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The Impact of the Identification of GSIBs on their Business Model

Abstract: Most research papers dealing with systemic footprint in the banking system either investigate the definition and the measure of systemic risk, or try to identify systemic banks and to calibrate the systemic risk buffers. To the best of our knowledge, this paper is among the first to provide empirical evidence on how the recent international regulation designed for global systemically important banks (GSIBs) drove changes on these institutions' activity. Our data consists of cross-section observations for 97 large international banks from 22 countries from 2005 to 2016 (12 years). Our econometric approach quantifies the impact of the FSB designation on GSIBs' activity, controlling for both structural differences between GSIBs and non-GSIBs and structural evolutions of the banking system over time (industry trends). We find that GSIBs have curbed downward the expansion of their total balance sheet after the FSB designation, which resulted in an additional improvement of their leverage ratio. In turn, a sizeable downward pressure is noticed on their return on equity (ROE). However, no adverse consequences can be observed on risk-taking and issuance of loans to the economy. Finally, while the relative deleveraging experienced by GSIBs illustrates a mean-reverting process, tending to close the structural gap between GSIBs and non-GSIBs, this is not the case for the cost of their deposits, which remains lower than the one of other banks, tending to prove that the GSIB framework has not so far put an end to the "too-big-to-fail" distortions.

Keywords: GSIBs, business model, profitability, leverage, RWA

JEL classification: G01, G21, G28, G32

L'impact de l'identification des GSIBs sur leur business model

Résumé : La plupart des articles de recherche traitant de la systémicité bancaire s'intéressent à la définition et à la mesure du risque systémique, ou bien tentent d'identifier les banques systémiques et de calibrer les exigences additionnelles de fonds propres adéquates. A notre connaissance, cet article est l'un des premiers à fournir des éléments empiriques sur l'impact que les récentes évolutions réglementaires concernant les banques systémiques d'envergure mondiale (GSIBs en anglais, pour "global systemically important banks") ont pu avoir sur l'activité de ces établissements. Nos observations portent sur un panel de 97 grandes banques internationales réparties dans 22 pays entre 2005 et 2016. Notre approche économétrique consiste à quantifier l'impact de la désignation du FSB sur l'activité de ces GSIBs, en tenant compte tant des différences structurelles qui peuvent exister entre les GSIBs et les non-GSIBs, que des évolutions structurelles (tendances générales) qu'a pu connaître le système bancaire sur cette période. Nous montrons que les GSIBs ont fortement freiné la croissance de leur bilan suite à leur désignation par le FSB, ce qui a débouché sur une amélioration supplémentaire de leur ratio de levier. En conséquence, un impact notable à la baisse est constaté sur la rentabilité de leurs fonds propres ("return on equity" - ROE). En revanche, aucune conséquence néfaste n'est observée sur la prise de risque par les banques ni sur leur capacité à financer l'économie. La réduction relative du levier financier des GSIBs illustre un processus de retour à la moyenne, contribuant à réduire l'écart existant entre les GSIBs et les non-GSIBs. Ce qui n'est pas le cas pour le coût des dépôts qui demeure structurellement plus faible pour les GSIBs comparé aux autres banques, tendant à montrer que le nouveau cadre réglementaire n'a pour l'instant pas encore mis fin aux distorsions dues au statut de "too-big-to-fail" dont bénéficient les GSIBs.

Mots-clés: Banques systémiques, business model, rentabilité, ratio de levier, RWA

Non-Technical Summary

"Systemic" banks are defined as those *whose distress or disorderly failure could cause significant disruption to the wider financial system and to the economic activity* (FSB [2011]). As this issue of banks that appear "too-big-to-fail" became of major importance following the bankruptcy of Lehman Brothers and the 2008 financial crisis, it was put high on the agenda of the G20 and the international regulators over the past decade. Since 2011, the Financial Stability Board (FSB) publishes each year the list of "Global Systemically Important Bank" (GSIB) - around 30 institutions - that are subject to more stringent regulations and additional supervisory requirements. The purpose of this paper is to investigate what has been the impact of this new regulatory framework on the activity of these GSIBs. Have they changed the composition of their assets? In particular, do we see a negative impact of this regulation on the ability of these GSIBs to finance the economy? Have they changed their funding sources? Have they modified their income mix? Is their profitability impacted by this regulation? In a word, what has been the impact of being designated as GSIBs on the business model of these banks? To answer these questions, we built a dataset containing 97 large banks from 22 countries over 12 years (2005-2016) and empirically evaluated the impact of the regulation, taking into account both structural differences between the categories of banks and industry trends. We find that the designation of GSIBs by the FSB led these banks to curb the expansion of their balance sheet (as a consequence the share of assets held by GSIBs versus non-GSIBs decreased over time). This also further reduced their financial leverage (ie. increased their regulatory leverage ratio) in a context of general raise of own funds requested by the Basel III framework. In turn, a significant negative impact is noticed on their profitability. Our study shows that there is no empirical evidence that this regulation reduced the issuance of loans to the economy by the designated GSIBs. Finally, it also shows that these banks still have access to funding at lower cost than other banks, which indicates that the implicit public support benefiting to these banks has not been removed by this regulation. The key contribution of this paper is to provide a comprehensive and systematic *ex-post* evaluation of this GSIB regulatory framework and to quantify its impact on many aspects of these banks' business model.

Résumé non technique

Les banques "systémiques" sont définies comme celles dont la faillite ou la défaillance désordonnée pourrait perturber considérablement le système financier dans son ensemble et l'activité économique (FSB [2011]). Cette problématique des banques qui semblent "trop grosses pour faire faillite" est apparue d'une importance capitale après la faillite de Lehman Brothers et la crise financière de 2008. Elle est donc devenue une priorité pour le G20 et des régulateurs internationaux au cours de la dernière décennie. Depuis 2011, le Conseil de Stabilité Financière (*Financial Stability Board* en anglais - FSB) publie chaque année la liste des "établissements d'importance systémique mondiale" (ou "*Global Systemically Important Bank*" - GSIB en anglais), contenant environ 30 établissements qui sont soumis à des réglementations plus strictes et à des exigences supplémentaires de la part des superviseurs. L'objectif de cet article est d'étudier l'impact de ce nouveau cadre réglementaire sur l'activité de ces GSIBs. Ont-ils changé la composition de leurs actifs ? En particulier, voyons-nous un impact négatif de cette réglementation sur leur capacité à financer l'économie ? Ont-ils changé leurs sources de financement ? Leur rentabilité est-elle impactée par cette réglementation ? En somme, quel a été l'impact de la désignation des GSIBs sur le modèle économique de ces banques ? Pour répondre à ces questions, nous avons construit une base de données contenant 97 grandes banques réparties dans 22 pays sur 12 ans (2005-2016). Nous évaluons ensuite empiriquement l'impact de cette réglementation, en tenant compte des différences structurelles entre les banques et des tendances ayant affecté l'ensemble du secteur. Nous constatons que la désignation des GSIBs par le FSB a conduit ces banques à freiner l'expansion de leur bilan (en conséquence la part des actifs détenus par les GSIBs a diminué au cours du temps). Ceci a également conduit à une réduction plus forte leur levier financier (donc a accru leur ratio de levier réglementaire), dans un contexte d'augmentation générale des fonds propres requis par les accords de Bâle III. Conséquemment, un impact négatif significatif est constaté sur leur rentabilité. Notre étude empirique montre que cette réglementation n'a pas réduit l'octroi de prêts à l'économie par les GSIBs. Enfin, l'article montre que ces banques ont toujours accès à un financement à moindre coût comparativement aux autres banques, ce qui suggère que le soutien public implicite bénéficiant à ces banques n'a pas été supprimé par cette réglementation. La principale contribution de cette étude est de fournir une évaluation *ex-post* complète et systématique de ce nouveau cadre réglementaire et de quantifier son impact sur de nombreux aspects du modèle économique des GSIBs.

1 Introduction

At the Pittsburg Summit in 2009, G20 leaders called on international supervisors and regulators to propose solutions to the "too-big-to-fail" (TBTF) problem (FSB [2010]). Whereas this category of banks had already been identified in 1984² and the adverse incentives related to their status have largely been analyzed by academics (Flannery and Sorescu [1996]; Freixas et al. [2004]; Brandao Marques et al. [2013]; Gropp et al. [2013]), no concrete measure had been taken until the crisis has burst in order to end the TBTF distortions. The 2008 financial crisis clearly revealed that size is only one determinant of the systemic risk; the complexity of a bank's business model, its interconnections with other financial entities and internationally driven activities are other key dimensions of the systemic risk of an institution.

Thus, the quantification of banks' systemic footprint and the identification of *the financial institutions whose distress or disorderly failure could cause significant disruption to the wider financial system and to the economic activity* (FSB [2011]) became a priority for international regulators and one key element of the post-Lehman reform agenda. Several indicators have been developed in the academic literature to measure the systemic footprint of large banks, and they are still subject to ongoing discussions and refinements: the Marginal Expected Shortfall and the Systemic Expected Shortfall of Acharya et al. [2017], the SRISK of Acharya et al. [2012] and Engle et al. [2015], and the CoVaR of Adrian and Brunnermeier [2016]³. These indicators are mainly based on market valuation. In parallel, the international regulators developed specific frameworks to make large financial institutions more resilient and to bring an end to the too-big-to-fail paradigm (FSB [2010]; FSB [2013b]). The indicators used in this framework are mainly based on accounting and prudential information.

²In 1984, the US federal government took the decision to intervene in order to avoid the failure of any of the nation's 11 largest banks. This led to the identification of a new category of banks, whose disorderly failure, due to their size, could cause significant disruption in the functioning of financial markets and the economy as a whole.

³Benoit et al. [2016a] provides a comparative analysis of these systemic risk indicators.

In this context, the concept of the "Global Systemically Important Bank" (GSIB) has been introduced to characterize banks to be submitted to a more demanding and intrusive regulatory, supervisory and resolution regimes. In November 2011, the Basel Committee on Banking Supervision (BCBS) and the Financial Stability Board (FSB) identified for the first time a new typology of banks, the GSIBs. This approach further facilitated a focused implementation of additional capital requirements (additional capital buffers, higher loss absorbency requirements imposed under the TLAC framework), macro-prudential measures and additional recovery and resolution regulation (FSB [2013b]; FSB [2014b]; FSB [2015b]; FSB [2016b]). The roll-out of the framework has taken place progressively and will pursue in the coming years⁴.

In this context, this paper seeks to evaluate whether the regulatory reforms for systemic banks has contributed to G20 objectives and strengthen the resilience of financial institutions, to further improve the functioning of financial markets and enhance global financial stability. More precisely, we will evaluate whether and how much financial institutions, designated as GSIBs, experienced changes in line with the intended objectives and if unintended consequences also occurred.

Research work has been driven so far to investigate the effects of GSIB regulation, but usually from a different point of view: the impact of GSIB designation on banks' debt implicit public guarantees and the efficiency of resolution regimes and practices (Schich and Toader [2017]), or the shifts in stock market evaluations driven by the recent regulatory frameworks imposed to GSIBs (Moenninghoff et al. [2015]). Birn et al. [2017] investigate with a non linear optimization model how Basel III capital and liquidity requirements combine and result in a changing balance sheet⁵. They suggest that GSIBs, contrary to their peers, have decreased total balance sheet and simultaneously increased more than other banks the share of highly liquid instruments required to fulfil

⁴Additional prudential requirements have to be phased in from 1st January 2016 and fully implemented by 1st January 2019. TLAC requirements have to be fulfilled by 2022.

⁵The empirical part of this study is based on bank-level data from the BCBS's quantitative impact studies for 156 banks between 2011 and 2014

the liquidity coverage ratio (LCR). No additional empirical analysis on the structural changes in GSIBs' business models has been published so far to the best of our knowledge. Thus, our study comes to fill the gaps in the existing literature by examining whether GSIB regulation affects the business of regulated banks and whether it put them at a disadvantage, as some banks often claim.

In this study, we empirically ask if the post-crisis regulation specifically applied to GSIBs, starting with the FSB designation in 2011, has driven changes in their business models, more broadly speaking. We first investigate whether the size and structure of the balance sheet has changed in response to the new regulatory reforms and we focus on the effects on the traditional activity of lending. Then, we take the analysis one step further and evaluate changes in the risk-taking behaviour and the cost of funding, to ultimately assess regulatory driven variations in overall profitability. In order to deal with such questions, we use granular balance sheet and income statement data for a large sample of 97 large international banks over a 12-year period from 2005 to 2016.

