarterly bilateral bank claims between quarter t-1 to quarter t of all BIS reporting banks headquartered in country i (the 11 countries in the G-10 country group) against the 67 (j) debtor countries (listed in Table 1). The bilateral bank claims data is sourced from the Table B2: Foreign claims by nationality of reporting banks, immediate borrower basis, provided by the BIS. These have previously been used in other studies on international bank flows (e.g., Houston, Lin and Ma, 2012, Hasan, et al. 2015).

Changes in sovereign credit ratings are shown as $\Delta Rating_{j,t}$, where Rating is the average quarterly sovereign rating of the borrower country j which is calculated by averaging daily ratings across each quarter. The quarterly rating changes are then calculated as the change in average rating from quarter t-1 to t. We consider the rating changes together with bank flows by considering the interaction between the two. Hasan et. al (2015) show that there is a unidirectional causality running from rating changes to bank flows, and the interaction between the two represents rating change-induced banks flows. We consider rating changes separately between pre Basel 2 and post Basel 2 periods as denoted by $\Delta Rating_{j,t}^{PreB2}$ and $\Delta Rating_{j,t}^{PostB2}$ for pre- and post-Basel 2 (B2) periods between quarter t-1 to quarter t, respectively.[13] We also consider upgrades (positive changes) and downgrades (negative changes) separately in the investigations.

To specifically examine the effects of Basel 2 ratings-based capital requirements, we directly investigate the effects of sovereign credit rating changes that lead to risk-weight changes (RWC) and those that do not (NRWC). To do so, we interact rating changes with two

[13] We also tested an OECD indicator variable for countries that are members of the Organization for Economic Cooperation and Development, as lending to OECD sovereigns was given zero risk weightings under earlier Basel 1 standards. The OECD indicator variable takes a value of 1 for countries that are part of the OECD group and zero otherwise. The results are not qualitatively different from the full sample estimations given that an overwhelming number of our 67 recipient countries are members of the OECD throughout the entire sample period studied.

indicator variables in the *postB2* period only. RWC takes a value of 1 when the rating movement leads to the crossing of risk weight buckets and zero otherwise while NRWC takes a value of 1 for rating changes that do not map to risk-weight changes. The resulting variables are shown as $\Delta Rating\_NRWC_{j,t}^{\text{PostB2}}$ and $\Delta Rating\_RWC_{j,t}^{PostB2}$ for post-Basel 2 periods in equation (1). Under the standardized approach to credit risk in Basel 2, risk-weights used for the purpose of calculating capital charges are directly mapped to credit ratings and so rating changes across rating categories will lead to changes in the risk-weights applied. For sovereign credit ratings, 0%, 20%, 50% and 100% risk weights apply on sovereign debt for the ratings from AA- and above, between A+ and A-, between BBB+ and BBB-, and BB+ and below, respectively.[14] As shown in Table 2, in our sample we identify 78 risk weight changes in total, resulting from 43 rating upgrades and 35 rating downgrades out of a total of 647 rating upgrades and 296 rating downgrades, respectively.[15]

As controls for economic growth, we also include various recipient country and country-pair-specific variables to account for the financial linkages between creditor and recipient countries and the levels of financial development. To account for persistence in the growth rates, we include the past changes in economic growth and also include past bank flows to capture the finance-growth relationship because it is typical to expect economic growth to respond with a lag to financial deepening. Appendix Table A provides the descriptions of all variables employed in the analyses.

[14] For bank debt, Option 1 under Basel 2 is to benchmark off sovereign credit ratings and to apply risk-weights one category below that for sovereigns (BCBS, 2004).

[15] We examine the pre- and post- Basel 2 sub-period breakdown in rating and risk weight change distributions. Since Basel 2 start dates are staggered across the 11 countries, we used the earliest date (Q1 2007 – Canada and Japan) to partition the sample. We find that the total number of rating changes is higher in the pre-Basel 2 sub-period. For investment grade borrowers, there are more rating and risk weight upgrades than downgrades during the pre-Basel 2 period, whereas the opposite is observed for the post-Basel 2 period. Within the non-investment grade borrowers, a similar pattern is shown for the highest risk category (150% risk weight). However, there tends to be more rating upgrades than downgrades in both periods, although there are more risk weight upgrades in the pre-Basel 2 period and more risk weight downgrades in the post-Basel 2 period for the 100% risk weight category borrowers.

4.2 Institutional quality and the impact of bank flows

Next, we examine the influence of the quality of the institutional environment in recipient countries on the effect of ratings-based capital regulation via equation (2):

$$\begin{aligned}\Delta LogGDP^{i}_{j,t+N} = {} & \alpha_1 \cdot LogGD^{i}_{j,t} + \alpha_2 \cdot BF^{i}_{j,t} + \alpha_3 \cdot B2DUM^{i}_{j,t} \\ & + \alpha_4 \cdot \Delta Rating^{\mathrm{PreB2}}_{j,t} \cdot BF_{j,t} \\ & + \alpha_5 \cdot \Delta Rating^{\mathrm{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} \\ & + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \sum_k \beta_k \cdot Controls^{k}_{j,t} + \varepsilon_{j,t}\end{aligned} \quad (2)$$

We interact the main ratings-based variables with various proxies for institutional quality within recipient countries – banking sector competition (LERNERINDEX), corruption (CORRUPTION) and government stability (GOVSTABILITY).

5. Results

5.1 Impact of rating change-induced bank flows during pre- and post-Basel 2 periods

The dynamic panel regression results for aggregate bilateral flows stemming from G-10 countries to sub-samples of investment-grade and non-investment grade debtor countries when there are upgrades as represented in Eq. (1) are reported in Tables 3 and 4, respectively.[16]

<Insert Table 3 and Table 4 here>

[16] We also estimated equation (1) using a 3D panel regression in addition to running 11 standard panel regressions. The estimation results are weaker and less clear cut. This can be expected as the aggregation required for running a 3D panel results in the averaging of significant and insignificant (and also opposite signed) coefficients across the 11 donor countries. We report the individual lender country panel regressions to facilitate a comparison in sensitivity across different G-10 lender countries.

For the Investment grade countries in Table 3, bank flows on their own (shown in row (2)) have a mixed impact (4 positive vs 4 negative coefficients) on growth over the next four quarters. The supply of foreign bank credit from the UK, Belgium, Sweden and Switzerland proved to be beneficial for the finance-growth nexus as indicated by the positive impact on recipient countries' economic growth corroborating with prior studies highlighting the importance of external bank financing for stimulating economic growth (King and Levine, 1993; Levine, Loayza and Beck, 2000, Levine, 2005). On the other hand, there is evidence for a growth reducing effect of bank flows from Canada, Italy, the US and the Netherlands.

However, ratings-induced bank flows show overwhelmingly positive impact both before after the introduction of the Basel 2 accord as indicated by the significant positive interaction terms involving $\Delta Rating_{j,t}^{PreB2}$ and $\Delta Rating_{j,t}^{PostB2}$ and BF (rows (4) to (6)). Nearly all significant coefficient estimates are positive in the *preB2* period suggesting that bank flows induced by rating upgrades in recipient countries unequivocally contribute to enhancing economic growth. Rating upgrades provide public and objective indications on improvements in the local investment environment within recipient countries. Evidently, global banks are attracted to increase foreign credit supply in countries experiencing sovereign rating upgrades. This improved access to external bank financing significantly enhances growth in the year following rating upgrades.

In the *PostB2* period, rating upgrades that do not reduce regulatory risk weights have the same positive impact on economic growth as shown by the dominance of positive and significant coefficients (5 positive vs. 2 negative). When rating upgrades do provide a reduction in risk weights for the lending banks, the positive influence is even stronger (9 positive vs. 2 negative coefficients). The combined evidence suggests that the implementation of risk weights under Basel 2 significantly strengthened the positive link between bank flows and economic growth of borrowing countries with investment-grade status.

With regards to the control variables used, we find that openness and financial development measures as shown in rows (7) to (10) show a mixed impact on economic growth. Higher levels of portfolio investment flows (LTPort) between lending and borrowing countries and higher borrower country stock market capitalization (SMCAPGDP) have a negative impact effect on growth. It appears that for Investment grade borrower countries where financial markets are well developed, larger portfolio related investments flows and further growth in the stock market are seen as contributing to systemic risks rather than contributing to economic performance. The size of banking sector (BANKCRED) and bilateral trade activities (DOTXM) do not have a significant impact in general and positive and negative impacts are evenly distributed.

The financial system efficiency measures (rows (11) to (13)) suggest that economic growth is significantly enhanced by banking sector competition (LERNERINDEX). Banking sector competition is an important factor in achieving economic growth as the degree of banks' market power within the local banking sector captured by the Lerner index allows the scale economy necessary for the banking industry to achieve efficiency. In addition, lower corruption (CORRUPTION) and higher government stability (GOVSTABILITY) are also positive and significant determinants of economic growth. In addition to these control variables, there is potentially a long list of alternative determinants one can consider. However, since some of these alternative control variables are correlated with the selected controls and the qualitative results for the main ratings and bank flow variables remain unchanged, we only report estimates for the aforementioned list of control variables for brevity.

Table 4 reports the estimations results for non-investment grade borrower countries. Overall, the results represent a significant departure from those for Investment grade countries. First, bank flows on their own (row (2)) now have a dominant positive impact (5 positive vs 1

negative) on growth which suggests that external bank financing from foreign lenders are most beneficial for growth in non-investment grade countries.

Second, there is a much more pronounced and distinct impact of ratings induced bank flows in the PostB2 period, especially for the RWC events. The upgrades not causing risk weight changes (NRWC, row 5) stimulate economic growth in most cases (8 out of 11 cases). In contrast, the bank flows following from upgrades with a risk weight reduction (RWC) predominantly reduced growth (in 7 out of 11 cases) which is opposite to what we find for investment-grade borrowers estimations reported in Table 3. As lending banks are required to hold less capital reserves for the loans to borrower countries with lower risk weights, they may have an incentive to increase loans to those borrower countries with reduced risk weights. However, if most of the additional loans are motivated by higher yields, but now with lower capital requirements, in the non-investment grade countries, there may be an inevitable rise in loan defaults and subsequent downturns in economic activities in the borrower countries. This suggests that an unintended consequence of the use of ratings-based capital regulation is the creation of perverse incentives for lenders to relax monitoring and screening efforts and to take more risk in response to tangible reductions in regulatory capital costs. Consistent with the theoretical predictions of Diamond and Rajan (2000), lower regulatory costs imposed on bank capital effectively reduces banks' collective 'skin in the game' and weakens banks' monitoring and screening of borrowers despite the significant information asymmetry faced in cross-border lending. This conceivably leads to inefficient use of foreign bank credit and growth retardation.

As such, there is a need for the regulators in recipient countries to be vigilant in monitoring the lending activities of foreign banks when sovereign rating changes occur. [17][18]

Third, some of the control variables play different roles. In particular, stock market development is now a significant and positive factor in economic growth in Non-Investment grade countries. In addition, bilateral trade contributes significantly to growth. The evidence suggests that in emerging market countries, stock market development and international trade are important indicators of economic growth. However, neither portfolio flows nor banking sector development are significant positive growth determinants in Non-Investment grade countries.

In all the estimations reported in Tables 3 and 4, the J-Statistic which measures the validity of over identification in the GMM estimation is insignificant. This suggests that the endogeneity of the explanatory variables is adequately addressed.[19]

<Insert Table 5 and Table 6 here>

The estimation results for rating downgrades are reported in Tables 5 and 6. We concentrate our discussions on the main explanatory variables as reported in rows (4) – (6). In thePreB2 period, we report opposite impact of bank flows following downgrades between Investment and Non-Investment grade countries. While bank flows following rating downgrades retard economic growth in Investment grade countries (10 out of 11 cases), there is strong evidence

[17] Alsakka and ap Gwilym (2013) report different impacts for individual rating agencies. To examine whether the results might be driven by a specific CRA, we also estimated equation (1) using S&P and Moodys ratings separately in addition to using the average of the two. We find that for investment grade countries, the estimations using Moodys ratings are similar to the average rating results reported in this paper, whereas economic growth is less sensitive to S&P ratings. However, we did not find such a difference for non-investment grade countries nor in latter investigations of equations (2) and (3). In order to save space we do not report these robustness estimations, however interested readers may obtain the results from the corresponding author.

[18] Whilst it has been documented that outlook and watch signals tend to have a stronger impact than actual rating changes in some asset markets (see for example, Alsakka and ap Gwilym, 2013) we do not assess these short term assessments provided by CRAs as we focus on assessing the effects from implementing Basel 2 rules based on actual rating changes.

19 As an additional robustness check, we re-estimate the base model with all the variables winsorized at 1 and 5%. Although there are some changes to the size and significance of some of the variables, the qualitative results as reported in the paper remain unchanged.

for enhanced economic growth in Non-Investment grade countries (7 out of 11 cases). This suggests that when ratings were not used as part of the regulatory fabric, downgrades were viewed as signals of reductions in growth opportunities and curbed foreign credit supply to investment grade countries. However, in non-investment grade countries downgrades were viewed differently as they offered not only relatively greater interest spreads but also greater diversification opportunities to reduce banks' concentrated credit risk exposures. In the *PostB2* period, bank flows made after rating downgrades significantly reduced growth irrespective of whether the downgrades were associated with risk weight changes or not. This suggests that downgrades have become 'bad news' regardless of the regulatory imposition of the Basel 2 conditions. Moreover, the results are more consistent and stronger for Non-Investment grade countries. Overall, the estimation results strongly indicate that bank flows following downgrades lead to negative economic growth for all countries and that the negative effects are stronger for Non-Investment grade countries.

5.2. The short- and long-run growth effects over the next quarter and up to 5 years

As a robustness test, we consider various horizons for future economic growth. We re-estimate model (1) for economic growth over the next quarter (quarter to quarter), two to up to five years (from year 0 to year 2, 3, 4 and 5 on the same quarter) in addition to the annual growth estimates (year on year on the same quarter) reported in Tables 3 to 6. We summarize the results in Tables 7 and 8 where only the PostB2 period coefficients for NRWC and RWC ((5) and (6)) are reported over the six horizon estimations for upgrades, and in Tables 9 and 10 the results for downgrades.

<Insert Table 7 and Table 8 here>

For bank flows induced by rating upgrades within a risk weight category (NRWC), we find that the observed patterns of growth effects documented above for the one year impact

window also apply for all growth horizons up to five years for both investment and non-investment grade borrowers. However, we find that the growth effects in the investment and non-investment grade borrowers following upgrades with risk weight changes (RWC) are fully offset and reversed by the third year and this reversal continues to the fifth year.

For the investment grade borrower countries, the effects of the RWC upgrades become generally weaker from year two. The growth effects into the second year become weaker relative to the one year horizon but lender countries' bank flows remain significant in encouraging economic growth in recipient countries. The growth benefits are however, reversed beyond three years. The negative impact becomes more severe in the fourth and the fifth year.

In non-investment grade borrower countries, bank flows following from RWC upgrades in the borrowers' sovereign ratings generally had a negative impact on economic growth in the first two years. The reversal occurs in the third year and continues through to the fifth year.

<Insert Table 9 and Table 10 here>

For rating downgrades (Tables 9 and 10), there is a consistent and dominant negative impact on all the growth horizons for rating downgrades that bring about a risk weight increase (RWC) for all borrowers. However, there is some evidence to suggest this is only temporary in investment grade borrowers in the fifth year when there are no regulatory repercussions associated with those downgrades.

The evidence overall thus suggests that the impact of G10 banks' lending behavior induced by Basel 2 specific risk weight regulations have different short-run and longer-term effects on economic growth in response to rating upgrades. However, there is a consistent and dominant negative impact across all growth horizons for rating downgrades that bring about a risk weight increase.

5.3. Influence of institutional quality on the growth effects of ratings and bank flows

The estimation results on the interactive effects of the quality of the recipient countries' institutional environment in Equation (2) are summarized in Table 11 (for banking market power), Table 12 (for corruption) and Table 13 (for government stability).

<Insert Table 11 to Table 13 here>

In Table 11 there are significant interactive effects between market power as captured by the Lerner Index and the bank flows induced by RWC. Competition within a banking sector is viewed on one hand as a pre-condition of efficient and innovative financial systems (Boyd and Nicolo, 2005; Schaeck, Cihak and Wolfe, 2009; Anginer, Demirguc-Kunt and Zhu, 2014) and on the other as a source of financial fragility (Keeley, 1990; Allen and Gale, 2004). Our results are more supportive of the competition-fragility view of Keeley (1990) in investment grade countries in that higher market power (less competition) helps to maintain bank profitability and reduces the incentives for banks to take excessive risks and lend to riskier borrowers. The empirical evidence points to rating upgrades that allow a mild reduction in regulatory capital costs when banks have more market power to significantly spur economic growth, in investment grade recipient countries. Consistent with Allen and Gale's (2004) prediction, a small number of large banks may be easier to monitor and to supervise for local bank regulators and this we conjecture encourages more prudent lending that enhances economic output. However, when the risk-weight reductions provide much lower regulatory capital costs in non-investment grade countries and greater market power allows banks to charge even higher interest rates on loans (Allen, Carletti and Marquez, 2011), there are significant reductions in investments and growth from surges in borrowing costs (Boyd and Nicolo, 2005). Conversely, mild increases in risk weights coming with downgrades in investment grade countries are growth enhancing as they effectively encourage banks to have more skin in the game and managers to exert more effort in screening and monitoring the

borrowers (Diamond and Rajan, 2000). However, there appears to be a threshold effect as more substantial increases in regulatory costs in non-investment grade recipient countries in the presence of greater market power allows banks to take advantage of borrowers by charging higher loan rates to claw back the additional regulatory costs consistent with the competition-fragility view.

In Table 12, the results for the interactive effects of corruption are quite similar to those for market power in that it is more significant in non-investment grade countries where corruption exacerbates the adverse effects of reductions in regulatory capital costs on economic growth. This finding suggests that in more corrupt environments, foreign banks are enticed into lending with less skin in the game (Diamond and Rajan, 2000), are more inclined to allocate foreign credit to inefficient uses, thus, further exacerbating the adverse effects of the ratings-contingent capital regulation on economic growth. In other instances, there are no significant differences for RWC and NRWC rating events.

In contrast, the results in Table 13 show the interactive effects of government stability and the ratings-based capital regulation on economic growth. The empirical evidence indicates that political stability is particularly supportive of economic output when rating upgrades create reductions in regulatory capital costs and this is irrespective of investment grade. This suggests that political stability is important for overcoming the adverse growth effects emanating from the perverse incentives created by the use of ratings-contingent regulation. Taken together, the empirical evidence corroborates with Papaioannou's (2009) previous finding on the importance of the political and institutional environment in attracting foreign bank flows. However, our findings in this study extend upon their earlier work to show that politics and institutions also significantly influence the effects of banking regulation on the real economy via foreign bank lending.

6. Conclusions

In this study, we investigate the growth effects of the use of credit ratings-based capital rules on cross-border bank lending behavior. To do so, we examine the sensitivity of recipient and creditor countries' economic growth to international bank flows induced by changes in sovereign credit rating revisions before and after the implementation of the Basel 2 risk-based capital regulatory rules in G-10 creditor banking systems. We study the growth effects of bilateral flows from these advanced creditor banking systems to borrowers in 67 recipient countries over the period from Q4:1999 to Q2:2018. Specifically, we investigate a key research question: have the regulatory costs tied to risk weight changes affected the finance-growth nexus since the implementation of Basel 2 capital rules?

We provide empirical evidence to show that risk-weight changes mapped to sovereign credit rating revisions, especially upgrades, have exerted a more significant effect on economic growth in both recipient and creditor countries since the adoption of Basel 2 capital rules. Our evidence indicates that the practice of global banks in increasing their foreign lending to countries with lower regulatory risk weights has a short-term positive (negative) impact on the economic growth of investment grade (non-investment grade) country borrowers (up to two years). However, these effects are then reversed three years after the bank flows are triggered. We argue that lower regulatory capital costs arising from risk weight reductions reduce banks' skin in the game and also their screening and monitoring efforts in lending to the investment grade borrowing countries. Since investment grade countries have mature economies and domestic economic activities account for the bulk of their GDP, additional foreign credit in response to a risk weight reduction is unlikely to generate significant long-term marginal benefits as the foreign credit is likely to be directed towards less productive investments. This would generate a short-term increase in domestic economic activities resulting in a rise in GDP. However, the longer-term effect of the additional foreign credit could be negative. On the other

hand, despite the short-term negative impact of higher bank flows due to a reduction in risk weights, non-investment country borrowers may experience longer-term benefits. This might suggest that the lenders direct their loanable funds toward funding infrastructure projects that could generate longer term economic growth at the cost of short-term reductions in economic growth.

These results have clear implications for the incoming tighter Basel 3 capital rules that are being progressively phased in around the world. With an increase in the minimum risk-based capital ratio under Basel 3, as well as narrower definitions for regulatory capital, the link between bank lending decisions and risk weight changes and ultimately the finance-growth nexus will become even more important. Whilst references to credit ratings have been somewhat discouraged in creditor countries like the US, for the majority of other countries there will be a continual reliance on the use of external credit ratings as measures of credit risk for the purpose of calculating risk-weights in determining minimum regulatory capital as there is no consensus on an alternative credit risk measure that would be more suitable.