The remaining of this paper proceeds as follows. Section 2 presents a brief overview of the post-crisis reforms dedicated to GSIBs, and especially the GSIB identification methodology used by the BCBS. In Sections 3 and 4 we describe the dataset and the methodology that allows us to analyze empirically our topic of interest. In Section 5, we present the econometric results focusing on different aspects of banks' business model (balance sheet patterns, risk-taking, cost of funding and profitability). Section 6 concludes.

2 Short overview of post-crisis reforms for GSIBs

The G20 post-crisis agenda deals with the systemic and moral hazard risks associated with systemically important financial institutions (SIFIs)⁶ and aims to build a more resilient financial system. More than 8 years after the G20 leaders called on the FSB to propose possible measures to address the too-big-to-fail distortions generated by SIFIs, and 6 years after the disclosure of the initial list of 29 global systemically important banks (GSIBs) by the FSB and BCBS, the need of concrete evidence on the contribution of the G20 reforms in building a more resilient financial system is mandatory for the legitimacy and the credibility of FSB's post-crisis reform agenda.

Since 2009, the FSB has been called to bring proposals of regulatory measures for SIFIs. In this context, the concept of GSIB has been introduced to characterize the banks to be subject to the new additional regulation. In November 2011, the BCBS published a methodology for identifying these systemically important institutions focusing on five main features: size, interconnectedness, availability of substitutes, global activity and complexity (FSB [2011]; BCBS [2011]). Based on a score analysis, a new typology of banks has been identified and an initial list of 29 GSIBs (17 from Europe, 8 from the US, and 4 from Asia) was published by the FSB in November 2011. This list, revised and published annually by the FSB, went through several changes since its creation, particularly in November 2012 when the methodology was revised and GSIBs were allocated into five "*buckets*" of ascending levels of systemic importance (FSB [2013b]; FSB [2014b]; FSB [2015b])⁷ The latest version has been disclosed in July 2013 (BCBS [2013b]). Box 1 below provides a broad description of this methodology developed by the BCBS for the identification of GSIBs.

Since then, the GSIBs methodology and classification in buckets were conceived first

⁶(FSB [2011])

⁷Benoit et al. [2016b] question the adequacy of the BCBS's methodology. They propose a correction of the score methodology and an alternative list of systemically important institutions to be further used to set capital surcharges or alternative tax on systemic risk.

and foremost to gradually implement additional capital requirements. Initially, only risk based capital buffer were required, staging from 1% to 3.5%. More recently, in 2017, a corresponding additional buffer for the leverage ratio requirement of GSIBs was decided.

However, such additional capital buffers are only one aspect of the direct consequences of such GSIB designation. Indeed, among other regulatory obligations directly stemming from the FSB designation, GSIBs are subject to a minimum "TLAC" (Total Loss-absorbing Capacity) requirement ensuring that in case of resolution the bank holds enough instruments to absorb losses and to be recapitalised without public funds intervention (cf. FSB [2014b]). Additional consequences also have to be taken into account. For instance, cross-border supervisory colleges are put in place for almost all GSIBs in order to enhance international supervisory cooperation, and GSIBs are subject to further resolution planning expectations from supervisory authorities. GSIBs are also requested to take part into additional reporting and statistical data collections, such as the FSB Datagaps initiative that imposes a weekly submission of their main exposures and a monthly submission of their top financing sources. Finally, the annual publication of the list of GSIBs by the FSB is supposed to draw investors' attention on this particular set of banks, so there should be specific "market discipline" applied to them. Hence, for the remainder of this paper, it is crucial to have in mind that what we call *GSIB designation* or *FSB designation* actually covers this complete set of consequences that applies to GSIBs, and not only the sole capital buffer.

The constraints resulting from being a GSIBs were thus staged through time, with a leeway for GSIB to anticipate or delay the change in balance sheet until the effective implementation date. Additionally, the phasing in of Basel III may have affected GSIB differently from other banks due to their structure of activity⁸. It is thus not possible to precisely define a clear cutoff date where the GSIB constraint would apply.

⁸For example, Birn et al. [2017] demonstrate that GSIBs have suffered more than other banks from the treatment of derivatives and short term loans was made more stringent for the Net stable funding ratio (NSFR).

Box 1 - Description of the BCBS methodology for identifying GSIBs

According to the BCBS methodology, banks' systemic footprint is assessed using a set of 12 indicators grouped into five categories. For each indicator, a "market share" is computed at bank-level (i.e. the value of the indicator for bank *i* is divided by the sum of this indicator's values for all banks in the sample used by the BCBS). Within each of the five categories, the "market shares" of the underlying indicators are then equally weighted to compute a score in basis points. Finally, these five categories' sub-scores are averaged (20% each) to get the final systemic score. The figure below provides an illustration of this methodology.

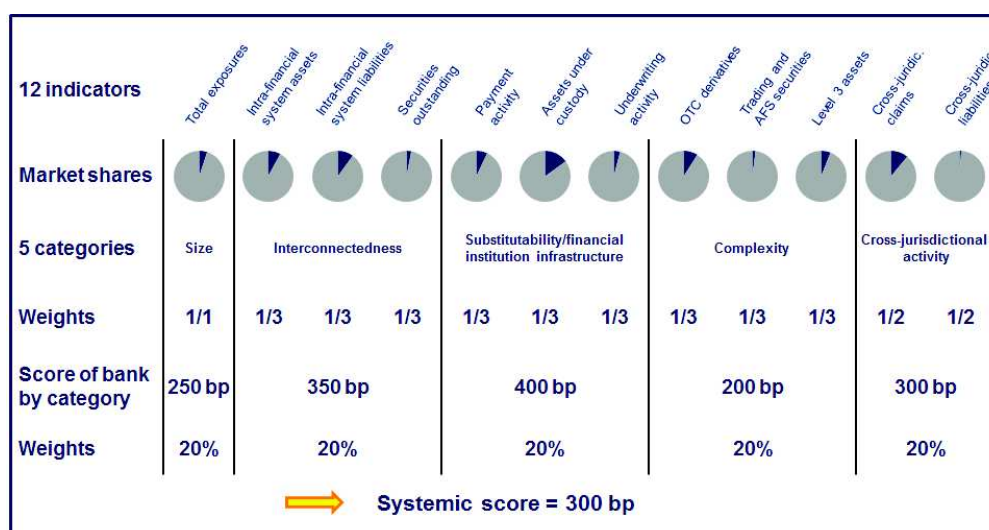


Illustration of current BCBS methodology to identify GSIBs

Once the systemic score is computed, banks are ordered and allocated into buckets according to their systemic score value. Only banks with systemic scores above 130 basis points (bp) are labelled as GSIBs. For these banks, the allocation into buckets is made as follows. If its systemic score is between 130 and 230 basis points, the bank will be allocated to the first bucket and face an additional CET1 capital requirement (or "buffer") of 1% of its total risk-weighted assets (RWA). Next buckets are then imposing more and more stringent buffers: 1.5% for banks with systemic scores between 230 and 330 bp, 2% between 330 and 430 bp and 2.5% between 430 and 530 bp. Currently, the fifth and last bucket would trigger a 3.5% buffer if the systemic score were to reach the 530 bp threshold. For the time being, this last bucket is only "dissuasive" and has never been applied to any GSIB.

3 Dataset description

We exploit balance sheet and income statement data for 97 large international banks from 22 countries over the period from 2005 to 2016 (12 years). We focus on a sample of large banks with total assets exceeding 200 billion euros⁹ as of end-2016, at the highest level of consolidation (subsidiaries are excluded). A detailed list of banks considered in the study is provided in Appendix 1. The distribution of national banking systems into the aggregated total assets is shown in figure 1(a) below. Figure 1(b) shows that the share of total assets held by banks that have been designated as GSIB at least once since 2011 is steadily decreasing over time.

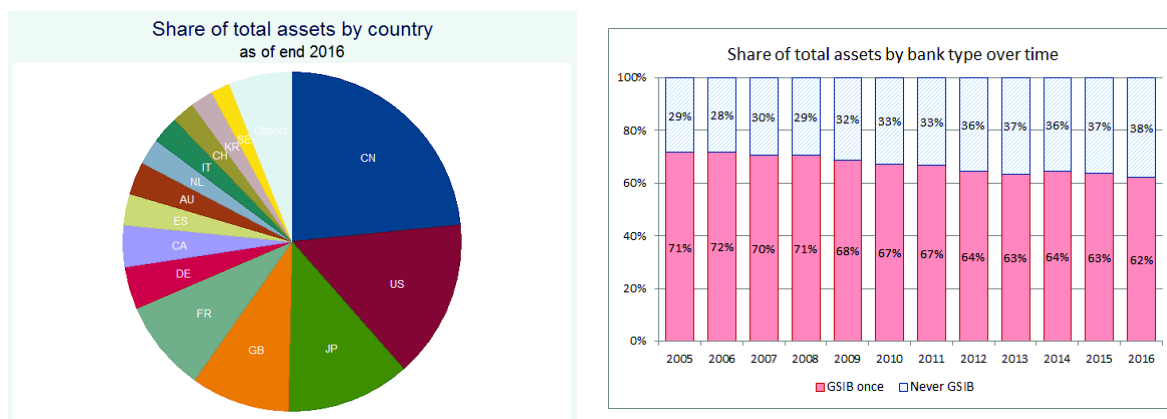


Figure 1: Shares of total assets (a) by national banking system (left) and (b) by type of bank (right)

For each bank, we collected a set of variables at yearly frequency¹⁰ using the SNL database. Since the purpose of this paper is to investigate the changes driven by the post-crisis regulatory framework on GSIBs "business model", we cover several topics such as capital adequacy, balance sheet size and structure, profitability and cost of funding.

In a first set of dependent variables, we focus on some balance sheet and prudential ratios. Our first variables of interest are the yearly growth rates of total assets and Tier

⁹The 200 billion euros represent the threshold of the Basel III leverage ratio exposure considered by the Basel Committee to identify large banks in the world.

¹⁰Most series were not available at higher frequency (half-yearly or quarterly) for many banks. Moving to such higher frequency would therefore drastically reduce the number of banks in the sample.

1 capital. We also include two capital adequacy ratios: a non-weighted ratio dividing Tier 1 capital (T1) by total assets (TA), which is a proxy of the leverage ratio (hereafter referred to as "leverage ratio") and a weighted solvency ratio dividing T1 capital by total risk-weighted assets (RWA). Finally we have three balance sheet composition ratios: one measuring the share of cash (and balances with central banks) within total assets, one measuring the share of loans to non-financial customers within total assets, and one measuring the share of subordinated debt within total liabilities.

In a second set of dependent variables, we focus on profitability measures, risk-taking indicators and yield rates. We include in this set of variables the ratio of net profit over the operating income, the return on assets (ROA) and the return on equity (ROE). In order to capture the risk-taking behaviour of banks, we use the RWA density (ie. total RWA over total assets), which correspond to the average risk-weight of the balance sheet, and we also compute the non-performing loans (NPL) ratio. We also investigate the loan yield, the average cost of deposits and the net interest margin.

Table 1 below provides a description of the sets of variables that we use as successive dependent variables in the regressions.

TABLE 1 - List of dependent variables

Set of variables	Variable code	Variable description	Obs.	Mean
Balance sheet and prudential ratios	TA gr	Total Assets (TA) Growth Rate (gr)	1023	8.94%
	T1 gr	Tier 1 capital (T1) Growth Rate (gr)	886	13.94%
	T1 / TA	Tier 1 Capital over Total Assets ("leverage ratio")	990	5.09%
	T1 / RWA	Tier 1 Capital over RWA (solvency ratio)	972	11.72%
	CASH CB / TA	Cash and Balances with Central Banks over TA	681	5.97%
	LOANS CUST / TA	Net Loans to Non-Financial Customers over TA	681	51.61%
	SUB DEBT / TL	Total Subordinated Debt over Total liabilities	679	1.84%
Profitability, risk-taking and yield ratios	NET PROF / OP INC	Net Profit over Operating Income	663	23.99%
	ROA	Return on average assets	1037	0.66%
	ROE	Return on average equity	1017	10.50%
	RWA Density	Total RWA over Total Assets	1000	47.40%
	NPL / LOANS	Share of NPL over Total Loans	1003	2.73%
	LOAN YIELD	Total Loans Yield	686	5.22%
	DEP COST	Total Deposits Interest Cost	686	2.00%
	NIM	Net Interest Margin	686	2.16%

Table 2 displays some summary statistics for these dependent variables and details the means for GSIBs and non-GSIBs over the two periods (2005-2011) and (2012-2016).

Figures 2 and 3 illustrate the evolution over time of the average of these variables of interest for GSIBs versus non-GSIBs.