Given we find evidence that ratings-based banking regulation has had more pronounced adverse effects in lending to Non-Investment grade countries and that this has altered lenders' incentives and hampered economic growth, it would be worthwhile to investigate the effects of ratings-based regulation on income inequality to extend our current understanding on the real effects of ratings-based capital regulation. In addition, the implementation of some of the core Basel 3 features from 2013 in the major economies provides an additional opportunity to consider the real impact of Basel 3 adoption in the lender countries on the borrower countries' economic growth. The more stringent conditions imposed on the lending banks in term of additional capital requirements (the 2.5% capital buffer) and the leverage and liquidity requirements, may create different incentive structures on international bank flows. However, since only some of the aspects of Basel 3 (i.e. leverage ratio) were implemented in January

2018, while a full adoption is not expected until January 2022, sufficient time needs to pass before the real impact of Basel 3 adoption on the economies of borrower countries can be investigated.[20]

[20] Financial Stability Board. https://www.fsb.org/work-of-the-fsb/implementation-monitoring/monitoring-of-priority-areas/basel-iii/

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Table 1. List of borrower countries

This table lists the 67 borrower countries examined in this study. The sample covers 7 regional groups and both OECD and non-OECD countries.

East Asia & Pacific	Europe & Central Asia		Latin America & Caribbean	Middle East & North Africa	North America	South Asia	Sub-Saharan Africa
Australia	Austria	Latvia	Argentina	Egypt	Canada	India	South Africa
China	Belgium	Lithuania	Bolivia	Israel	United States	Pakistan	
Hong Kong	Bulgaria	Luxembourg	Brazil	Jordan			
Indonesia	Croatia	Netherlands	Chile	Malta			
Japan	Cyprus	Norway	Colombia	Morocco			
Korea	Czech Republic	Poland	Dominican Republic	Qatar			
Malaysia	Denmark	Portugal	Ecuador				
New Zealand	Estonia	Romania	Mexico				
Philippines	Finland	Russia	Panama				
Thailand	France	Slovakia	Peru				
	Germany	Slovenia	Trinidad & Tobago				
	Greece	Spain	Venezuela				
	Hungary	Sweden					
	Iceland	Switzerland					
	Ireland	Turkey					
	Italy	Ukraine					
	Kazakhstan	United kingdom					
10	34		12	6	2	2	1

Table 2. Descriptive statistics on sovereign re-ratings and risk weight changes

Sovereign credit rating assessments from three credit rating agencies and their numerical conversions are summarized below. Investment grade is between the ratings scores 11 to 20, while non-investment grade is 10 or below.

S&P	Moodys	Fitch	Ratings Score	Basel 2 Risk Weight (RW)	Number of RW Changes on Average Ratings		Number of Rating changes on Average Ratings within each RW	
					Upgrade	Downgrade	Upgrade	Downgrade
Investment Grade								
AAA	Aaa	AAA	20	0			67	56
AA+	Aa1	AA+	19	0				
AA	Aa2	AA	18	0				
AA-	Aa3	AA-	17	0	4			
A+	A1	A+	16	20		7	132	46
A	A2	A	15	20				
A-	A3	A-	14	20	13			
BBB+	Baa1	BBB+	13	50		11	152	53
BBB	Baa2	BBB	12	50				
BBB-	Baa3	BBB-	11	50	18			
Non-Investment Grade								
BB+	Ba1	BB+	10	100		8	260	107
BB	Ba2	BB	9	100				
BB-	Ba3	BB-	8	100				
B+	B1	B+	7	100				
B	B2	B	6	100				
B-	B3	B-	5	100	8			
CCC+	Caa1	CCC	4	150		9	36	34
CCC	Caa2	CC	3	150				
CCC-	Caa3	C	2	150				
CC	Ca	RD	1	150				
SD	C	D	0	150				
					43	35	647	296

Table 3. The effects of international bank flows induced by sovereign rating upgrade - Investment grade countries

$$\Delta LogGDP_{j,t+4} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of for 67 borrower countries. The dependent variable, , is the changes in log GDP per capita from quarter t to quarter t+4 (year on year growth) of the borrower country j. The independent variables include the following variables used on their own and as cross products: log of GDP per capita for quarter t, ; Bank flows, , from G-10 country i to borrower country j from quarter t-1 to t; Basel 2 period dummy, , that takes the value of 1 after Basel 2 implementation date in the G10 lender country i and 0 otherwise; quarterly sovereign rating changes, and , for pre- and post-Basel 2 (B2) periods between quarter t-1 to quarter t, respectively; (is a dummy for sovereign rating changes for country j that cause risk-weights to change (not change). The economic control variables measure the size of the economy, and the development of the financial system and institutional quality inof the borrower country i. These are theinclude bilateral portfolio flows, stock market capitalization to GDP, total bank credit provided, total trade (export plus import), Lerner index, and corruption and country governance index. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces." The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
(1) $LogGDP_{j,t}$	-0.4395 **	0.0606	0.0860	0.0965	-0.7479 ***	0.1972	0.1429	0.2358	-0.3672 ***	-0.2471 *	0.0391	0	4
	{0.0356}	{0.6769}	{0.5626}	{0.4932}	{0.0000}	{0.1170}	{0.1827}	{0.1324}	{0.0066}	{0.0992}	{0.7573}		
(2) $BF^i_{j,t-1}$	-0.0753 ***	0.0043	-0.0107	-0.0233 ***	-0.0045	0.0233 ***	-0.0160 ***	0.0771 ***	-0.0522 **	0.0570 ***	0.1526 ***	4	4
	{0.0000}	{0.1671}	{0.1190}	{0.0000}	{0.5788}	{0.0000}	{0.0000}	{0.0000}	{0.0147}	{0.0000}	{0.0000}		
(3) $B2DUM^i_t$	-0.8858 **	-0.1633	-0.1211	-0.9541 ***	-2.7863 ***	-0.0436	0.2177	1.0467 ***	0.5320	-1.5789 ***	0.6350 *	2	4
	{0.0176}	{0.5972}	{0.7089}	{0.0028}	{0.0000}	{0.8863}	{0.4227}	{0.0014}	{0.1219}	{0.0000}	{0.0522}		
(4) $BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t}$	-0.0008	0.0077 ***	0.0049 ***	-0.0025	0.0021 *	0.0035 ***	0.0081 ***	0.0018 **	0.0156 ***	0.0035 ***	-0.0047 ***	8	1
	{0.7575}	{0.0000}	{0.0000}	{0.1600}	{0.0687}	{0.0000}	{0.0000}	{0.0117}	{0.0000}	{0.0027}	{0.0000}		
(5) $\Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t}$	-0.1140 ***	0.0012 ***	0.0047 ***	-0.0032	0.0030 **	0.0003	0.0021 ***	0.0089 ***	-0.0004	-0.0025 **	0.0007	5	2
	{0.0000}	{0.0000}	{0.0014}	{0.1214}	{0.0464}	{0.6350}	{0.0000}	{0.0000}	{0.5269}	{0.0213}	{0.6684}		
(6) $\Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t}$	-0.0110 **	0.0361 ***	0.0652 ***	0.0073 ***	0.0034 **	0.0074 **	0.0021 ***	0.0046 ***	-0.3340 ***	0.0312 ***	0.0420 *	9	2
	{0.0309}	{0.0006}	{0.0021}	{0.0000}	{0.0125}	{0.0373}	{0.0000}	{0.0017}	{0.0000}	{0.0008}	{0.0693}		
(7) $LTPort^i_{j,t}$	-0.0582 *	-0.0431 **	-0.0235	-0.0787 ***	-0.0602 **	-0.1094 ***	-0.0240 *	-0.1064 ***	-0.0026	-0.0235	-0.0497 **	0	8
	{0.0742}	{0.0178}	{0.4161}	{0.0000}	{0.0324}	{0.0000}	{0.0658}	{0.0001}	{0.9274}	{0.4161}	{0.0320}		
(8) $SMCAPGDP_{j,t}$	0.0094 ***	-0.0009	-0.0027	-0.0052 ***	-0.0030 **	-0.0045 **	-0.0022	-0.0056 ***	-0.0052 ***	-0.0027	-0.0046 ***	1	6
	{0.0001}	{0.6077}	{0.1022}	{0.0003}	{0.0494}	{0.0266}	{0.1490}	{0.0000}	{0.0022}	{0.1022}	{0.0064}		
(9) $BANKCRED_{j,t}$	0.0907 *	-0.0376	-0.0588	-0.0219	-0.1218 ***	-0.0568	-0.0447	-0.0667 ***	0.1171 ***	-0.0588	-0.0064	2	2
	{0.0718}	{0.2039}	{0.1427}	{0.5125}	{0.0010}	{0.1563}	{0.1546}	{0.0000}	{0.0005}	{0.1427}	{0.6470}		
(10) $DOTXM_{j,t}$	0.1353 ***	-0.0225	-0.0205	-0.0030	0.2641 ***	0.0024	-0.0031	-0.0589 ***	0.0060	-0.0205	-0.0790 **	2	2
	{0.0015}	{0.5255}	{0.5815}	{0.9361}	{0.0000}	{0.9488}	{0.9063}	{0.0044}	{0.8586}	{0.5815}	{0.0146}		
(11) $LERNERINDEX_{j,t}$	5.8130 **	4.6633 **	4.1482 **	6.5374 ***	4.1409 **	4.4344 ***	2.6879	4.0054 ***	6.2126 ***	4.1482 **	6.3153 ***	10	0
	{0.0249}	{0.0196}	{0.0361}	{0.0002}	{0.0105}	{0.0023}	{0.1797}	{0.0053}	{0.0059}	{0.0361}	{0.0000}		
(12) $CORRUPTION_{j,t}$	-0.7027 ***	-0.4986 ***	-0.6775 ***	-0.5850 ***	-0.5455 ***	-0.5849 ***	-0.5351 ***	-0.4148 ***	-0.4017 **	-0.6775 ***	-0.7315 ***	0	11
	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0013}	{0.0242}	{0.0000}	{0.0000}		
(13) $GOVSTABILITY_{j,t}$	0.1599	0.5686 ***	0.6591 ***	0.6759 ***	-0.0166	0.6443 ***	0.4767 ***	0.7905 ***	0.4849 ***	0.6591 ***	0.9168 ***	9	0
	{0.2301}	{0.0000}	{0.0000}	{0.0000}	{0.8882}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
J-Stat	{0.8262}	{0.4600}	{0.0529} *	{0.0912} *	{0.1500}	{0.5681}	{0.4507}	{0.7956}	{0.2798}	{0.0529} *	{0.7692}		
NOBS	1910	2334	2339	2333	2193	2280	2335	2284	1919	2339	2240		

Table 4. The effects of international bank flows induced by sovereign rating upgrade – Non-investment grade countries

$$\Delta LogGDP_{j,t+4} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+4 (year on year growth) of the borrower country *j*. The independent variables include the following variables used on their own and as cross products: log of GDP per capita for quarter t, $LogGDP_{j,t}$; Bank flows, $BF^i_{j,t}$, from G-10 country *i* to borrower country *j* from quarter t-1 to t; Basel 2 period dummy, $B2DUM^i_{j,t}$, that takes the value of 1 after Basel 2 implementation date in the G10 lender country *i* and 0 otherwise; quarterly sovereign rating changes, $\Delta Rating^{PreB2}_{j,t}$ and $\Delta Rating^{PostB2}_{j,t}$, for pre- and post-Basel 2 (B2) periods between quarter t-1 to quarter t, respectively; $RWC_{j,t}$ ($NRWC_{j,t}$) is a dummy for sovereign rating changes for country *j* that cause risk-weights to change (not change). The economic control variables measure the size of the economy and financial system of the borrower country *i*. These are the bilateral portfolio flows, stock market capitalization to GDP, total bank credit provided, total trade (export plus import), Lerner index, and corruption and country governance index. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
(1) $LogGDP_{j,t}$	-1.7678 *	-0.1775	-0.1985	0.0237	-0.2895 **	-0.5881 ***	-0.4262 ***	-0.1741	0.9603	-0.2207 *	-0.2109	0	5
	{0.0859}	{0.5575}	{0.3212}	{0.8878}	{0.0318}	{0.0034}	{0.0068}	{0.4165}	{0.2981}	{0.0945}	{0.2247}		
(2) $BF^i_{j,t-1}$	-0.0033	-0.0018	0.0711 ***	0.0122 ***	-0.0153 ***	0.0039	0.0168 ***	0.0191 ***	-0.0929	0.0186	0.0069 **	5	1
	{0.9798}	{0.8363}	{0.0033}	{0.0000}	{0.0004}	{0.3237}	{0.0000}	{0.0017}	{0.1427}	{0.1879}	{0.0281}		
(3) $B2DUM^i_t$	-3.0396	-1.7352 ***	-1.4971 ***	-2.4034 ***	-2.8534 ***	-2.3580 ***	-1.5338 ***	-1.5004 ***	-2.3355	-2.2669 ***	-1.4623 ***	0	9
	{0.1945}	{0.0018}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0016}	{0.6450}	{0.0000}	{0.0041}		
(4) $BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t}$	-0.0761	-0.0027 ***	0.0015	0.0013	0.0025 ***	0.0001	0.0033 ***	-0.0028 **	-0.0021	0.0003	0.0001	2	2
	{0.7355}	{0.0003}	{0.4035}	{0.1659}	{0.0000}	{0.2448}	{0.0000}	{0.0107}	{0.8076}	{0.6489}	{0.6212}		
(5) $\Delta Rating^{PostB2}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t}$	0.7315	0.0016 ***	0.0071 ***	0.0126 ***	0.0003 ***	0.0040 ***	0.0006	0.0017 ***	-0.0099	0.0027 *	0.0025 **	8	0
	{0.2209}	{0.0006}	{0.0000}	{0.0000}	{0.0092}	{0.0017}	{0.2686}	{0.0000}	{0.3570}	{0.0762}	{0.0150}		
(6) $\Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t}$	-29.4541	-0.4249 ***	0.0186 *	-0.1473 ***	0.0883 **	0.1280 ***	-0.0806 ***	-0.0576 *	0.1577	-0.1463 **	-0.0537 **	3	6
	{0.3443}	{0.0087}	{0.0788}	{0.0000}	{0.0312}	{0.0091}	{0.0095}	{0.0775}	{0.8339}	{0.0443}	{0.0254}		
(7) $LTPort^i_{j,t}$	-0.0592	0.0000	-0.0248	-0.0045	-0.0796 ***	-0.0739 ***	-0.0080	-0.0683 ***	0.0831	-0.0248	-0.0696 ***	0	4
	{0.1680}	{0.9989}	{0.2791}	{0.8330}	{0.0000}	{0.0000}	{0.7114}	{0.0062}	{0.5728}	{0.2791}	{0.0005}		
(8) $SMCAPGDP_{j,t}$	0.0293	0.0009	0.0047	0.0082 **	0.0105 **	0.0073	0.0052	-0.0017	0.0925	0.0047	0.0072	2	0
	{0.1539}	{0.8624}	{0.3777}	{0.0269}	{0.0145}	{0.1722}	{0.2433}	{0.7453}	{0.1046}	{0.3777}	{0.1962}		
(9) $BANKCRED_{j,t}$	-0.0158	-0.0034	0.0080	-0.0466 ***	-0.0305 ***	0.0254	-0.0016	0.0013	0.0204	0.0080	0.0038	0	2
	{0.6881}	{0.8555}	{0.7020}	{0.0004}	{0.0075}	{0.1276}	{0.9152}	{0.9376}	{0.8188}	{0.7020}	{0.8176}		
(10) $DOTXM_{j,t}$	0.9027	0.2301 ***	0.1578 ***	0.2135 ***	0.2816 ***	0.2519 ***	0.2034 ***	0.2289 ***	-0.6413	0.1578 ***	0.2420 ***	9	0
	{0.3186}	{0.0004}	{0.0002}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0007}	{0.1900}	{0.0002}	{0.0000}		
(11) $LERNERINDEX_{j,t}$	10.0310	10.8714 ***	7.0086 ***	6.3234 ***	6.9404 ***	5.6867 **	9.9139 ***	4.3888 **	51.1968	7.0086 ***	7.4849 ***	9	0
	{0.2268}	{0.0009}	{0.0003}	{0.0055}	{0.0000}	{0.0135}	{0.0000}	{0.0364}	{0.5342}	{0.0003}	{0.0009}		
(12) $CORRUPTION_{j,t}$	-1.1983 ***	-1.1123 ***	-0.9151 ***	-0.7912 **	-1.0946 ***	-1.5514 ***	-1.0953 ***	-1.5360 ***	0.7926	-0.9151 ***	-1.1544 ***	0	10
	{0.0001}	{0.0008}	{0.0060}	{0.0189}	{0.0002}	{0.0000}	{0.0000}	{0.0003}	{0.6822}	{0.0060}	{0.0000}		
(13) $GOVSTABILITY_{j,t}$	0.2365	-0.2927	-0.0004	-0.3076 *	-0.2798 ***	0.0566	-0.2429 ***	0.1290	0.9348	-0.0004	-0.1261	0	3
	{0.7643}	{0.1874}	{0.9976}	{0.0789}	{0.0002}	{0.7005}	{0.0032}	{0.3872}	{0.1911}	{0.9976}	{0.5345}		
J-Stat	{0.5855}	{0.3636}	{0.9491}	{0.7147}	{0.6232}	{0.7186}	{0.7741}	{0.7267}	{0.9977}	{0.9491}	{0.8321}		
NOBS	585	860	869	869	781	850	869	797	504	869	763		

Table 5. The effects of international bank flows induced by sovereign rating downgrade - Investment grade countries

$$\Delta LogGDP_{j,t+4} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+4 (year on year growth) of the borrower country *j*. The independent variables include the following variables used on their own and as cross products: log of GDP per capita for quarter t, $LogGDP_{j,t}$; Bank flows, $BF^i_{j,t}$, from G-10 country *i* to borrower country *j* from quarter t-1 to t; Basel 2 period dummy, $B2DUM^i_{j,t}$, that takes the value of 1 after Basel 2 implementation date in the G10 lender country *i* and 0 otherwise; quarterly sovereign rating changes, $\Delta Rating^{PreB2}_{j,t}$ and $\Delta Rating^{PostB2}_{j,t}$, for pre- and post-Basel 2 (B2) periods between quarter t-1 to quarter t, respectively; $RWC_{j,t}$ ($NRWC_{j,t}$) is a dummy for sovereign rating changes for country *j* that cause risk-weights to change (not change). The economic control variables measure the size of the economy and financial system of the borrower country *i*. These are the bilateral portfolio flows, stock market capitalization to GDP, total bank credit provided, total trade (export plus import), Lerner index, and corruption and country governance index. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
(1) $LogGDP_{j,t}$	-0.1123	0.1108	0.0964	0.0700	-0.4724 ***	0.1425	-0.1194	0.0490	-0.1463 *	-0.0903	0.1091	0	2
	{0.4502}	{0.4480}	{0.5030}	{0.5853}	{0.0070}	{0.2666}	{0.3812}	{0.6778}	{0.0926}	{0.5014}	{0.2893}		
(2) $BF^i_{j,t-1}$	-0.0304 ***	-0.1046 ***	-0.0008	0.0355 ***	-0.0213	0.0029	0.0004	0.0041 ***	-0.0471 ***	0.0026	0.0226 ***	3	3
	{0.0000}	{0.0000}	{0.9662}	{0.0000}	{0.1117}	{0.1108}	{0.6778}	{0.0087}	{0.0000}	{0.5187}	{0.0000}		
(3) $B2DUM^i_t$	-0.9683 ***	-1.8311 ***	-0.2710	-0.5104 *	-3.2140 ***	-0.2291	-0.2373	-0.7752 ***	-0.5680 **	-2.5704 ***	-0.1220	0	7
	{0.0026}	{0.0000}	{0.5889}	{0.0642}	{0.0000}	{0.4499}	{0.2762}	{0.0014}	{0.0310}	{0.0000}	{0.6160}		
(4) $BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t}$	-0.0740 ***	-0.0067 **	-0.1268 **	-0.0687 ***	0.0475	-0.0319 ***	-0.0028 ***	-0.0899 ***	-0.0238 ***	-0.0319 ***	-0.0092 ***	0	10
	{0.0009}	{0.0419}	{0.0333}	{0.0000}	{0.2229}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0002}	{0.0000}		
(5) $\Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t}$	-0.0004 ***	0.0002	-0.0105 ***	-0.0039 ***	-0.0018 ***	-0.0036 ***	-0.0025 ***	-0.0002	-0.0039 ***	-0.0016 ***	-0.0015 ***	0	9
	{0.0086}	{0.6450}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.3341}	{0.0000}	{0.0000}	{0.0000}		
(6) $\Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t}$	-0.0006 ***	-0.0013 ***	-0.0044 ***	-0.0016 ***	0.0007 ***	-0.0006 ***	-0.0012 ***	-0.0038 ***	-0.0040 ***	0.0007 ***	-0.0037 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0045}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(7) $LTPort^i_{j,t}$	-0.0185	-0.0248	-0.0443 **	-0.0259	-0.0771 **	-0.1108 ***	-0.0446 *	-0.0381	-0.0021	-0.0443 **	-0.0768 ***	0	6
	{0.5292}	{0.1787}	{0.0185}	{0.4027}	{0.0101}	{0.0000}	{0.0656}	{0.1463}	{0.9429}	{0.0185}	{0.0001}		
(8) $SMCAPGDP_{j,t}$	-0.0037 **	-0.0043 **	-0.0049 ***	-0.0039 **	-0.0049 ***	-0.0059 ***	-0.0046 ***	-0.0044 ***	-0.0037 **	-0.0049 ***	-0.0056 ***	0	11
	{0.0490}	{0.0104}	{0.0054}	{0.0446}	{0.0037}	{0.0012}	{0.0037}	{0.0053}	{0.0445}	{0.0054}	{0.0001}		
(9) $BANKCRED_{j,t}$	0.0366	-0.0100	-0.0180	-0.0087	-0.1053	-0.0393	-0.0479	-0.0084	0.0065	-0.0180	0.0059	0	0
	{0.2496}	{0.7449}	{0.6552}	{0.8093}	{0.2311}	{0.2827}	{0.1859}	{0.8103}	{0.7899}	{0.6552}	{0.8172}		
(10) $DOTXM_{j,t}$	0.0569	-0.0088	-0.0024	-0.0232	0.2515 ***	0.0082	0.0524 **	-0.0368	0.0076	-0.0024	-0.0125	2	0
	{0.1983}	{0.7873}	{0.9441}	{0.5630}	{0.0000}	{0.7863}	{0.0399}	{0.2095}	{0.8214}	{0.9441}	{0.6960}		
(11) $LERNERINDEX_{j,t}$	4.6958 ***	8.3656 ***	4.7443 **	6.9865 ***	5.5356 ***	5.8030 ***	4.1752 ***	9.4282 ***	5.2187 ***	4.7443 **	4.8280 ***	11	0
	{0.0040}	{0.0000}	{0.0113}	{0.0022}	{0.0012}	{0.0008}	{0.0089}	{0.0000}	{0.0005}	{0.0113}	{0.0004}		
(12) $CORRUPTION_{j,t}$	-0.7868 ***	-0.7576 ***	-0.7414 ***	-0.6543 ***	-0.7712 ***	-0.6745 ***	-0.6475 ***	-0.7361 ***	-0.6149 ***	-0.7414 ***	-0.6349 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(13) $GOVSTABILITY_{j,t}$	0.4890 ***	0.6959 ***	0.7058 ***	0.6554 ***	0.0765	0.7165 ***	0.4969 ***	0.7519 ***	0.5836 ***	0.7058 ***	0.7114 ***	10	0
	{0.0002}	{0.0000}	{0.0000}	{0.0000}	{0.5630}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
J-Stat	{0.7070}	{0.5662}	{0.5577}	{0.8321}	{0.7326}	{0.4387}	{0.1884}	{0.1540}	{0.8169}	{0.5577}	{0.4966}		
NOBS	1910	2334	2339	2333	2193	2280	2335	2284	1919	2339	2240		