TABLE 2 - Means by sub-group and sub-period

Variables	All banks			GSIB (at least once)		Never GSIB		T-test (E)-(C) t-stat	T-test (F)-(D) t-stat
	Mean 2005-2011 (A)	Mean 2012-2016 (B)	T-test (B)-(A) t-stat	Mean 2005-2011 (C)	Mean 2012-2016 (D)	Mean 2005-2011 (E)	Mean 2012-2016 (F)		
Balance sheet and prudential ratios									
TA gr	11.8% <i>Obs = 542</i>	5.71% <i>Obs = 481</i>	-7.489 ***	10.32% <i>Obs = 193</i>	0.48% <i>Obs = 167</i>	12.62% <i>Obs = 349</i>	8.49% <i>Obs = 314</i>	1.78 **	7.977 ***
T1 gr	17,87% <i>Obs = 465</i>	9,59% <i>Obs = 421</i>	-5,761 ***	14,98% <i>Obs = 170</i>	5,68% <i>Obs = 137</i>	19,54% <i>Obs = 295</i>	11,48% <i>Obs = 284</i>	1,86 **	3,646 ***
T1 / TA	4.72% <i>Obs = 556</i>	5.56% <i>Obs = 434</i>	7.393 ***	4.33% <i>Obs = 201</i>	5.31% <i>Obs = 143</i>	4.94% <i>Obs = 355</i>	5.68% <i>Obs = 291</i>	3.851 ***	2.097 **
T1 / RWA	10.15% <i>Obs = 548</i>	13.74% <i>Obs = 424</i>	13.356 ***	10.15% <i>Obs = 201</i>	14.1% <i>Obs = 143</i>	10.15% <i>Obs = 347</i>	13.55% <i>Obs = 281</i>	-0.018	-1.159
CASH CB / TA	5.4% <i>Obs = 356</i>	6.6% <i>Obs = 325</i>	4.687 ***	4.2% <i>Obs = 129</i>	7.33% <i>Obs = 116</i>	6.08% <i>Obs = 227</i>	6.2% <i>Obs = 209</i>	3.092 ***	-2.13 **
LOANS CUST / TA	51.84% <i>Obs = 356</i>	51.37% <i>Obs = 325</i>	-0.417	43.6% <i>Obs = 129</i>	43.4% <i>Obs = 116</i>	56.52% <i>Obs = 227</i>	55.79% <i>Obs = 209</i>	8.209 ***	8.233 ***
SUB DEBT / TL	1.94% <i>Obs = 372</i>	1.73% <i>Obs = 307</i>	-6.059 ***	1.93% <i>Obs = 142</i>	1.73% <i>Obs = 116</i>	1.94% <i>Obs = 230</i>	1.73% <i>Obs = 191</i>	0.044	0.007
Profitability, risk-taking and yield ratios									
NET PROF / OP INC	21.09% <i>Obs = 367</i>	27.59% <i>Obs = 296</i>	2.178 **	17.07% <i>Obs = 134</i>	24.72% <i>Obs = 94</i>	23.4% <i>Obs = 233</i>	28.93% <i>Obs = 202</i>	1.17	0.932
ROAA	0.69% <i>Obs = 556</i>	0.63% <i>Obs = 481</i>	-1.635	0.59% <i>Obs = 202</i>	0.46% <i>Obs = 167</i>	0.74% <i>Obs = 354</i>	0.72% <i>Obs = 314</i>	3.201 ***	5.588 ***
ROAE	11.52% <i>Obs = 536</i>	9.37% <i>Obs = 481</i>	-3.8 ***	9.9% <i>Obs = 189</i>	6.08% <i>Obs = 167</i>	12.4% <i>Obs = 347</i>	11.12% <i>Obs = 314</i>	2.816 ***	6.948 ***
RWA Density	49.09% <i>Obs = 551</i>	45.33% <i>Obs = 449</i>	-3.326 ***	44.07% <i>Obs = 201</i>	41.45% <i>Obs = 159</i>	51.97% <i>Obs = 350</i>	47.45% <i>Obs = 290</i>	5.237 ***	3.38 ***
NPL / LOANS	2.65% <i>Obs = 540</i>	2.83% <i>Obs = 463</i>	0.941	3.25% <i>Obs = 199</i>	3.12% <i>Obs = 161</i>	2.3% <i>Obs = 341</i>	2.67% <i>Obs = 302</i>	-3.922 ***	-1.431
LOAN YIELD	5.57% <i>Obs = 362</i>	4.83% <i>Obs = 324</i>	-3.316 ***	4.7% <i>Obs = 113</i>	3.5% <i>Obs = 93</i>	5.96% <i>Obs = 249</i>	5.36% <i>Obs = 231</i>	4.036 ***	4.534 ***
DEP COST	2.25% <i>Obs = 362</i>	1.72% <i>Obs = 324</i>	-5.812 ***	1.76% <i>Obs = 113</i>	0.92% <i>Obs = 93</i>	2.47% <i>Obs = 249</i>	2.04% <i>Obs = 231</i>	4.065 ***	5.538 ***
NIM	2.25% <i>Obs = 362</i>	2.05% <i>Obs = 324</i>	-2.381 **	1.88% <i>Obs = 113</i>	1.51% <i>Obs = 93</i>	2.42% <i>Obs = 249</i>	2.26% <i>Obs = 231</i>	3.674 ***	4.749 ***

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note that in order to avoid potential disturbance of our results by extreme outliers, some variables are winsorised at 1st and 99th percentiles¹¹. Also note that, in order to ensure the stationarity of our series, all of them are expressed either as scaled by an aggregate (eg total assets), or as ratios, or as growth rates. Such stationarity is required from an econometric technical perspective.

¹¹This means that, for a given variable, any value larger than the 99th percentile will actually be capped at this level. Similarly, any value lower than the 1st percentile will be raised up to this level.

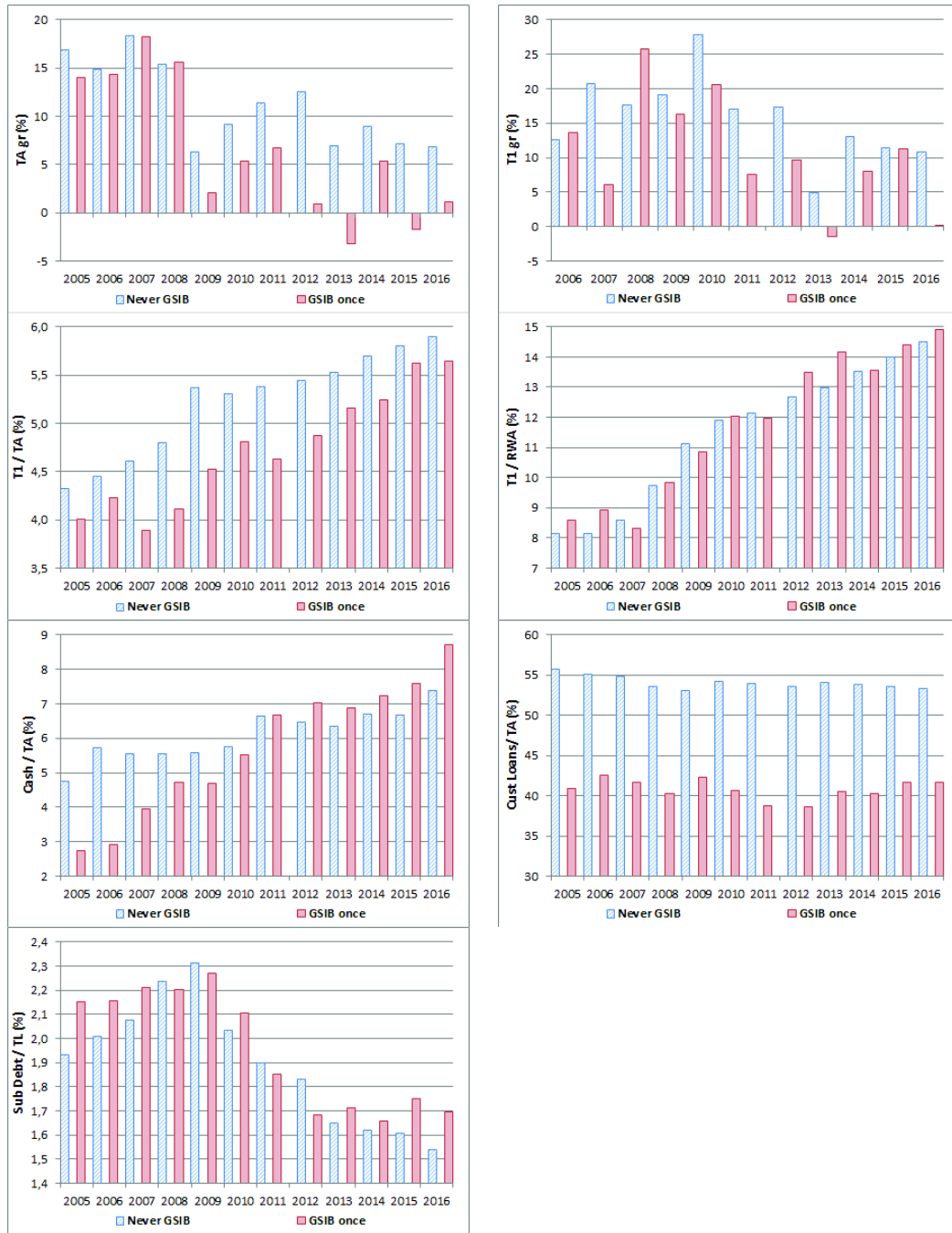


Figure 2: Evolution of the average balance sheet and prudential ratios for GSIBs (red bars) versus non-GSIBs (blue bars)

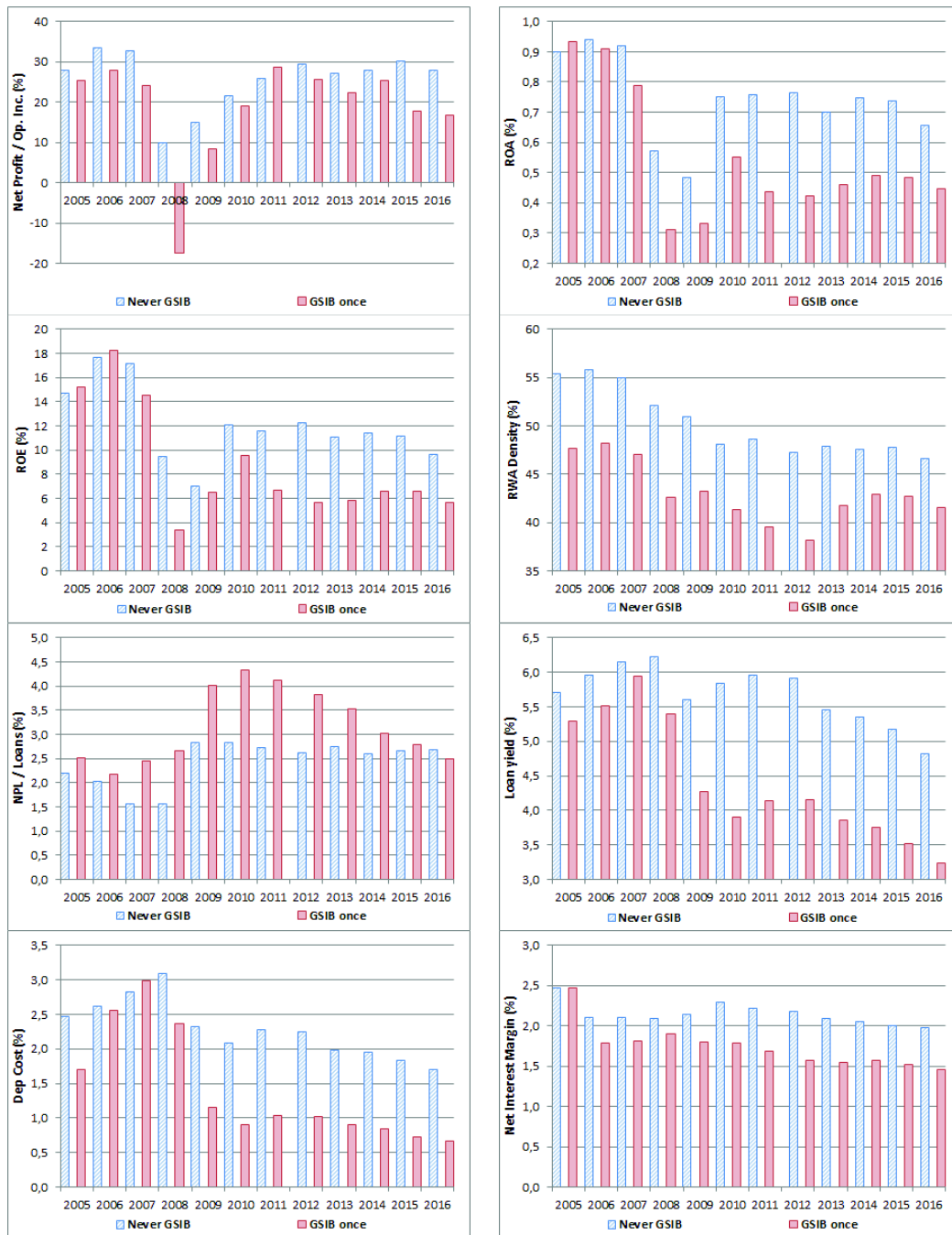


Figure 3: Evolution of the average profitability, risk-taking and yield ratios for GSIBs (red bars) versus non-GSIBs (blue bars)

4 Econometric methodology

4.1 Specification

The aim of this empirical analysis is to study the effects (intended and unintended) of post-crisis reforms on the business model of large financial institutions. We consider a broad view of the definition of "business model" that involves both structural balance sheet and revenue composition, as well as profitability patterns. We seek to evaluate the changes in business model following the announcement and/or implementation of prudential rules between different categories of banks. To do this, we rely on an approach inspired by the difference-in-difference methodology¹². In a standard difference-in-difference model, the group of GSIBs would correspond to the *treated* group while the group of other banks, non-GSIBs, would constitute the *control* group.