Table 6. The effects of international bank flows induced by sovereign rating downgrade – Non-investment grade countries

$$\Delta LogGDP_{j,t+4} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+4 (year on year growth) of the borrower country *j*. The independent variables include the following variables used on their own and as cross products: log of GDP per capita for quarter t, $LogGDP_{j,t}$; Bank flows, $BF^i_{j,t}$, from G-10 country *i* to borrower country *j* from quarter t-1 to t; Basel 2 period dummy, $B2DUM^i_{j,t}$, that takes the value of 1 after Basel 2 implementation date in the G10 lender country *i* and 0 otherwise; quarterly sovereign rating changes, $\Delta Rating^{PreB2}_{j,t}$ and $\Delta Rating^{PostB2}_{j,t}$, for pre- and post-Basel 2 (B2) periods between quarter t-1 to quarter t, respectively; $RWC_{j,t}$ ($NRWC_{j,t}$) is a dummy for sovereign rating changes for country *j* that cause risk-weights to change (not change). The economic control variables measure the size of the economy and financial system of the borrower country *i*. These are the bilateral portfolio flows, stock market capitalization to GDP, total bank credit provided, total trade (export plus import), Lerner index, and corruption and country governance index. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
(1) $LogGDP_{j,t}$	-0.3134	-1.1827 ***	0.1571	-0.0786	-0.0778	-0.2366	0.1093	-0.0154	0.2531	-0.2169	-0.3260 *	0	2
	{0.1688}	{0.0000}	{0.3756}	{0.6633}	{0.5128}	{0.1526}	{0.5146}	{0.9267}	{0.2346}	{0.1088}	{0.0601}		
(2) $BF^i_{j,t-1}$	-0.0524	0.0013	0.1863 ***	-0.0154 ***	0.0005	0.0847 ***	0.0047 ***	0.0086 ***	-0.0832 *	0.0462 ***	0.0457 ***	6	2
	{0.5866}	{0.2013}	{0.0000}	{0.0003}	{0.7721}	{0.0000}	{0.0000}	{0.0000}	{0.0673}	{0.0000}	{0.0000}		
(3) $B2DUM^i_t$	-1.3816 ***	-2.7730 ***	0.2169	-1.0262 ***	-3.0202 ***	-1.1298 ***	-0.9365 ***	-1.2643 ***	-1.9899 **	-1.7208 ***	-0.0306	0	9
	{0.0005}	{0.0000}	{0.5653}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0073}	{0.0150}	{0.0000}	{0.9361}		
(4) $BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t}$	-0.0005	-0.0567 ***	0.0212 ***	0.0067 ***	-0.0089	0.0036 ***	0.0118 ***	0.0057 ***	0.0022	0.0046 *	0.0219 ***	7	1
	{0.9286}	{0.0000}	{0.0000}	{0.0000}	{0.2393}	{0.0000}	{0.0000}	{0.0012}	{0.8484}	{0.0826}	{0.0000}		
(5) $\Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t}$	-0.0002	-0.0026 ***	-0.0067 ***	-0.0080 ***	-0.0034 ***	-0.0088 ***	-0.0004 ***	-0.0022 ***	-0.0093 ***	-0.0132 ***	-0.0009 ***	0	10
	{0.7823}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6) $\Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t}$	-0.0036 ***	-0.0050 ***	-0.0040 ***	-0.0032 ***	-0.0018 ***	-0.0013 ***	-0.0004 ***	-0.0017 ***	0.0231 ***	-0.0011 ***	-0.0062 ***	1	10
	{0.0073}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(7) $LTPort^i_{i.t}$	-0.0457	-0.0865 ***	-0.0436 **	-0.0472 ***	-0.0703 ***	-0.0818 ***	-0.0368 ***	-0.0548 ***	-0.0258	-0.0436 **	-0.0764 ***	0	9
	{0.1218}	{0.0000}	{0.0124}	{0.0027}	{0.0000}	{0.0000}	{0.0002}	{0.0001}	{0.5655}	{0.0124}	{0.0000}		
(8) $SMCAPGDP_{j,t}$	-0.0028 *	-0.0180 ***	-0.0017	-0.0023	0.0001	-0.0050	-0.0008	-0.0017	-0.0026	-0.0017	-0.0033	0	2
	{0.0820}	{0.0000}	{0.6757}	{0.5438}	{0.9809}	{0.1321}	{0.8879}	{0.5955}	{0.2026}	{0.6757}	{0.3479}		
(9) $BANKCRED_{j,t}$	0.0139	0.0512 **	0.0038	-0.0122	-0.0280 *	-0.0002	0.0107	-0.0255 *	-0.0276	0.0038	0.0208	1	2
	{0.4594}	{0.0287}	{0.8723}	{0.4365}	{0.0681}	{0.9886}	{0.5396}	{0.0713}	{0.1826}	{0.8723}	{0.2657}		
(10) $DOTXM_{j,t}$	0.1250 ***	0.3484 ***	0.0814 ***	0.1860 ***	0.2841 ***	0.2295 ***	0.0726 ***	0.1829 ***	0.0104	0.0814 ***	0.1683 ***	10	0
	{0.0037}	{0.0000}	{0.0027}	{0.0000}	{0.0000}	{0.0000}	{0.0021}	{0.0003}	{0.8426}	{0.0027}	{0.0000}		
(11) $LERNERINDEX_{j,t}$	7.2147 ***	1.7870	9.7447 ***	9.5763 ***	12.1181 ***	9.3682 ***	11.3346 ***	12.8634 ***	9.3144 ***	9.7447 ***	6.8667 ***	10	0
	{0.0013}	{0.2078}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0005}	{0.0000}	{0.0001}		
(12) $CORRUPTION_{j,t}$	-0.6837 ***	-1.0033 ***	-0.9578 ***	-0.8550 ***	-1.0375 ***	-1.1346 ***	-0.9753 ***	-1.0229 ***	-0.9762 ***	-0.9578 ***	-0.9599 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(13) $GOVSTABILITY_{j,t}$	0.2429 *	0.1531 **	0.1313	-0.1607	-0.4320 ***	-0.1479	0.1302 *	-0.1675	0.5098 ***	0.1313	0.1455	4	1
	{0.0932}	{0.0143}	{0.2235}	{0.1908}	{0.0000}	{0.2086}	{0.0698}	{0.2083}	{0.0024}	{0.2235}	{0.2282}		
J-Stat	{0.2075}	{0.4154}	{0.3878}	{0.5013}	{0.5385}	{0.7521}	{0.0732} *	{0.2323}	{0.3145}	{0.3878}	{0.4770}		
NOBS	2495	860	869	869	781	850	869	797	2423	869	763		

Table 7. The effects of international bank flows induced by sovereign rating upgrade – Investment grade countries