We compare the post-crisis reform-driven evolutions of business model's characteristics for two groups of banks, those designated as GSIBs versus all other large international banks (non-GSIBs). As the list of GSIBs is relatively stable (with only a few entries and exits each year, if any), we will consider as a GSIB every bank that has been designated at least once by the FSB since 2011. Hence we construct the $GSIB_{i,k}$ binary variable that takes value 1 for all periods t if the GSIB i located in country k appeared on the FSB list at least once between 2011 and 2016, and 0 otherwise. Regarding the time dimension, even if it is not possible to precisely define a clear cutoff date where the GSIB constraint would apply (due to the phased-in approach of the regulation, as discussed in section 2), we should recall that the first list of banks designated as GSIBs has been disclosed by the FSB in November 2011. Therefore, in this study it seems natural to consider that the first GSIB designation could not have direct impacts on balance sheets and income statements as of end-2011, and the potential effects of the GSIB reform agenda affected the financial statements starting with 2012. Hence, we construct

¹²We use a similar approach to the one developed by Grill et al. [forthcoming, 2018], Hills et al. [2017] and especially Schich and Toader [2017], applied to different regulatory contexts.

a binary variable $Post2011_t$ that equals 1 if $t > 2011$ and 0 otherwise. Appendix 2 provides some robustness checks by testing alternative definitions of the $GSIB_{i,k}$ and $Post2011_t$ variables and shows that the "arbitrary" decisions made here are not driving the results.

In addition to these two main explanatory variables, a set of bank-specific time varying control variables and some country-specific time varying factors are considered. At the end, we select a given dependent variable Y (among those listed in table 1) for all banks i , incorporated in country k at time t , and we regress it on the two binary variables described above, $GSIB_{i,k}$ and $Post2011_t$, and on the cross-variable *interaction term* of these two variables: $Interaction_{i,k,t} = GSIB_{i,k} \times Post2011_t$, as well as on the control variables. We estimate the following model¹³:

$$Y_{i,k,t} = \alpha + \beta GSIB_{i,k} + \gamma Post2011_t + \delta(GSIB_{i,k} \times Post2011_t) + \varphi B_{i,k,t} + \chi C_{k,t} + PTH_t + u_{i,k,t} \quad (1)$$

With $B_{i,k,t}$ being the set of bank-specific control variables, $C_{k,t}$ the set of country-specific macroeconomic control variables, PTH_t a conditional time dummy variable capturing potential violations of the "parallel trend hypothesis"¹⁴, and $u_{i,k,t}$ being an error term. Since we cannot be sure that observations are i.i.d. among banks, standard errors will be clustered at individual level in all our regressions.

The set of country-specific macroeconomic control variables $C_{k,t}$, described in table 3 below, will be included in all following regressions to take into account potential discrepancies between economies in terms of growth, wealth, unemployment, inflation, public debt, aggregate credit growth, and sovereign yield. The annual growth rate of exchange rate against the euro is also included since our dataset is entirely denomi-

¹³Appendix 2 also provides some robustness checks of this model, by testing alternative specifications.

¹⁴See explanation below in section 4.2

nated in euros, for consistency reasons. The set of bank-specific control variables $B_{i,k,t}$ included in the regressions can vary from one dependent variable to another. They will be described below each regression table in the next section, but note that the size of the bank (measured by the logarithm of total assets) will always be taken into account in order to eliminate any statistically significant size effect during the sample period or across banks.

Table 3 - Set of country-specific macroeconomic control variables $C_{k,t}$

Variable code	Variable description
GDP gr	Real GDP Growth (%)
GDPperCap	GDP per Capita
UR	Unemployment Rate (%)
INFL	Inflation (%)
PUBD / GDP	Public Debt / GDP (%)
DOMCRED gr	Domestic Credit Growth (%)
SOVYIELD	10-year sovereign debt yield (%)
FX RATE gr	Annual growth rate of exchange rate against Euro (%)

The econometric identification strategy described in equation (1) allows us to assess the impact of the FSB designation on GSIBs structural patterns. It can be applied successively to each of our dependent variables listed in table 1. Within this framework, our main parameter of interest will be δ , the coefficient of the interaction term. It captures the causal impact of the FSB designation on the Y variable for GSIBs, controlling for both the effect of structural differences between GSIBs and non-GSIBs (captured by the coefficient β of the binary variable $GSIB_{i,k}$), and the time structural changes, or "industry trends" (captured by the coefficient γ of the variable $Post2011_t$). The graphic illustration in figure 4 helps visualising the interest of this approach, inspired by a difference-in-difference model, in a simple univariate case.

However, it is recognized that this econometric identification has some limitations. The model is able to take into account general evolutions of the environment, either macroeconomic conditions and/or implementation of new regulations affecting the whole banking system. This is the purpose of using two sub-groups and two sub-periods that

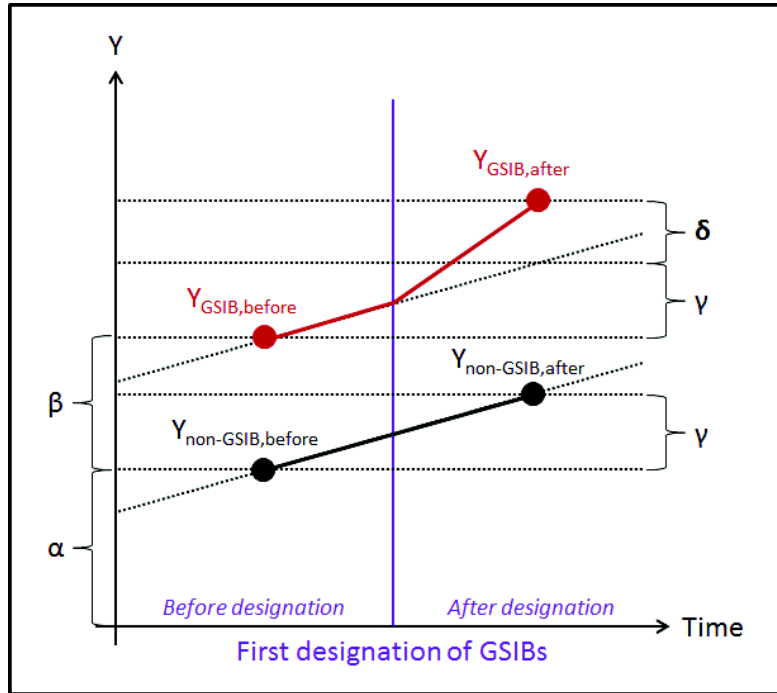


Figure 4: Illustration of the econometric methodology in the univariate case

should be affected in a similar way by these general evolutions, while only GSIBs are affected by the designation. On the other hand, it will not be able to disentangle the effects of each individual consequence of the designation of a bank as a GSIB by the FSB. As described in section 2, such designation entails several regulatory implications, such as capital buffers and TLAC requirements. Therefore, one should keep in mind that the estimator δ captures the *overall* effect of all diverse consequences *ex-post* to the GSIB designation, and not the impact of the sole additional capital requirement.

4.2 Parallel trend hypothesis

In an "ideal world" where the difference-in-difference methodology would purely apply, we should use as a control group the exact same set of treated banks, the *only* difference being that banks in the control group would not have been designated as GSIBs. Such configuration is obviously impossible in the real world. Indeed, non GSIB are from the

beginning smaller or less systemic than GSIBs. Furthermore, some non-GSIB may also be subject to additional requirements, especially when they are designated as domestical systemically important banks (DSIB), even if this framework decided at the jurisdiction level is usually more recent and less homogeneous than the one of GSIBs.

Thus, as a *second-best* option in this paper, we use all other large international banks not designated as GSIBs as a kind of control group to capture the "industry trends" (ie. the γ coefficient). The underlying assumption in this methodology is that both groups of banks (GSIBs and non-GSIBs) follow parallel trends before the designation, and that they would have continue to do so if the designation would not have occurred. If the latter is clearly not testable, at least we can empirically check the former.

We can graphically assess on figures 2 and 3 whether the averaged characteristics of the two sub-groups tended to evolve similarly before the first designation of GSIBs in November 2011. In order to formally assess this "parallel trend hypothesis" (PTH) we perform a test, in line with what Danisewicz et al. [2017] proposed. For each year preceding the first designation of GSIBs we compute the annual growth rate of the dependent variables and then compare these growth rates between the two sub-groups. Applying mean-difference t-test, we determine whether these variables show significantly different annual evolutions between GSIBs and non-GSIBs. That is to say, if we notice a difference in the growth rates of GSIBs versus non-GSIBs, even at 10% significance level, then the parallel trend hypothesis will be deemed not fully met for this particular year. Table 4 summarizes the results of these tests of the parallel trend hypothesis for all our dependent variables listed in table 1.

Looking at the overall result of table 4, we see that the PTH seems met for most of the variables over the years between 2006 and 2011. The few violations of the PTH mostly tend to appear in years 2007, 2008 and 2009, which might be related to a different impact of the crisis on the two sub-groups.

When such violation of the PTH appears for a given year for a dependent variable,

TABLE 4 - Test of the parallel trend hypothesis (PTH)

Variable	2006			2007			2008		
	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.
TA gr	2.80	0.43		16.0	0.22		-1.3	0.27	
T1 gr				-13.0	0.19		-3.6	0.63	
T1 / TA	0.01	0.75		-0.1	0.01	**	-0.0	0.54	
T1 / RWA	0.02	0.58		-0.1	0.00	***	0.13	0.00	***
CASH CB / TA	-0.0	0.79		0.44	0.20		-0.2	0.34	
LOANS CUST / TA	0.02	0.23		-0.0	0.81		-0.0	0.15	
SUB DEBT / TL	-0.0	0.35		-0.0	0.40		-0.2	0.28	

Variable	2009			2010			2011		
	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.
TA gr	-1.1	0.61		1.31	0.45		0.68	0.63	
T1 gr	2.57	0.02	**	1.36	0.61		-0.3	0.33	
T1 / TA	0.06	0.26		0.03	0.31		-0.0	0.06	*
T1 / RWA	-0.0	0.41		0.03	0.17		-0.0	0.50	
CASH CB / TA	0.64	0.07	*	0.07	0.57		-0.9	0.06	*
LOANS CUST / TA	0.10	0.00	***	-0.0	0.22		-0.0	0.18	
SUB DEBT / TL	0.21	0.00	***	0.02	0.72		0.00	0.95	

Variable	2006			2007			2008		
	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.
NET PROF / Op. Inc.	-0.1	0.22		0.03	0.85		3.80	0.21	
ROA	2.88	0.32		0.22	0.47		0.30	0.56	
ROE	3.78	0.29		-0.0	0.66		0.14	0.79	
RWA Density	-0.0	0.74		0.01	0.57		-0.2	0.14	
NPL / LOANS	0.08	0.31		0.04	0.84		0.12	0.58	
LOAN YIELD	0.08	0.03	**	-0.0	0.36		-0.1	0.07	*
DEP COST	0.15	0.19		-0.0	0.88		-0.2	0.00	***
NIM	0.04	0.52		0.04	0.59		0.16	0.17	

Variable	2009			2010			2011		
	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.	Δ GR	p-val	Sig.
NET PROF / Op. Inc.	-2.9	0.28		-3.6	0.23		1.10	0.11	
ROA	-2.0	0.37		-1.1	0.00	***	0.22	0.71	
ROE	-1.8	0.35		-1.0	0.00	***	0.24	0.65	
RWA Density	0.07	0.00	***	-0.0	0.46		-0.0	0.09	*
NPL / LOANS	-0.0	0.78		0.64	0.27		0.03	0.43	
LOAN YIELD	-0.0	0.81		-0.0	0.09	*	-0.0	0.36	
DEP COST	-0.2	0.00	***	-0.0	0.18		-0.1	0.21	
NIM	0.07	0.24		-0.0	0.27		-0.0	0.07	*

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

then we will include the time-dummy variable PTH_t in the regression. It will take value 1 for all i if the parallel trend hypothesis seems violated at time t for the dependent variable $Y_{i,k,t}$, even at a 10% significance level, and value 0 otherwise. Hence, it will try to capture the underlying source of divergence between the two sub-groups that occurred during that particular year. Such introduction of the PTH_t variable for some years in the case of some variables will be indicated at the bottom of each regression output table in section 5.

5 Assessing changes in banks' business model

This section presents the regression results regarding the different aspects of the banks business models. We first focus on some key balance sheet and prudential ratios (including balance sheet growth and structure, as well as capital adequacy). Then we turn to an analysis of profitability, risk-taking behaviour and yields.

5.1 Balance sheet and prudential ratios

Growth of the balance sheet

Looking at the regression results in table 5, we notice a very significant negative sign for the interaction variable (δ coefficient) for the growth rate of total assets. It decreases by 5.8 pp on average for GSIBs starting with 2012, everything else equal. Combined with the decreasing rate for all banks in the second period (γ coefficient), this leads to a significant decrease in the balance sheet size for many GSIBs in the years following their designation. This is coherent with the conclusions of Birn et al. [2017] that shows that GSIBs, contrary to other banks, have decreased in size between 2011 and 2014, size being measured by total assets. This tends to indicate that GSIBs try to reduce their systemic footprints by actively curbing the expansion of their balance sheet, as the size indicator is of paramount importance in the identification of GSIBs performed by the BCBS¹⁵.

Result n°1: *Everything else equal, GSIBs have strongly curbed the expansion of their balance sheet since the FSB designation started.*

Note that, as shown in table 2, growth rates of total assets remain - at least slightly - positive on average for the two types of banks over the two sub-periods. However, this

¹⁵Out of the 12 indicators used by the BCBS in its GSIB identification methodology, we could replicate six of them with enough accuracy using the SNL database. Apart from the growth rate of total assets described here, the strategic reduction of the systemic footprint does not appear significant for the other systemic indicators of the BCBS methodology, as they can be proxied from public data. Detailed results for these other dependent variables not shown here are available upon request to the authors.

relative slowdown of the expansion of GSIBs' balance sheet, that we can attribute to the designation, is strongly consistent with the steady decline over time of the share of assets held by GSIBs versus non-GSIBs illustrated in figure 1(b).

Table 5 - Balance sheet and prudential ratios - Regression results

<i>Figures in percentage points (pp)</i>	Dependent variable						
	TA gr	T1 gr	T1 / TA	T1 / RWA	CASH CB / TA	LOANS CUST / TA	SUB DEBT / TA
(β) GSIB	0.177 (1.605)	0.100 (1.780)	-0.907** (0.375)	-0.748 (0.922)	-0.300 (0.844)	-4.475 (4.137)	0.294 (0.347)
(γ) Post2011	-1.651** (0.834)	-3.730** (1.737)	0.509*** (0.107)	1.974*** (0.451)	2.312*** (0.804)	3.555*** (1.160)	-0.234 (0.157)
(δ) GSIB \times Post2011	-5.763*** (1.392)	-2.512 (2.039)	0.589*** (0.200)	-0.133 (0.569)	2.340*** (0.809)	-1.120 (1.545)	0.301* (0.169)
Size	0.019 (0.636)	-0.418 (0.765)	0.337** (0.167)	-0.675* (0.350)	0.232 (0.387)	-5.499*** (1.070)	-0.221* (0.115)
LOANS / TA		-0.074** (0.029)	0.004 (0.008)	-0.058** (0.025)			
DEP / TL		0.006 (0.034)	0.013* (0.007)	0.013 (0.018)			
ROA		4.794*** (1.579)	0.459*** (0.117)	0.282 (0.224)			
Intercept	5.428 (12.297)	34.671** (16.821)	-2.008 (3.407)	26.618*** (6.627)	2.900 (7.983)	151.677*** (21.167)	6.951*** (2.148)
Obs.	1,023	883	946	930	681	681	679
adj-R ²	0.333	0.266	0.227	0.383	0.547	0.103	0.122
Macro control var.	YES	YES	YES	YES	YES	YES	YES
PTH dummy = 1 for non-parallel trends in year(s)		2009	2007 2011	2007 2008	2009 2011	2009	2009

Bank-specific control variables included for some variables of this set

Size : Balance sheet size (log of Total assets)
LOANS / TA : Loans to total assets
DEP / TL : Deposits to total liabilities
ROA : Return on assets

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ - *Standard deviations in brackets*

Prudential ratios

Our focus is now drawn towards solvency patterns. For the growth rate of Tier 1 capital, and for the two capital adequacy ratios (leverage ratio and Tier 1 solvency ratio), we include as bank-specific control variables two ratios describing the level of retail activities in banks' balance sheets: the share of loans within total assets and the share of deposits within total liabilities. We also include the return on average asset (ROA) to take into account differences in assets profitability, which is likely to impact banks ability to raise capital.

The results reported in table 5 highlight some interesting evolutions. Both structural and time differences can be noticed. We find a significant structural gap in terms of leverage ratio (T1/TA) between GSIBs and non-GSIBs (coefficient β). This implies that GSIBs are generally more leveraged than non-GSIBs, with a leverage ratio 0.91 percentage points lower in average than the one of non-GSIBs, everything else equal. Such structural gap between GSIBs and non-GSIBs does not appear significant for the risk-weighted capital ratio (T1/RWA). The results highlight that all banks, either GSIB or not, display significantly higher solvency levels in average starting with 2012 compared to the previous period (2005-2011): the coefficient γ of the time dummy variable "Post2011" is positive and strongly significant for the two capital adequacy ratios. This finding is mainly explained by the adoption of the Basel III regulatory framework imposing all banks to boost their solvency ratios and to improve their ability to absorb shocks.

The main interest variable, $GSIB \times Post2011$, brings additional interesting evidence, although counter-intuitive at a first view : it appears that the coefficient of this interaction variable is significant only for the leverage ratio and not for the risk-weighted solvency ratio (T1/RWA). Since the designation of a bank as a GSIB automatically results in an additional capital buffer on top of the risk-weighted minimum solvency requirements, one may have expected a positive and significant coefficient for the interaction variable in the case of this T1/RWA ratio.

In fact, such mechanical explanation does not take into account the general race for higher solvency ratios. Many banks, either GSIBs or not, have increased solvency ratio more than requested by the Basel III standards, as a response to market and supervisory pressure (such as "Pillar 2" additional requirements, for instance). Such race for raising capital is reflected in our results by the coefficient δ which is not significant for the growth rate of Tier 1 capital (T1 gr): GSIBs did not increased their Tier 1 more than their peers following the post-crisis reforms. This may also come from the fact that

some banks among the non-GSIBs might be subject to equivalent additional capital requirements, such as a DSIB buffer¹⁶. These two elements could partly explain why the GSIB designation has no significant effect on the GSIBs' risk-weighted capital adequacy ratio in our results.

On the contrary, the GSIB reform agenda starting with the GSIB designation has a significant and substantial effect on the leverage ratio: it leads to an additional increase in the leverage ratio of 0.59 percentage points for GSIBs on top of the general improvement of 0.51 percentage points that affected all banks in the second period (according to the coefficient of the variable *Post2011*). As GSIBs used to be more leveraged than other banks before 2011, this further improvement of the leverage ratio helped them bridge this leverage gap. This is the natural outcome of the Basel III new leverage ratio constraint, leading banks that were more leveraged than their peers to converge to the "standard". It is noticeable that such an evolution occurred years before the discussion about a possibly higher leverage ratio requirement for GSIBs began.

***Result n° 2:** The GSIBs designation seems to have triggered an additional increase of the leverage ratio for the sub-group of GSIBs since 2012, tending to close the structural leverage gap noticed between GSIBs and non-GIBs. Surprisingly, the designation does not seem to have an impact on the levels of the risk-weighted capital ratio in the second period.*

Balance sheet structure

Beyond the efforts to raise core capital in order to improve solvency ratios, the GSIB reform agenda might impose to banking institutions to make use of alternatives to reach minimum regulatory requirements. One may immediately think of improving the quality of asset portfolio as well as increasing the share of stable loss-absorbing liabilities.

To test the evolution of balance sheets, we dispose of a number of observations that allows for a detailed breakdown of both assets and liabilities: 681 observations for assets

¹⁶If they are listed as "domestic systemically important banks" by their national supervisory authority; please see BCBS [2012]

structure and 679 observations for liabilities¹⁷

With regard to asset portfolio, two main changes have to be highlighted. First, we find a significant positive impact of the GSIB reform agenda on cash and central bank holdings for the sub-sample of GSIBs compared to other banks. This result brings empirical proof on the efforts made by GSIBs to catch up with a higher share of liquid assets of good quality (ie. cash and balances with central banks) from a relatively lower level recorded over the period 2005-2011. This effect has been driven by the favourable macroeconomic environment (quantitative easing programs and low interest rates) and the implementation of a new liquidity framework within the post-crisis reform agenda.¹⁸. Our findings are in line with the conclusions of Birn et al. [2017] highlighting that between 2011 and 2014, GSIBs have effectively increased liquid assets more than other banks. Moreover, as one can see in figure 2, GSIBs started to increase the share of cash since the crisis; this can easily be explained through market pressure to increase the holdings of high quality liquid assets (the so-called flight to liquidity and quality). Still, taking into account the crisis effect in the regressions, using a set of macroeconomic control variables, we find that the GSIB designation pushed further this reallocation of assets towards increasing cash holdings.

Secondly, the share of loans to non-financial customers in the balance sheet was not affected by the scheduled overall regulatory framework for banks designated as GSIBs since 2011. Surprisingly, and contrary to industry's concerns, over the second period

¹⁷The full database comprises a maximum of 1164 observations (97 banks time 12 years). On average, total assets can be broken down into cash and balances with central banks (6.0% of assets over the full panel), loans to banks (6.9%), loans to non-financial customers (51.6%), trading account (7.2%), available for sales securities (7.6%), held to maturity securities (2.9%), derivatives (6.6%), other financial assets (1.2%), intangible assets (0.7%) and other assets (9.3%). Total liabilities can be split into deposits from banks (11.6% of liabilities over the full sample), customer deposits (53.1%), subordinated debt (1.8%), senior debt obligations (17.5%), derivatives (7.0%), other financial liabilities (2.1%) and other liabilities (6.9%). All these variables for both assets and liabilities sides have been tested to provide an in-depth assessment of potential structural changes. For reasons of simplicity and brevity, only statistically important results with important policy implications are reported in this paper. However, results for all other variables are gathered into a supplementary document available upon request to the authors.

¹⁸Cash and balances with central banks are high quality liquid assets taken for 100% as a buffer in the context of the liquidity coverage ratio (LCR).

all banks have raised in average the holdings of loans (as indicated by the coefficient γ). The estimated coefficient δ of the interaction variable is negative although statistically insignificant. Such finding is in line with Admati and Hellwig [2014] sustaining that, according to the Modigliani-Miller view, higher capital requirements should have a limited impact on the bank's lending policy. It therefore provides empirical evidence against industry's concerns that higher regulatory requirements will lead to a drop in credit supply.

Result n°3: *Everything else equal, the most important change in broad asset structure driven by the GSIB designation has been the increase in the share of cash and central bank reserves that tended to offset the structural gap in the share of cash recorded before 2011 compared to non-GSIBs. Beyond that, the rest of the balance sheet does not seem to have been affected by the GSIB designation, especially the ability of GSIBs to provide loans and finance the real economy remained unchanged.*

Turning now to our analysis of the structure of liabilities, the estimated coefficients δ suggest that the GSIB designation and the subsequent reforms did not drive major shifts in the liabilities composition of GSIBs, except a slightly significant increase of the share of subordinated debt (+0.3 percentage point after 2011 compared to non-GSIBs). This finding may be assigned to the introduction of the TLAC requirement, as some of the underlying debt instruments can be eligible to fulfill the required loss-absorbing capacity of the bank¹⁹.