$$\Delta LogGDP_{j,t+N} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+1 (quarterly growth), t+4 (yearly), t+8 (2 years), t+12 (3 years), t+16 (4 years), and t+20 (5 years). The rest of the variables are defined as in previous tables. We provide only the coefficients α_5 and α_6 for all growth horizon estimations. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Quarter to Quarter GDP growth													
(5)	-0.0475 ***	0.0001	0.0015 ***	-0.0055 ***	0.0017 ***	-0.0003	0.0004 ***	0.0030 ***	-0.0004	-0.0009	0.0014 **	5	2
	{0.0000}	{0.3216}	{0.0001}	{0.0000}	{0.0000}	{0.6197}	{0.0000}	{0.0000}	{0.5165}	{0.1738}	{0.0120}		
(6)	0.0022	0.0258 ***	0.0248 ***	0.0038 ***	0.0027 ***	0.0053 ***	-0.0015 ***	0.0026 ***	-0.1218 ***	0.0054 *	0.0243 ***	8	2
	{0.1752}	{0.0000}	{0.0000}	{0.0000}	{0.0012}	{0.0005}	{0.0005}	{0.0010}	{0.0053}	{0.0524}	{0.0008}		
Year 0 to Year 1 GDP growth													
(5)	-0.1140 ***	0.0012 ***	0.0047 ***	-0.0032	0.0030 **	0.0003	0.0021 ***	0.0089 ***	-0.0004	-0.0025 **	0.0007	5	2
	{0.0000}	{0.0000}	{0.0014}	{0.1214}	{0.0464}	{0.6350}	{0.0000}	{0.0000}	{0.5269}	{0.0213}	{0.6684}		
(6)	-0.0110 **	0.0361 ***	0.0652 ***	0.0073 ***	0.0034 **	0.0074 **	0.0021 ***	0.0046 ***	-0.3340 ***	0.0312 ***	0.0420 *	9	2
	{0.0309}	{0.0006}	{0.0021}	{0.0000}	{0.0125}	{0.0373}	{0.0000}	{0.0017}	{0.0000}	{0.0008}	{0.0693}		
Year 0 to Year 2 GDP growth													
(5)	-0.1285 ***	-0.0008	0.0083 ***	0.0057 **	0.0098 ***	-0.0012 ***	0.0045 ***	0.0098 ***	0.0037	-0.0017	0.0059 **	6	2
	{0.0000}	{0.1033}	{0.0000}	{0.0356}	{0.0000}	{0.0015}	{0.0000}	{0.0000}	{0.1011}	{0.1447}	{0.0133}		
(6)	-0.0204	-0.0053	0.0158	0.0153 ***	0.0008	0.0026	0.0069 ***	0.0016	-0.3026 ***	0.0314 ***	0.0315	3	1
	{0.3808}	{0.6915}	{0.4272}	{0.0000}	{0.6125}	{0.4414}	{0.0000}	{0.4604}	{0.0002}	{0.0074}	{0.4181}		
Year 0 to Year 3 GDP growth													
(5)	-0.0833 **	-0.0024 ***	0.0072 ***	0.0001	0.0066 ***	-0.0013 ***	0.0054 ***	0.0106 ***	0.0070	-0.0034 *	0.0048	4	4
	{0.0386}	{0.0000}	{0.0002}	{0.9843}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.1096}	{0.0877}	{0.1583}		
(6)	-0.0622 ***	-0.0503 **	-0.0008	0.0103 ***	-0.0071 ***	0.0025	0.0033	-0.0020	-0.2674 **	0.0173	-0.0542	1	4
	{0.0000}	{0.0363}	{0.9608}	{0.0000}	{0.0002}	{0.4307}	{0.1004}	{0.4164}	{0.0124}	{0.2359}	{0.2395}		
Year 0 to Year 4 GDP growth													
(5)	-0.1170 ***	-0.0040 ***	0.0107 ***	0.0176 ***	0.0081 ***	-0.0024 ***	0.0067 ***	0.0061 ***	0.0116 *	0.0013	0.0021	6	3
	{0.0023}	{0.0000}	{0.0000}	{0.0008}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0754}	{0.4650}	{0.5567}		
(6)	-0.0604 ***	-0.0732 **	0.0040	0.0219 ***	-0.0136 ***	-0.0185 ***	0.0003	-0.0054 **	-0.4266 ***	-0.0086	-0.0345	1	6
	{0.0022}	{0.0111}	{0.8748}	{0.0000}	{0.0000}	{0.0001}	{0.9306}	{0.0446}	{0.0000}	{0.5999}	{0.5208}		
Year 0 to Year 5 GDP growth													
(5)	-0.1894 ***	-0.0049 ***	0.0142 ***	0.0316 ***	0.0085 ***	-0.0030 ***	0.0076 ***	0.0025 ***	0.0153 **	0.0025 **	0.0069 *	8	3
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0328}	{0.0223}	{0.0761}		
(6)	-0.0881 ***	-0.0579 **	0.0215	0.0180 ***	-0.0113 ***	-0.0104 **	-0.0051 *	-0.0049 **	-0.2184 ***	-0.0264 **	0.0282	1	8
	{0.0003}	{0.0316}	{0.3823}	{0.0003}	{0.0000}	{0.0318}	{0.0954}	{0.0133}	{0.0096}	{0.0402}	{0.5485}		

Table 8. The effects of international bank flows induced by sovereign rating upgrade – Non-investment grade countries

$$\Delta LogGDP_{j,t+N} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+1 (quarterly growth), t+4 (yearly), t+8 (2 years), t+12 (3 years), t+16 (4 years), and t+20 (5 years). The rest of the variables are defined as in previous tables. We provide only the coefficients α_5 and α_6 for all growth horizon estimations. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Quarter to Quarter GDP growth													
(5)	0.3434 ***	0.0007 ***	0.0028 ***	0.0037 ***	-0.0003 ***	0.0016 ***	0.0004 ***	0.0012 ***	-0.0059 ***	-0.0010 ***	0.0040 *	8	3
	{0.0024}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0003}	{0.0016}	{0.0002}	{0.0003}	{0.0001}	{0.0621}		
(6)	4.4356 **	-0.0632	0.0128 ***	-0.0099	0.0146	0.0097	-0.1552 ***	-0.0108 **	-0.1444	-0.0554 **	0.0132	2	3
	{0.0179}	{0.1247}	{0.0001}	{0.2907}	{0.3948}	{0.4346}	{0.0000}	{0.0102}	{0.4451}	{0.0233}	{0.1398}		
Year 0 to Year 1 GDP growth													
(5)	0.7315	0.0016 ***	0.0071 ***	0.0126 ***	0.0003 ***	0.0040 ***	0.0006	0.0017 ***	-0.0099	0.0027 *	0.0025 **	8	0
	{0.2209}	{0.0006}	{0.0000}	{0.0000}	{0.0092}	{0.0017}	{0.2686}	{0.0000}	{0.3570}	{0.0762}	{0.0150}		
(6)	-29.4541	-0.4249 ***	0.0186 *	-0.1473 ***	0.0883 **	0.1280 ***	-0.0806 ***	-0.0576 *	0.1577	-0.1463 **	-0.0537 **	3	6
	{0.3443}	{0.0087}	{0.0788}	{0.0000}	{0.0312}	{0.0091}	{0.0095}	{0.0775}	{0.8339}	{0.0443}	{0.0254}		
Year 0 to Year 2 GDP growth													
(5)	2.8166 ***	0.0042 ***	0.0163 ***	0.0198 ***	0.0003	0.0096 ***	-0.0001	0.0048 ***	-0.0300 ***	0.0073 ***	0.0047 **	8	1
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.3217}	{0.0000}	{0.9574}	{0.0003}	{0.0014}	{0.0014}	{0.0323}		
(6)	-34.1671	-1.2223 ***	0.0472 **	-0.2670 ***	0.1861 ***	0.0936	-0.1481 **	-0.0281	0.2353	-0.1800	-0.0917 **	2	4
	{0.1087}	{0.0086}	{0.0127}	{0.0012}	{0.0000}	{0.2534}	{0.0145}	{0.5767}	{0.2437}	{0.2663}	{0.0304}		
Year 0 to Year 3 GDP growth													
(5)	2.7948 **	0.0053 ***	0.0217 ***	0.0322 ***	0.0006	0.0120 ***	0.0022	0.0004	-0.0197 **	0.0102 ***	0.0038	6	1
	{0.0264}	{0.0001}	{0.0000}	{0.0000}	{0.3989}	{0.0047}	{0.3305}	{0.5394}	{0.0130}	{0.0002}	{0.1066}		
(6)	-12.9201	-0.3751	0.0556 ***	-0.1340	0.4237 ***	0.4772 ***	-0.1024 **	-0.0532 *	0.5457	0.7373 ***	0.0085	4	2
	{0.7857}	{0.1061}	{0.0087}	{0.2202}	{0.0000}	{0.0000}	{0.0430}	{0.0551}	{0.1424}	{0.0000}	{0.8685}		
Year 0 to Year 4 GDP growth													
(5)	7.1065 ***	0.0067 ***	0.0222 ***	0.0370 ***	-0.0006	0.0099 *	0.0013	0.0077 ***	-0.0101	0.0157 ***	0.0232 ***	8	0
	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.5820}	{0.0980}	{0.3031}	{0.0018}	{0.5095}	{0.0000}	{0.0000}		
(6)	27.1432	-0.7765	0.0719 ***	-0.0595	0.6284 ***	0.8806 ***	-0.0758	-0.0315	0.1024	2.1299 ***	-0.0601	4	0
	{0.2796}	{0.1014}	{0.0091}	{0.6888}	{0.0000}	{0.0000}	{0.2864}	{0.5710}	{0.9343}	{0.0000}	{0.4425}		
Year 0 to Year 5 GDP growth													
(5)	11.2319 ***	0.0074 ***	0.0300 ***	0.0394 ***	-0.0024 ***	0.0117 *	0.0003	0.0092 **	-0.0090	0.0281 ***	0.0193 ***	8	1
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0764}	{0.9080}	{0.0181}	{0.4044}	{0.0000}	{0.0000}		
(6)	33.5994	-0.4309	0.1068 ***	0.3811 *	1.2629 ***	1.2307 ***	0.0470	-0.0313	0.1855	2.3983 ***	0.0446	5	0
	{0.2278}	{0.3760}	{0.0012}	{0.0663}	{0.0000}	{0.0000}	{0.4889}	{0.5098}	{0.6652}	{0.0000}	{0.6740}		

Table 9. The effects of international bank flows induced by sovereign rating downgrade – Investment grade countries

$$\Delta LogGDP_{j,t+N} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+1 (quarterly growth), t+4 (yearly), t+8 (2 years), t+12 (3 years), t+16 (4 years), and t+20 (5 years). The rest of the variables are defined as in previous tables. We provide only the coefficients α_5 and α_6 for all growth horizon estimations. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Quarter to Quarter GDP growth													
(5)	0.0002	0.0000	-0.0005	-0.0004	-0.0003 *	-0.0011 ***	-0.0007 ***	-0.0002 *	-0.0004 **	-0.0005 ***	-0.0002 **	0	7
	{0.1209}	{0.9699}	{0.3609}	{0.3707}	{0.0681}	{0.0000}	{0.0000}	{0.0858}	{0.0166}	{0.0000}	{0.0157}		
(6)	-0.0001 ***	-0.0006 ***	-0.0024 ***	-0.0013 **	-0.0017 ***	-0.0002 ***	-0.0008 ***	-0.0014 ***	-0.0012 ***	-0.0001	-0.0018 ***	0	10
	{0.0009}	{0.0000}	{0.0000}	{0.0205}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.2202}	{0.0000}		
Year 0 to Year 1 GDP growth													
(5)	-0.0004 ***	0.0002	-0.0105 ***	-0.0039 ***	-0.0018 ***	-0.0036 ***	-0.0025 ***	-0.0002	-0.0039 ***	-0.0016 ***	-0.0015 ***	0	9
	{0.0086}	{0.6450}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.3341}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0006 ***	-0.0013 ***	-0.0044 ***	-0.0016 ***	0.0007 ***	-0.0006 ***	-0.0012 ***	-0.0038 ***	-0.0040 ***	0.0007 ***	-0.0037 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0045}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 2 GDP growth													
(5)	-0.0004	0.0032 ***	-0.0136 ***	-0.0046 ***	-0.0018 ***	-0.0054 ***	-0.0039 ***	0.0000	-0.0067 ***	-0.0026 ***	-0.0028 ***	1	8
	{0.1208}	{0.0023}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.7986}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0011 ***	-0.0020 ***	-0.0072 ***	-0.0009 ***	-0.0034 ***	-0.0010 ***	0.0011 **	-0.0058 ***	-0.0071 ***	0.0018 ***	-0.0050 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0272}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 3 GDP growth													
(5)	0.0000	0.0049 ***	-0.0189 ***	-0.0041 ***	-0.0007 ***	-0.0073 ***	-0.0056 ***	0.0007 **	-0.0088 ***	-0.0028 ***	-0.0025 ***	2	8
	{0.7978}	{0.0003}	{0.0000}	{0.0000}	{0.0003}	{0.0000}	{0.0000}	{0.0141}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0013 ***	-0.0026 ***	-0.0082 ***	-0.0017 ***	-0.0093 ***	-0.0014 ***	0.0054 ***	-0.0076 ***	-0.0078 ***	0.0022 ***	-0.0025 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0002}		
Year 0 to Year 4 GDP growth													
(5)	0.0027 ***	0.0138 ***	-0.0209 ***	0.0019 ***	0.0003	-0.0076 ***	-0.0028 ***	0.0024 ***	-0.0058 ***	-0.0015 ***	-0.0011 ***	4	6
	{0.0014}	{0.0000}	{0.0000}	{0.0049}	{0.2326}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0004 **	-0.0033 ***	-0.0070 ***	-0.0014 ***	-0.0017 ***	-0.0020 ***	0.0089 ***	-0.0080 ***	-0.0062 ***	0.0032 ***	0.0010 **	3	8
	{0.0462}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0282}		
Year 0 to Year 5 GDP growth													
(5)	0.0027 **	0.0174 ***	-0.0228 ***	0.0037 ***	0.0011 ***	-0.0090 ***	-0.0017 ***	0.0034 ***	-0.0044 ***	-0.0006	0.0001	5	4
	{0.0153}	{0.0000}	{0.0000}	{0.0001}	{0.0010}	{0.0000}	{0.0007}	{0.0000}	{0.0000}	{0.2761}	{0.7986}		
(6)	-0.0003	-0.0039 ***	-0.0110 ***	-0.0010 ***	-0.0007 *	-0.0026 ***	0.0101 ***	-0.0097 ***	-0.0076 ***	0.0036 ***	0.0008 **	3	7
	{0.1000}	{0.0000}	{0.0000}	{0.0001}	{0.0786}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0181}		