Result n°4: *Everything else equal, apart from a small increase of subordinated debt, the GSIB designation does not seem to have changed the liability structure of GSIBs' balance sheet.*

¹⁹Once again, for the sake of brevity, only the effect on subordinated debt is reported in table 5. The complete analysis of all components of the liability side of the balance sheet is reported in a supplementary document available upon request to the authors.

5.2 Profitability, risk-taking and yield ratios

We now focus on other aspects of banks business model and analyse measures of profitability, risk-taking behaviour and yields. The challenges posed by new regulations and the macroeconomic environment are likely to affect the results of financial institutions. Banks designated as GSIBs since 2011 are subject to more stringent regulatory requirements, which is generally considered costly for regulated banks, according to the banking industry (Institute of International Finance [20110]). At the opposite, several empirical study highlight that an improvement of the quality of capital reduces banks' risk-taking and leaves profitability unchanged in the long run (King [2010]; Kashyap et al. [2010]). The aim of the analysis driven in this subsection is to examine the extent to which the regulatory driven changes have affected the risk-taking behaviour, the cost of funding and ultimately the profitability of banks designated as GSIBs since 2011.

Profitability

Our investigation on the income statement composition provided clear evidence of the existence of a major structural difference in the revenue mix of the two groups: GSIBs report a much lower income generated by interest bearing activities compared to other banks (non-GSIBs) while the revenues from trading securities are considerably higher for the former sub-group. With regard to time-variations, net gains on securities have increased for all banks during the second sub-period to the detriment of net interest revenues, which is consistent with the macroeconomic conditions characterized by low interest rates and the flattening of the yield curve.²⁰ On the other hand, the model fails to find evidence that the FSB designation has significantly impacted whatsoever the income statement composition of GSIBs.

We observe from descriptive statistics (table 2 and figure 2) that GSIBs and non-

²⁰For the sake of brevity, results are generally not shown in the regression output tables presented in the main text but additional results are available from the authors upon request.

Result n°5: *The FSB designation of GSIBs seems not to have had any statistically significant impact on their net profit (scaled by operating income).*

GSIBs have rather comparable profitability level in terms of net profit, ROA and ROE, at the beginning of the study period, ie. 2005-2007. Then GSIBs tend to be more heavily affected during the 2008-2009 crisis. Finally, in the aftermath of the crisis, profitability is recovering for all banks relative to the crisis level, but GSIBs' profitability remains at a lower level compared to their peers.

The results of the regressions fail to confirm the existence of a structural difference (β coefficient) between the two sub-groups of banks over the whole study period (2005-2016), all things being equal. The second sub-period (2012-2016) is characterized by a significantly higher profitability than the first one (ie. 2005-2011), which is rather consistent given the fact that the first sub-period includes the financial crisis. Such overall improvement of profitability can be seen for the three profitability indicators. As a consequence, the net profit (scaled by operating income) appears 21.6 pp larger in the second sub-period for the complete set of banks (γ coefficient).

Our empirical results in table 6 suggest that becoming a GSIB had a significant negative impact on the ROE (-3.0 pp), and offset the upward profitability trend noticed over the period for the whole sample of institutions.²¹ Econometrically, we do not find any impact of the FSB's designation on the return on assets (ROA) of GSIBs as the fall in their ROA is triggered by the crisis and not the designation. Therefore, taking the ROA as exogenous, and everything else equal, we interpret the negative impact of the designation on the return on equity (ROE) as a "mechanical" effect of the general improvement of GSIBs' leverage ratio (LR), as it can easily be seen looking at the accounting equation (2) below.

²¹This effect can also be seen graphically in figure 3 showing that profitability recovered for all banks from crisis level, but GSIBs' profitability is still lagging behind.

$$ROE = \frac{R}{TE} = \frac{R}{TA} \times \frac{TA}{TE} = ROA \times \frac{1}{LR} \quad \Rightarrow \quad ROA \times \frac{1}{\overleftarrow{LR}} = \overrightarrow{ROE} \quad (2)$$

Result n°6: *There is no empirical evidence of any GSIB specificity in the level and change in the profitability of assets (ROA). On the contrary, GSIBs' return on equity (ROE) appears negatively affected through a deleveraging effect induced by the GSIB regulation.*

TABLE 6 - Profitability, risk-taking and yield - Regression results

<i>Figures in percentage points (pp)</i>	Dependent variable							
	NET PROF / OP INC	ROA	ROE	RWA Density	NPL / LOANS	LOAN YIELD	DEP COST	NIM
(β) GSIB	24.457 (15.034)	-0.024 (0.093)	1.782 (1.566)	-3.784 (3.615)	0.737 (0.692)	-0.899* (0.497)	-0.418** (0.193)	-0.529* (0.295)
(γ) Post2011	21.553*** (8.073)	0.157*** (0.042)	1.853** (0.790)	-2.714** (1.256)	0.154 (0.242)	-0.087 (0.110)	-0.122 (0.120)	-0.064 (0.082)
(δ) GSIB × Post2011	-4.610 (7.309)	-0.074 (0.053)	-3.064*** (1.056)	4.609*** (1.432)	-0.675* (0.348)	0.096 (0.134)	0.086 (0.138)	-0.051 (0.087)
Size	-12.531* (7.580)	0.046 (0.037)	-0.246 (0.652)	3.011*** (1.152)	-0.612** (0.290)	-0.179 (0.114)	0.044 (0.081)	-0.072 (0.067)
LOANS / TA	0.291 (0.215)	0.001 (0.002)	0.039 (0.032)	0.294*** (0.083)	-0.009 (0.014)	-0.017* (0.009)	0.005 (0.004)	0.001 (0.006)
DEP / TL	-0.155 (0.289)	0.004*** (0.001)	0.065* (0.036)	0.001 (0.059)	-0.017 (0.013)	-0.014** (0.007)	-0.020*** (0.004)	0.005 (0.004)
RWA Density	-0.013 (0.207)							
Intercept	223.261 (150.737)	-0.872 (0.741)	2.801 (13.333)	-4.787 (22.710)	13.600*** (5.254)	10.289*** (2.278)	1.491 (1.783)	3.277** (1.374)
Obs.	637	1,026	1,007	994	998	686	686	686
adj-R ²	0.100	0.404	0.364	0.364	0.204	0.676	0.729	0.317
Macro control var.	YES	YES	YES	YES	YES	YES	YES	YES
PTH dummy = 1 for non-parallel trends in year(s)		2010	2010	2009 2011		2006 2008	2008 2009	2011

Bank-specific control variables included for some variables of this set

Size : Balance sheet size (log of Total assets)
 LOANS / TA : Loans to total assets
 DEP / TL : Deposits to total liabilities
 RWA Density : Total RWA over Total Assets

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ - Standard deviations in brackets

Risk-taking behaviour

One can notice a sizeable relative increase of the RWA density for GSIBs in the second sub-period (+4.47 pp) while non-GSIBs record a slight reduction of their RWA density. The increase in riskier activity that first springs to mind, may not be the main reason.

Birn et al. [2017] tend to underline that off-balance sheet (OBS) activity increased only for GSIBs starting 2011²². Such increase of OBS items would then translate into an increase of RWAs, but not of total assets (by construction), which would ultimately result in an increase of the RWA density of GSIBs. Meanwhile, such off-balance sheet activities (for example guarantees and undrawn credit lines) are not riskier than balance sheet activities, if correctly measured.

Secondly, the increase in the amount of RWAs for GSIBs could be partly explained by the implementation of Basel III standards for all banks through the period, combined with GSIBs' higher exposure to market activities and particularly to counterparty credit risk and market risk. Indeed, the revision of market risk framework (under Basel 2.5 and Basel III) drove important increases in risk weighted assets measures (counterparty risk capital charges, higher asset value correlation parameter for exposures to certain financial institutions, higher risk weights for securitized assets or derivatives)²³. Hence, this change of weights would have affected differently the two groups of banks and would have also triggered an increase of the average risk-weight of GSIBs' balance sheet, irrespective of any change in activity.

Finally, we cannot fully exclude the remaining explanation that some GSIBs might have started to gradually shift their assets towards more heavily weighted (ie. riskier) assets. However, if such voluntary risk-shifting is occurring for some banks in search for higher returns, it has not yet materialized in the intended improved profitability of GSIBs' assets, neither in an increase of non-performing loans (NPL). On the contrary, the share of NPL even seems to have been slightly reduced for GSIBs following the designation.

Whatever explanation for the underlying phenomenon of the increased RWA density of GSIBs, this fact also brings insights for why we do not notice any significant impact

²²This is an *indirect* observation based on the difference between total leverage exposure measure, that comprises OBS items, and total assets that does not.

²³See BCBS [2013a] showing that Group 1 banks' RWA increased in the aggregate by approximated 16.1% after applying the Basel 2.5 and Basel III frameworks.

of the designation on GSIBs' risk-based solvency ratio (see section 5.1). In addition to the global race toward solvency ratios higher than the minimum for all banks, the higher increase of RWA density for GSIBs also played a role as it caught up their effort to increase Tier 1, as shown in the equation (3) below.

$$\frac{T1}{RWA} = \frac{T1}{TA} \times \frac{TA}{RWA} = LR \times \frac{1}{RWA dens} \Rightarrow \overset{\uparrow}{LR} \times \frac{1}{\overset{\uparrow}{RWA dens}} = \left(\frac{\overset{\uparrow}{T1}}{RWA} \right) \quad (3)$$

Result n°7: *The GSIB regulation seems to have triggered an increase of their RWA density, but this does not seem to reflect a shift in the risk-taking behaviour of these banks.*

Yields

The question that can be raised further in the analysis concerns the extent to which banks subject to higher regulatory requirements responded to the reduction in ROE. Using equation (1), we analyze the effects of GSIB reform agenda on the cost of funding (especially for deposits), the yield of loans and interest margins.

Over the available sample for the complete 2005-2016 period (686 observations), the average yield on loans equals 5.2% while the average cost of deposits is 2.0% and the global net interest margin is 2.2%. The results of regressions, and particularly the estimated coefficient β , suggest that GSIBs, compared to their peers, benefit from a structural lower cost of deposits in the range of 0.4 pp. Such funding advantage can be related to both the existence of implicit public support (cf. Schich and Toader [2017]) and the greater diversification of GSIBs (in terms of activity and geographic locations) that could lower their idiosyncratic risk in the view of investors.

Our findings suggest that, for GSIBs, this lower cost of liabilities is transmitted to loans pricing to the extent that their average loan yield is structurally 0.9 pp lower than for non-GSIBs. Furthermore, these structural features are stable through time for all

banks, GSIBs or not. The lack of significance for the coefficient γ of the "Post2011" time dummy variable can be explained by the introduction of macroeconomic control variables, and particularly the 10-year sovereign debt spread that captures the impact of the evolution of the general interest rates environment. As for the interaction variable, we do not find any direct and significant impact of the GSIB designation on these dependent variables.

Result n° 8: *The GSIB designation did not have any impact on loans yields, cost of deposits nor net interest margin. This lack of significant impact suggests that stricter regulation had no unintended effects so far on banks' and customers' funding cost. However, since the cost of funding appears to be structurally lower for GSIBs, the absence of impact of the GSIB regulation on this variable also corroborates the fact that the designation of GSIBs did not put an end to the implicit public support.*

6 Concluding remarks

This empirical analysis of 97 banks over 12 years is designed to identify the changes in GSIBs' business model characteristics after their first designation by the FSB in 2011, when controlling for the changes also experienced by other banks (industry trends). It helps to identify initial structural differences between GSIBs and other banks. In that respect, we show that GSIBs are structurally more leveraged. Regarding the income statement, we notice a smaller share of net interest margin in the net operating income, to the benefit of net gains on securities. We also find empirical evidence that GSIBs benefit from a lower cost of deposits that is likely to indicate lower perceived idiosyncratic risk due to higher diversification and implicit public support.

GSIBs are also specific in the changes they incurred after 2011, the year of the first designation by the FSB. Using our econometric identification methodology, we identified some key effects of the designation on GSIBs that are all consistently intertwined. The starting point is that the GSIB designation triggered a very significant slowdown in the expansion of their balance sheet. Combined with the substantial increase of capital that was requested from all banks by the Basel III framework, these two effects led to

a major improvement of the leverage ratio for GSIBs (cf. section 5.1). In terms of profitability, we do not find an impact of the designation on the return on assets (ROA) of GSIBs. However, taking the ROA as exogenous, and everything else equal, the general improvement of GSIBs' leverage ratio (LR) "mechanically" resulted in a negative impact on the return on equity (ROE). This downward pressure on ROE is empirically shown through our regressions (see section 5.2).

Meanwhile, the RWA density (ie. ratio of RWA over Total assets) incurred a significant increase for GSIBs following the first designation in 2011. Reasons are alien to an unintended shift towards riskier assets. Indeed, they can be found in a higher impact of new Basel III standard on the risk weighting of GSIB market activity and on their increase in off-balance sheet operations. This is confirmed by the higher decrease in the share of non performing loans in the balance sheet of GSIBs. Consequences are at odd with expectation of higher solvency ratios for GSIBs. As their specific increase in RWA density compensated for their participation to the global race towards higher solvency ratios, we do *not* find empirical evidence that the GSIB designation led to an improvement of GSIBs' solvency ratios larger than other banks'.

In terms of leverage, as well as share of cash in the balance sheet, GSIBs catch up with other banks levels. In those respects, the new Basel III regulatory framework exerted a "mean-reverting" pressure on some business model characteristics for which a structural gap was noticed before 2011 between GSIBs and non-GSIBs.

This is not true regarding the cost of funding and the yield of loans which is passed on to customers. They both remain structurally lower for GSIBs. This corroborates the fact that the designation of GSIBs did not put an end so far to the implicit public support.

Finally, we should also recall that we cannot observe any negative impact of the GSIB designation on their issuance of loans to non-financial customers and their ability to finance the economy.

Appendices

Appendix 1 - List of banks included in the panel

N	Institution Name	Country	Total assets (€bn)	Identified as GSIB by the FSB						
				At least once	in 2011	in 2012	in 2013	in 2014	in 2015	in 2016
1	Dexia SA	BE	213	1	1	0	0	0	0	0
2	UBS Group AG	CH	872	1	1	1	1	1	1	1
3	Credit Suisse Group AG	CH	765	1	1	1	1	1	1	1
4	Industrial and Comm. Bank of China	CN	3293	1	0	0	1	1	1	1
5	China Construction Bank Corp.	CN	2860	1	0	0	0	0	1	1
6	Agricultural Bank of China Limited	CN	2670	1	0	0	0	1	1	1
7	Bank of China Limited	CN	2476	1	1	1	1	1	1	1
8	Deutsche Bank AG	DE	1591	1	1	1	1	1	1	1
9	Commerzbank AG	DE	480	1	1	0	0	0	0	0
10	Banco Santander, SA	ES	1339	1	1	1	1	1	1	1
11	Banco Bilbao Vizcaya Argentaria, SA	ES	732	1	0	1	1	1	0	0
12	BNP Paribas SA	FR	2077	1	1	1	1	1	1	1
13	Credit Agricole Group	FR	1723	1	1	1	1	1	1	1
14	Societe Generale SA	FR	1382	1	1	1	1	1	1	1
15	Groupe BPCE	FR	1235	1	1	1	1	1	1	1
16	HSBC Holdings Plc	GB	2252	1	1	1	1	1	1	1
17	Barclays Plc	GB	1421	1	1	1	1	1	1	1
18	Lloyds Banking Group Plc	GB	958	1	1	0	0	0	0	0
19	Royal Bank of Scotland Group Plc	GB	935	1	1	1	1	1	1	1
20	Standard Chartered Plc	GB	613	1	0	1	1	1	1	1
21	Morgan Stanley and Co. International	GB	401	1	1	1	1	1	1	1
22	UniCredit SpA	IT	860	1	1	1	1	1	1	1
23	Mitsubishi UFJ Financial Group, Inc.	JP	2330	1	1	1	1	1	1	1
24	Mizuho Financial Group, Inc.	JP	1511	1	1	1	1	1	1	1
25	Sumitomo Mitsui Financial Group	JP	1457	1	1	1	1	1	1	1
26	ING Groep N.V.	NL	845	1	1	1	1	1	1	1
27	Nordea Bank AB (publ)	SE	616	1	1	1	1	1	1	1
28	JPMorgan Chase and Co.	US	2362	1	1	1	1	1	1	1
29	Bank of America Corporation	US	2074	1	1	1	1	1	1	1
30	Wells Fargo and Company	US	1830	1	1	1	1	1	1	1
31	Citigroup Inc.	US	1699	1	1	1	1	1	1	1
32	Goldman Sachs Group, Inc.	US	816	1	1	1	1	1	1	1
33	Bank of New York Mellon Corporation	US	316	1	1	1	1	1	1	1
34	State Street Corporation	US	230	1	1	1	1	1	1	1
Total for GSIBs			47236	34	29	28	29	30	30	30
35	Commonwealth Bank of Australia	AU	626	0	0	0	0	0	0	0
36	Australia and NZ Banking Group	AU	623	0	0	0	0	0	0	0
37	Westpac Banking Corporation	AU	571	0	0	0	0	0	0	0
38	National Australia Bank Limited	AU	529	0	0	0	0	0	0	0
39	KBC Group NV	BE	275	0	0	0	0	0	0	0
40	Banco do Brasil S.A.	BR	404	0	0	0	0	0	0	0
41	Itau Unibanco Holding S.A.	BR	394	0	0	0	0	0	0	0
42	Caixa Economica Federal	BR	369	0	0	0	0	0	0	0
43	Banco Bradesco S.A.	BR	347	0	0	0	0	0	0	0
44	Royal Bank of Canada	CA	805	0	0	0	0	0	0	0
45	Toronto-Dominion Bank	CA	803	0	0	0	0	0	0	0
46	Bank of Nova Scotia	CA	611	0	0	0	0	0	0	0
47	Bank of Montreal	CA	469	0	0	0	0	0	0	0
48	Canadian Imperial Bank of Commerce	CA	342	0	0	0	0	0	0	0

N	Institution Name	Country	Total assets (€bn)	Identified as GSIB by the FSB						
				At least once	in 2011	in 2012	in 2013	in 2014	in 2015	in 2016
49	Bank of Communications Co., Ltd.	CN	1147	0	0	0	0	0	0	0
50	Industrial Bank Co., Ltd.	CN	830	0	0	0	0	0	0	0
51	China Merchants Bank Co., Ltd.	CN	811	0	0	0	0	0	0	0
52	China Minsheng Banking Corp., Ltd.	CN	804	0	0	0	0	0	0	0
53	Shanghai Pudong Development Bank	CN	799	0	0	0	0	0	0	0
54	China Everbright Bank Company	CN	549	0	0	0	0	0	0	0
55	Ping An Bank Co., Ltd.	CN	403	0	0	0	0	0	0	0
56	Hua Xia Bank Co., Limited	CN	321	0	0	0	0	0	0	0
57	Bank of Beijing Co., Ltd.	CN	289	0	0	0	0	0	0	0
58	China Guangfa Bank Co., Ltd.	CN	279	0	0	0	0	0	0	0
59	Bank of Shanghai Co., Ltd.	CN	240	0	0	0	0	0	0	0
60	DZ BANK AG	DE	509	0	0	0	0	0	0	0
61	Landesbank Baden-Wuerttemberg	DE	244	0	0	0	0	0	0	0
62	Bayerische Landesbank	DE	212	0	0	0	0	0	0	0
63	Danske Bank A/S	DK	469	0	0	0	0	0	0	0
64	Banco de Sabadell, SA	ES	213	0	0	0	0	0	0	0
65	La Banque Postale, SA	FR	230	0	0	0	0	0	0	0
66	Nomura International Plc	GB	336	0	0	0	0	0	0	0
67	Nationwide Building Society	GB	262	0	0	0	0	0	0	0
68	State Bank of India	IN	408	0	0	0	0	0	0	0
69	Intesa Sanpaolo SpA	IT	725	0	0	0	0	0	0	0
70	Cassa depositi e prestiti SpA	IT	410	0	0	0	0	0	0	0
71	Japan Post Bank Co., Ltd.	JP	1617	0	0	0	0	0	0	0
72	Norinchukin Bank	JP	790	0	0	0	0	0	0	0
73	Sumitomo Mitsui Trust Holdings, Inc.	JP	455	0	0	0	0	0	0	0
74	Resona Holdings, Inc.	JP	384	0	0	0	0	0	0	0
75	Shinkin Central Bank	JP	274	0	0	0	0	0	0	0
76	Japan Housing Finance Agency	JP	214	0	0	0	0	0	0	0
77	Shinhan Financial Group Co., Ltd.	KR	312	0	0	0	0	0	0	0
78	KB Financial Group Inc.	KR	296	0	0	0	0	0	0	0
79	NongHyup Financial Group Inc.	KR	289	0	0	0	0	0	0	0
80	Hana Financial Group Inc.	KR	274	0	0	0	0	0	0	0
81	Woori Bank	KR	245	0	0	0	0	0	0	0
82	Korea Development Bank	KR	215	0	0	0	0	0	0	0
83	Cooperatieve Rabobank U.A.	NL	663	0	0	0	0	0	0	0
84	ABN AMRO Group NV	NL	394	0	0	0	0	0	0	0
85	DNB ASA	NO	292	0	0	0	0	0	0	0
86	PAO Sberbank of Russia	RU	394	0	0	0	0	0	0	0
87	Svenska Handelsbanken AB (publ)	SE	274	0	0	0	0	0	0	0
88	Skandinaviska Enskilda Banken	SE	274	0	0	0	0	0	0	0
89	Swedbank AB (publ)	SE	225	0	0	0	0	0	0	0
90	DBS Group Holdings Limited	SG	316	0	0	0	0	0	0	0
91	Oversea-Chinese Banking Corp.	SG	269	0	0	0	0	0	0	0
92	United Overseas Bank Limited	SG	223	0	0	0	0	0	0	0
93	Cathay Financial Holding Co., Ltd.	TW	239	0	0	0	0	0	0	0
94	Federal Home Loan Banks	US	1002	0	0	0	0	0	0	0
95	U.S. Bancorp	US	423	0	0	0	0	0	0	0
96	PNC Financial Services Group, Inc.	US	347	0	0	0	0	0	0	0
97	Capital One Financial Corporation	US	339	0	0	0	0	0	0	0
Total for Non-GSIBs			28696	0	0	0	0	0	0	0

Note: Banks are ranked by (i) GSIBs vs. Non-GSIBs, (ii) country and (iii) decreasing total assets as of end-2016.

Appendix 2 - Robustness checks

2.1 - Alternative sub-periods

In section 4, we described that we chose to split our panel into the two sub-periods 2005-2011 and 2012-2016, so we included the $Post2011_t$ time dummy variable in the regressions. As explained above, this cutoff date between 2011 and 2012 seems the more natural since the first list of GSIBs was published in November 2011. However, on the one hand, someone could argue that a longer time is needed for real effects of this designation to materialize into the balance sheet / income statement of GSIBs. This would lead to postpone the cutoff date, for instance considering that the second sub-period only started in 2013 or 2014, instead of 2012. On the other hand, another one could say that most effects may have been anticipated, either by banks themselves, or by the market²⁴. This would argue for setting an earlier cutoff date, for instance in 2011 or 2010. Therefore, we re-ran all the regressions displayed in section 5, each time using an alternative starting date of the second sub-period, ranging from 2010 to 2014, with 2012 being the baseline starting date used in all previous sections of the paper.

Table 7 below shows the coefficient δ of the interaction variable for all dependent variables listed in table 1 and discussed in section 5 and for all alternative starting date of the second sub-period between 2010 and 2014. As one can notice in this table, coefficients generally remain of the same magnitude, as well as their significance level. This indicates that the natural choice - although still "arbitrary" - we made to consider 2012 as the start of the second sub-period is not driving the results, and that similar conclusions would have been drawn if we had decided to set an earlier or later cutoff date.

²⁴As mentioned by Moenninghoff et al. [2015], the *Financial Times* published two lists of systemic banks in 2009 and 2010, before the first official publication of the FSB list in November 2011.