Table 10. The effects of international bank flows induced by sovereign rating downgrade – Non-investment grade countries

$$\Delta LogGDP_{j,t+N} = \alpha_1 \cdot LogGDP_{j,t} + \alpha_2 \cdot BF^i_{j,t} + \alpha_3 \cdot B2DUM^i_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF^i_{j,t} + \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF^i_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF^i_{j,t} + \sum_k \beta_k \cdot Controls^k_{j,t} + \varepsilon_{j,t}$$

The table below reports the results of the GMM dynamic panel estimations of real GDP growth of 67 borrower countries. The dependent variable, $\Delta LogGDP_{j,t+4}$, is the changes in log GDP per capita from quarter t to quarter t+1 (quarterly growth), t+4 (yearly), t+8 (2 years), t+12 (3 years), t+16 (4 years), and t+20 (5 years). The rest of the variables are defined as in previous tables. We provide only the coefficients α_5 and α_6 for all growth horizon estimations. The significance levels of 1, 5, and 10% are denoted by ***, **, *, respectively. P-values are in curly braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Quarter to Quarter GDP growth													
(5)	-0.1514	-0.0007 ***	-0.0020 ***	-0.0022 ***	-0.0011 ***	-0.0022 ***	0.0002 ***	-0.0005 ***	-0.0008 ***	-0.0030 ***	-0.0003 ***	1	9
	{0.1779}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0013}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0005 ***	-0.0016 ***	-0.0017 ***	-0.0011 ***	-0.0010 ***	-0.0007 ***	-0.0002 ***	-0.0004 ***	-0.0007 ***	-0.0004 ***	-0.0017 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 1 GDP growth													
(5)	-0.0002	-0.0026 ***	-0.0067 ***	-0.0080 ***	-0.0034 ***	-0.0088 ***	-0.0004 ***	-0.0022 ***	-0.0093 ***	-0.0132 ***	-0.0009 ***	0	10
	{0.7823}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0036 ***	-0.0050 ***	-0.0040 ***	-0.0032 ***	-0.0018 ***	-0.0013 ***	-0.0004 ***	-0.0017 ***	0.0231 ***	-0.0011 ***	-0.0062 ***	1	10
	{0.0073}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 2 GDP growth													
(5)	-0.1167 ***	-0.0037 ***	-0.0098 ***	-0.0100 ***	-0.0056 ***	-0.0136 ***	0.0003 ***	-0.0036 ***	-0.0060 ***	-0.0205 ***	-0.0012 ***	1	10
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0006 ***	-0.0074 ***	-0.0061 ***	-0.0040 ***	-0.0028 ***	-0.0025 ***	-0.0002 ***	-0.0031 ***	-0.0034 ***	-0.0021 ***	-0.0102 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 3 GDP growth													
(5)	4.5995	-0.0043 ***	-0.0095 ***	-0.0136 ***	-0.0065 ***	-0.0154 ***	0.0004 ***	-0.0046 ***	-0.0058 ***	-0.0250 ***	-0.0016 ***	1	9
	{0.2136}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	0.0031	-0.0096 ***	-0.0055 ***	-0.0065 ***	-0.0031 ***	-0.0027 ***	-0.0002 ***	-0.0039 ***	0.0009	-0.0027 ***	-0.0135 ***	0	9
	{0.3533}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.8116}	{0.0000}	{0.0000}		
Year 0 to Year 4 GDP growth													
(5)	-1.2432 ***	-0.0047 ***	-0.0154 ***	-0.0156 ***	-0.0075 ***	-0.0233 ***	-0.0041 ***	-0.0049 ***	-0.0083 ***	-0.0312 ***	-0.0017 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0008 ***	-0.0134 ***	-0.0121 ***	-0.0093 ***	-0.0052 ***	-0.0122 ***	-0.0009 ***	-0.0050 ***	-0.0072 ***	-0.0036 ***	-0.0234 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Year 0 to Year 5 GDP growth													
(5)	-1.2716 ***	-0.0050 ***	-0.0235 ***	-0.0194 ***	-0.0108 ***	-0.0327 ***	-0.0051 ***	-0.0074 ***	-0.0102 ***	-0.0365 ***	-0.0020 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6)	-0.0012 ***	-0.0144 ***	-0.0165 ***	-0.0122 ***	-0.0071 ***	-0.0180 ***	-0.0012 ***	-0.0063 ***	-0.0090 ***	-0.0044 ***	-0.0245 ***	0	11
	{0.0003}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		

Table 11. The interactive effects of institutional quality and international bank flows on economic growth in recipient countries – Lerner Index

$$\Delta LogGDP^{i}_{j,(t+N)-t} = \alpha_1 \cdot LogGD^{i}_{j,t} + \alpha_2 \cdot BF^{i}_{j,t} + \alpha_3 \cdot B2DUM^{i}_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF_{j,t}$$
$$+ \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \sum_{k} \beta_k \cdot Controls^{k}_{j,t} + \varepsilon_{j,t}$$

This table reports the interactive effects between market power in the local banking sector and ratings-induced bank flows from the GMM dynamic panel estimations of log changes in real GDP per capita in investment and non-investment grade sub-sample recipient countries (Eq. (2)). (5) represents the NRWC rating events and (6) represents the RWC rating events. The subscript *j* represents the 67 borrower countries and the superscript *i* represents G10 lender countries. ***, **, * denote significance at the 1, 5, and 10% level, respectively. P-values are in curely braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Panel A: Upgrades													
Investment Grade													
(5) x LernerIDX$^{i}_{j}$	-3.0148 ***	0.0607 ***	0.1353 ***	-0.5316 ***	0.2257 ***	0.0134	0.1225 ***	0.3937 ***	0.0099	-0.0025	-0.0453	5	2
	{0.0000}	{0.0000}	{0.0023}	{0.0000}	{0.0000}	{0.5375}	{0.0000}	{0.0000}	{0.6147}	{0.9150}	{0.1579}		
(6) x LernerIDX$^{i}_{j}$	-0.3359 **	1.0835 ***	2.3725 ***	0.3135 ***	0.4470 ***	0.1820	0.1606 ***	0.2059 ***	-19.6561 ***	0.8986 ***	2.5101 ***	8	2
	{0.0105}	{0.0073}	{0.0012}	{0.0000}	{0.0000}	{0.1194}	{0.0000}	{0.0032}	{0.0000}	{0.0000}	{0.0075}		
Non-Investment Grade													
(5) x LernerIDX$^{i}_{j}$	-0.6913	0.0941 ***	0.3612 ***	0.4497 ***	0.0005	0.1692 ***	-0.0017	0.1260 ***	0.3516 ***	0.0909 **	0.0269	7	0
	{0.8512}	{0.0000}	{0.0000}	{0.0000}	{0.9350}	{0.0012}	{0.9197}	{0.0060}	{0.0000}	{0.0494}	{0.3917}		
(6) x LernerIDX$^{i}_{j}$	0.9471	-20.0410 ***	0.8963	-8.9116 ***	6.0321 ***	3.1243 *	-1.1732	-21.3980 ***	-34.7500 ***	-16.9390 ***	-2.5992 **	2	6
	{0.7942}	{0.0004}	{0.3228}	{0.0000}	{0.0004}	{0.0832}	{0.5602}	{0.0063}	{0.0000}	{0.0000}	{0.0128}		
Panel B: Downgrades													
Investment Grade													
(5) x LernerIDX$^{i}_{j}$	-0.0760 ***	-0.0794 **	-0.5586 ***	-0.1430 ***	-0.0960 ***	-0.2373 ***	-0.0590 ***	-0.0445 ***	-0.1643 ***	-0.0780 ***	-0.0715 ***	0	11
	{0.0000}	{0.0116}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0004}	{0.0000}	{0.0000}	{0.0000}		
(6) x LernerIDX$^{i}_{j}$	-0.0164 ***	0.0800 ***	0.0018	0.0894 ***	-0.0931 ***	0.0557 ***	-0.0449 ***	0.0574 ***	0.0938 ***	-0.0154 *	0.0910 ***	6	4
	{0.0000}	{0.0000}	{0.9046}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0764}	{0.0000}		
Non-Investment Grade													
(5) x LernerIDX$^{i}_{j}$	8.6388	-0.0619 ***	-0.3147 ***	-0.3123 ***	-0.1050 ***	-0.2407 ***	-0.0496 ***	-0.1114 ***	-0.2022 ***	-0.4255 ***	-0.0465 ***	0	10
	{0.7377}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6) x LernerIDX$^{i}_{j}$	-0.0149	-0.1498 ***	-0.1916 ***	-0.1253 ***	-0.0519 ***	-0.0555 ***	-0.0233 ***	-0.0458 ***	-0.1148 ***	-0.0705 ***	-0.2818 ***	0	10
	{0.4450}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		

Table 12. The interactive effects of institutional quality and international bank flows on economic growth in recipient countries – Corruption index

$$\Delta LogGDP^{i}_{j,(t+N)-t} = \alpha_1 \cdot LogGD^{i}_{j,t} + \alpha_2 \cdot BF^{i}_{j,t} + \alpha_3 \cdot B2DUM^{i}_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF_{j,t}$$
$$+ \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \sum_k \beta_k \cdot Controls^{k}_{j,t} + \varepsilon_{j,t}$$

This table reports the interactive effects between the degree of corruption in the recipient country and ratings-induced bank flows from the GMM dynamic panel estimations of log changes in real GDP per capita in investment and non-investment grade sub-sample recipient countries (Eq. (2)). (5) represents the NRWC rating events and (6) represents the RWC rating events. The subscript *j* represents the 67 borrower countries and the superscript *i* represents G10 lender countries. ***, **, * denote significance at the 1, 5, and 10% level, respectively. P-values are in curely braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Panel A: Upgrades													
Investment Grade													
(5) x Corruption$^{i}_{j}$	-0.3006 ***	0.0033 ***	0.0186 ***	0.0401 ***	0.0333 ***	0.0023	0.0061 ***	0.0310 ***	0.0053	-0.0062	-0.0040	6	1
	{0.0000}	{0.0000}	{0.0000}	{0.0043}	{0.0000}	{0.2644}	{0.0000}	{0.0000}	{0.1710}	{0.1098}	{0.6356}		
(6) x Corruption$^{i}_{j}$	-0.0577 **	0.0016	0.1129 **	0.0105	-0.0072	0.0545 ***	-0.0122 ***	0.0146 ***	-1.3494 ***	0.1517 ***	0.2471 **	5	3
	{0.0132}	{0.9688}	{0.0173}	{0.2836}	{0.3644}	{0.0068}	{0.0027}	{0.0004}	{0.0000}	{0.0002}	{0.0363}		
Non-Investment Grade													
(5) x Corruption$^{i}_{j}$	-0.0222	0.0072 ***	0.0317 ***	0.0562 ***	0.0041 ***	0.0195 ***	0.0170 ***	0.0049 ***	0.0708	0.0106	0.0154 ***	8	0
	{0.3822}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.1338}	{0.1317}	{0.0057}		
(6) x Corruption$^{i}_{j}$	0.0000	-1.1057 *	0.1316 ***	-0.6882 ***	0.1756 *	0.1852	-0.3383 ***	-0.0380	-0.6328	-0.9690 ***	-0.2870 ***	2	5
	{1.0000}	{0.0622}	{0.0000}	{0.0000}	{0.0922}	{0.2428}	{0.0030}	{0.8387}	{0.3679}	{0.0026}	{0.0015}		
Panel B: Downgrades													
Investment Grade													
(5) x Corruption$^{i}_{j}$	-0.0004	-0.0007	-0.0152 ***	-0.0053 ***	-0.0045 ***	-0.0094 ***	-0.0095 ***	-0.0003 *	-0.0095 ***	-0.0075 ***	-0.0079 ***	0	9
	{0.1842}	{0.2319}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0533}	{0.0000}	{0.0000}	{0.0000}		
(6) x Corruption$^{i}_{j}$	-0.0015 ***	-0.0024 ***	-0.0104 ***	-0.0028 ***	0.0025 ***	-0.0010 ***	-0.0020 ***	-0.0068 ***	-0.0087 ***	0.0006 ***	-0.0060 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0001}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Non-Investment Grade													
(5) x Corruption$^{i}_{j}$	-1.0002 ***	-0.0051 ***	-0.0253 ***	-0.0415 ***	-0.0124 ***	-0.0196 ***	-0.0069 ***	-0.0146 ***	-0.0169 ***	-0.0435 ***	-0.0053 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6) x Corruption$^{i}_{j}$	-0.0030 ***	-0.0188 ***	-0.0107 ***	-0.0121 ***	-0.0089 ***	-0.0031 ***	-0.0021 ***	-0.0036 ***	-0.0045 ***	-0.0063 ***	-0.0162 ***	0	11
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		

Table 13. The interactive effects of institutional quality and international bank flows on economic growth in recipient countries – Government stability index

$$\Delta LogGDP^{i}_{j,(t+N)-t} = \alpha_1 \cdot LogGD^{i}_{j,t} + \alpha_2 \cdot BF^{i}_{j,t} + \alpha_3 \cdot B2DUM^{i}_{j,t} + \alpha_4 \cdot \Delta Rating^{\text{PreB2}}_{j,t} \cdot BF_{j,t}$$
$$+ \alpha_5 \cdot \Delta Rating^{\text{PostB2}}_{j,t} \cdot NRWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \alpha_6 \cdot \Delta Rating^{PostB2}_{j,t} \cdot RWC_{j,t} \cdot BF_{j,t} \cdot InstitutionalQlty_{j,t} + \sum_{k} \beta_k \cdot Controls^{k}_{j,t} + \varepsilon_{j,t}$$

This table reports the interactive effects between political stability in the recipient country and ratings-induced bank flows from the GMM dynamic panel estimations of log changes in real GDP per capita in investment and non-investment grade sub-sample recipient countries (Eq. (2)). (5) represents the NRWC rating events and (6) represents the RWC rating events. The subscript *j* represents the 67 borrower countries and the superscript *i* represents G10 lender countries. ***, **, * denote significance at the 1, 5, and 10% level, respectively. P-values are in curely braces.

	CAD	FRA	GER	ITA	JPN	UK	US	BEL	NLD	SWE	SWI	No. +s	No. -s
Panel A: Upgrades													
Investment Grade													
(5) x GovStab$^{i}_{j}$	-0.1485 ***	0.0018 ***	0.0084 ***	-0.0059 ***	0.0077 ***	0.0001	0.0032 ***	0.0121 ***	0.0011	-0.0014	0.0047	5	2
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.7585}	{0.0000}	{0.0000}	{0.3568}	{0.1892}	{0.1164}		
(6) x GovStab$^{i}_{j}$	-0.0091	0.0314 **	0.0688 **	0.0076 ***	0.0034 *	0.0320 ***	0.0020 **	0.0031 *	-0.6257 ***	0.0292 ***	0.0969 ***	9	1
	{0.4235}	{0.0103}	{0.0166}	{0.0002}	{0.0760}	{0.0000}	{0.0232}	{0.0751}	{0.0000}	{0.0002}	{0.0015}		
Non-Investment Grade													
(5) x GovStab$^{i}_{j}$	0.0007	0.0023 ***	0.0087 ***	0.0159 ***	0.0001	0.0056 ***	0.0004	0.0016 ***	-0.0188 ***	0.0017	0.0054 ***	6	1
	{0.8906}	{0.0035}	{0.0000}	{0.0000}	{0.6663}	{0.0003}	{0.5799}	{0.0004}	{0.0000}	{0.3376}	{0.0068}		
(6) x GovStab$^{i}_{j}$	0.0000	-0.5075 **	0.0384	-0.3574 ***	0.1458 **	0.2275 ***	-0.1929 ***	-0.1044 **	-0.5195 **	-0.2436 *	-0.1247 ***	2	7
	{0.9999}	{0.0284}	{0.1262}	{0.0000}	{0.0340}	{0.0089}	{0.0005}	{0.0246}	{0.0224}	{0.0585}	{0.0013}		
Panel B: Downgrades													
Investment Grade													
(5) x GovStab$^{i}_{j}$	-0.0004 ***	-0.0007	-0.0098 ***	-0.0018 ***	-0.0033 ***	-0.0043 ***	-0.0037 ***	0.0001	-0.0078 ***	-0.0025 ***	-0.0026 ***	0	9
	{0.0066}	{0.1740}	{0.0000}	{0.0099}	{0.0000}	{0.0000}	{0.0000}	{0.2787}	{0.0000}	{0.0000}	{0.0000}		
(6) x GovStab$^{i}_{j}$	-0.0006 ***	-0.0012 ***	-0.0052 ***	-0.0008 ***	0.0032 ***	-0.0006 ***	-0.0020 ***	-0.0037 ***	-0.0048 ***	0.0005 ***	-0.0037 ***	2	9
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
Non-Investment Grade													
(5) x GovStab$^{i}_{j}$	-0.4122 ***	-0.0041 ***	-0.0107 ***	-0.0134 ***	-0.0055 ***	-0.0138 ***	-0.0001	-0.0035 ***	-0.0057 ***	-0.0194 ***	-0.0014 ***	0	10
	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.2507}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		
(6) x GovStab$^{i}_{j}$	-0.0010 **	-0.0091 ***	-0.0063 ***	-0.0056 ***	-0.0028 ***	-0.0025 ***	-0.0007 ***	-0.0027 ***	-0.0023 ***	-0.0017 ***	-0.0105 ***	0	11
	{0.0162}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}	{0.0000}		

Appendix Table A. Variable Descriptions

The descriptions of the variables employed in this study and their data sources are provided below.

Variables	Descriptions	Data Source
Aggregate Bank Claims	Quarterly observations on BIS reporting banks foreign claims on intermediate borrower basis to 67 borrower countries, in US$ millions.	BIS's consolidated banking statistic, Table 9A: Consolidated foreign claims of reporting banks - immediate borrower basis, Q4:1999 - Q3:2013
Economic Growth (LogGDP)	Logarithmic changes in Gross Domestic Product (GDP) per capital in 67 borrower countries	Word Bank's World Development Indicators (WDI), Q4:1999 - Q2:2018
Bank Flows (BF)	Quarter changes in G10 country banks' foreign claims on intermediate borrower basis to 67 borrower countries, in US$ millions	BIS International Banking statistics, Table 9B2: Foreign claims by nationality of reporting banks - immediate borrower basis, Q4:1999 to Q3:2013
Rating Variables		
Sovereign credit ratings (SovRating)	Sovereign credit ratings on long-term foreign currency denominated debt converted to a linear score [0 - 20]	Standard & Poor's
Risk Weighting Change (RWC)	An indicator variable that takes a value of 1 when the sovereign rating change corresponds with a change in the risk weight used for capital adequacy purpose and 0 when it does not	Authors' calculations
Non-Risk Weighting Change (NRWC)	An indicator variable that takes a value of 1 when the sovereign rating change does not correspond with a change in the risk weight used for capital adequacy purpose and 0 otherwise	
Control Variables		
Basel 2 Dummy (B2DUM)	Basel 2 indicator dummy that takes the value 1 for the quarters in the sample where Basel 2 requirements are implemented for each of the lending G10 countries and zero otherwise.	Various internet sources
Bilateral Long Term Portfolio Flows (LTPORT)	Natural log of Long term portfolio flows between G10 and borrower countries, in US$ millions	International Monetary Fund (IMF)
Stock Market Capitalization (SMCAPGDP)	Market capitalization of listed companies (% of GDP)	WDI
Banking Sector Development (BANCRED)	Private banking credit to GDP	WDI
Bilateral Total Trade (DOTXM)	Sum of export and import between G10 and borrower countries, in US$ millions	WDI
Lerner Index (LERNERINDEX)	A measure of market power in the banking market. Higher index value indicates a deterioration of the competitive conduct of financial intermediaries.	Financial development GFDD
Corruption index (CORRUPTION)	A measure of political corruption	World Bank governance indicators
Government Stability (GOVSTABILITY)	A measure of stability of national government	World Bank governance indicators