TABLE 7 - Alternative sub-periods

Set of variables	δ coefficient for dependent variable:	Second sub-period starting in				
		2010	2011	2012	2013	2014
Balance sheet and prudential ratios	TA gr	-5.079*** (1.65)	-5.532*** (1.385)	-5.763*** (1.392)	-3.401** (1.325)	-2.154* (1.306)
	T1 gr	-4.64 (3.029)	-4.248* (2.27)	-2.022 (1.976)	-1.116 (1.681)	-0.367 (1.728)
	T1 / TA	0.45** (0.215)	0.483** (0.207)	0.589*** (0.2)	0.65*** (0.199)	0.646*** (0.191)
	T1 / RWA	-0.332 (0.505)	-0.203 (0.523)	-0.133 (0.569)	-0.426 (0.601)	-0.63 (0.626)
	CASH CB / TA	2.7*** (1.028)	2.518*** (0.905)	2.34*** (0.809)	2.249*** (0.732)	2.196*** (0.702)
	LOANS CUST / TA	-1.651 (2.024)	-1.662 (1.741)	-1.051 (1.511)	-0.295 (1.356)	-0.247 (1.284)
	SUB DEBT / TL	0.329* (0.178)	0.321* (0.179)	0.297* (0.17)	0.321** (0.161)	0.27* (0.159)
Profitability, risk-taking and yield ratios	NET PROF / OP INC	6.064 (10.907)	1.798 (11.4)	-4.61 (7.309)	-6.663 (5.449)	-9.781* (5.822)
	ROA	-0.063 (0.065)	-0.101* (0.061)	-0.074 (0.053)	-0.031 (0.054)	-0.039 (0.052)
	ROE	-2.302* (1.399)	-3.284*** (1.268)	-3.064*** (1.056)	-2.052** (0.971)	-1.841** (0.92)
	NPL / LOANS	-0.393 (0.379)	-0.553 (0.341)	-0.675* (0.348)	-0.743** (0.343)	-0.699** (0.31)
	RWA Density	4.108** (1.619)	3.914*** (1.514)	4.609*** (1.432)	5.429*** (1.409)	5.608*** (1.408)
	LOAN YIELD	-0.145 (0.156)	-0.039 (0.13)	0.096 (0.134)	0.31** (0.158)	0.337** (0.165)
	DEP COST	-0.018 (0.138)	0.012 (0.134)	0.086 (0.138)	0.225 (0.142)	0.198 (0.126)
	NIM	-0.056 (0.111)	-0.058 (0.1)	-0.051 (0.087)	0.003 (0.082)	0.045 (0.082)

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ - Standard deviations in brackets

2.2 - Alternative definition of "GSIB" sub-sample

Similarly, section 4 explains that the $GSIB_{i,k}$ dummy variable indicates all banks that have been identified as GSIB at least once by the FSB between 2011 and 2016. In table 8 below, this baseline definition of the GSIB sub-sample is referred to as "GSIB once". Alternative definition of this "GSIB" sub-sample could have been used instead. Therefore, we re-ran all regressions presented in section 5 using two alternative GSIB binary variables. With the first alternative we simply focus on the initial list of GSIB published by the FSB in November 2011, and simply ignore the few changes of this

list that intervened in the following years. We refer to this first alternative dummy variable as "GSIB 2011" in the regression table below. The second alternative consists in restraining the binary variable to banks that have constantly been listed as GSIBs between 2011 and 2016, and therefore use a stable list of permanent GSIBs. We refer to this second alternative dummy variable as "GSIB always" in table 8.

TABLE 8 - Alternative definition of GSIB sub-sample

Set of variables	δ coefficient for dependent variable:	GSIB binary variable used		
		GSIB once	GSIB 2011	GSIB always
Balance sheet and prudential ratios	TA gr	-5.763*** (1.392)	-6.31*** (1.497)	-5.434*** (1.653)
	T1 gr	-2.022 (1.976)	-2.624 (1.95)	-1.422 (1.977)
	T1 / TA	0.589*** (0.2)	0.541** (0.213)	0.49** (0.222)
	T1 / RWA	-0.133 (0.569)	0.103 (0.584)	-0.248 (0.542)
	CASH CB / TA	2.34*** (0.809)	2.319*** (0.803)	2.266*** (0.833)
	LOANS CUST / TA	-1.051 (1.511)	-1.026 (1.513)	-0.249 (1.581)
	SUB DEBT / TL	0.297* (0.17)	0.273 (0.178)	0.343* (0.18)
Profitability, risk-taking and yield ratios	NET PROF / OP INC	-4.61 (7.309)	0.333 (10.098)	-7.774 (9.043)
	ROAA	-0.074 (0.053)	-0.092* (0.05)	-0.08 (0.05)
	ROAE	-3.064*** (1.056)	-3.084*** (1.079)	-2.306** (1.072)
	NPL / LOANS	-0.675* (0.348)	-0.509 (0.367)	-0.071 (0.372)
	RWA Density	4.609*** (1.432)	3.468** (1.598)	3.733** (1.616)
	LOAN YIELD	0.096 (0.134)	0.015 (0.154)	0.051 (0.159)
	DEP COST	0.086 (0.138)	-0.002 (0.139)	0.002 (0.14)
	NIM	-0.051 (0.087)	-0.083 (0.095)	-0.064 (0.099)

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ - Standard deviations in brackets

The "GSIB always" variables identifies 26 banks. "GSIB 2011" adds the following 3 banks compared to "GSIB always": Lloyds Banking Group, Commerzbank and Dexia. "GSIB once" adds the following 5 banks compared to "GSIB 2011": Industrial and

Commercial Bank of China, China Construction Bank Corporation, Agricultural Bank of China Limited, BBVA and Standard Chartered.

Table 8 displays the results for these two alternative definitions. Like in table 7, we only present the δ coefficient of the interaction variable for all dependent variables we look at in this paper. Similarly, we notice that most results remain the same whatever definition for the GSIB sub-sample is used.

2.3 - Alternative econometric specifications

Buffer rates

Replacing the dummy variable $GSIB_{i,k}$ in the interaction term by the level of GSIB buffer applied to each bank gives us an alternative econometric specification to equation (1).

$$Y_{i,k,t} = \alpha + \beta GSIB_{i,k} + \gamma Post2011_t + \delta(Buffer_{i,k,t} \times Post2011_t) + \varphi B_{i,k,t} + \chi C_{k,t} + PTH_t + u_{i,k,t} \quad (4)$$

This alternative specification takes into account the various levels of the GSIB buffers (from 1% to 2.5%) instead of the binary variable $GSIB_{i,k}$. Overall results are displayed in column "Buffer rates" of table 9. If the sign and significance level of coefficients can still be interpreted as in equation (1), on the other hand the magnitude of coefficients no longer comparable to the one estimated using equation (1).

Country FE

Instead of using country-specific macroeconomic control variables that evolve over time, we could simply have used country fixed effects (FE) as shown in equation (5) below. Results of this alternative specification are shown in column "Country FE" of table 9.

$$Y_{i,k,t} = \alpha + \beta GSIB_{i,k} + \gamma Post2011_t + \delta(GSIB_{i,k} \times Post2011_t) + \varphi B_{i,k,t}$$

$$\chi FE_k + PTH_t + u_{i,k,t} \quad (5)$$

Country FE * 2

Taking into account that the 2008-2009 financial crisis may have affected differently all countries represented in the panel, these country fixed effects may be differentiated between the pre and post crisis as in equation (6) below. These alternative results are displayed in column "Country FE * 2" of table 9.

$$Y_{i,k,t} = \alpha + \beta GSIB_{i,k} + \gamma Post2011_t + \delta(GSIB_{i,k} \times Post2011_t) + \varphi B_{i,k,t} \\ + \chi_1 FE_{k,(2005-2007)} + \chi_2 FE_{k,(2008-2016)} + PTH_t + u_{i,k,t} \quad (6)$$

Crisis dummy

In order to specifically isolate the impact of the financial crisis, on top of the macroeconomic control variables, we could have added a "crisis" time-specific dummy variable taking value equal 1 only for years 2008 and 2009, like in equation (7) below. These results are available in column "Crisis dummy" of table 9. However, one should note that the effects of the financial crisis are already - at least partly - taken into account in the baseline regression (1) used in the main sections of this paper, since the growth rate of the economy is included in the set of country-specific macroeconomic control variables.

$$Y_{i,k,t} = \alpha + \beta GSIB_{i,k} + \gamma Post2011_t + \delta(GSIB_{i,k} \times Post2011_t) + \varphi B_{i,k,t} \\ + \chi C_{k,t} + \lambda Crisis_t + PTH_t + u_{i,k,t} \quad (7)$$

Excluding some banks

Finally, we re-run twice equation (1) excluding some banks of the dataset. First, we exclude banks from China (which is the largest country in the dataset in terms of total assets as of end-2016). Then we exclude the largest GSIBs in order to focus only on

GSIBs in the first bucket (ie. with systemic scores between 130 and 230 bp in the 2016 FSB's designation). Results are presented respectively in the columns "Without China" and "First bucket" of table 9.

Table 9 - Alternative econometric specifications

Set of variables	δ coeff. for dep. var.:	Specification						
		Baseline	Buffer rates	Country FE	Country FE * 2	Crisis dummy	Without China	First bucket
		Eq. (1)	Eq. (4)	Eq. (5)	Eq. (6)	Eq. (7)	Eq. (1)	Eq. (1)
Balance sheet and prudential ratios	TA gr	-5,763*** (1,392)	-2,783*** (0,9)	-5,963*** (1,514)	-4,701*** (1,472)	-5,818*** (1,386)	-6,828*** (1,595)	-5,49*** (1,543)
	T1 gr	-2,512 (2,039)	-0,847 (1,033)	0,275 (1,913)	-1,435 (1,991)	-2,819 (2,108)	-4,989*** (1,852)	-2,386 (2,337)
	T1 / TA	0,589*** (0,2)	0,415*** (0,124)	0,642*** (0,197)	0,399** (0,171)	0,592*** (0,199)	0,491*** (0,181)	0,369 (0,226)
	T1 / RWA	-0,133 (0,569)	-0,247 (0,292)	0,018 (0,631)	-0,378 (0,532)	-0,187 (0,573)	-0,263 (0,595)	-0,081 (0,662)
	CASH CB / TA	2,34*** (0,809)	1,218** (0,494)	2,422*** (0,763)	2,094*** (0,655)	2,24*** (0,806)	2,587*** (0,895)	2,501*** (0,864)
	CUST LOANS / TA	-1,12 (1,545)	-0,396 (0,969)	-1,257 (1,473)	-0,903 (1,424)	-1,091 (1,53)	-2,742* (1,555)	-1,441 (1,631)
	SUB DEBT / TL	0,301* (0,169)	0,185* (0,105)	0,183 (0,205)	0,157 (0,169)	0,298* (0,169)	0,191 (0,192)	0,261 (0,178)
	Profitability, risk-taking and yield ratios	NET PROF / OP INC	-4,61 (7,309)	-11,315* (6,345)	-6,606 (8,622)	-2,993 (8,359)	-2,099 (7,28)	-8,96 (8,915)
ROAA		-0,074 (0,053)	-0,054* (0,03)	-0,093 (0,064)	-0,039 (0,057)	-0,052 (0,049)	-0,151*** (0,052)	-0,052 (0,061)
ROAE		-3,064*** (1,056)	-1,706*** (0,654)	-3,109*** (1,157)	-2,365** (1,076)	-2,714*** (1,001)	-4,435*** (1,153)	-2,366** (1,157)
NPL / LOANS		-0,675* (0,348)	-0,062 (0,197)	-0,384 (0,432)	-0,716* (0,412)	-0,676* (0,352)	-0,395 (0,394)	-0,835** (0,417)
RWA Density		4,609*** (1,432)	3,443*** (0,876)	3,809** (1,512)	3,246** (1,302)	4,816*** (1,415)	4,494*** (1,469)	3,457** (1,549)
LOAN YIELD		0,096 (0,134)	-0,017 (0,091)	-0,1 (0,18)	-0,051 (0,145)	0,057 (0,129)	0,17 (0,146)	0,136 (0,146)
DEP COST		0,086 (0,138)	-0,015 (0,103)	-0,134 (0,167)	0,074 (0,123)	0,086 (0,138)	0,134 (0,148)	0,129 (0,141)
NIM		-0,051 (0,087)	-0,02 (0,058)	-0,052 (0,089)	-0,095 (0,086)	-0,067 (0,088)	-0,08 (0,089)	-0,072 (0,095)

Significance levels : * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ - Standard deviations in brackets

Stability of results

As it can generally be seen in table 9, all conclusions we drew in this paper remain generally robust to all these alternative econometric specifications.

References

- Viral Acharya, Robert Engle, and Matthew Richardson. Capital shortfall: A new approach to ranking and regulating systemic risks. *The American Economic Review*, 102(3):59–64, 2012.
- Viral V Acharya, Lasse H Pedersen, Thomas Philippon, and Matthew Richardson. Measuring systemic risk. *Review of Financial Studies*, 30(1):2–47, 2017.
- Anat Admati and Martin Hellwig. *The bankers' new clothes: What's wrong with banking and what to do about it*. Princeton University Press, 2014.
- Tobias Adrian and Markus K Brunnermeier. Covar. *The American Economic Review*, 106(7):1705–1741, 2016.
- BCBS. (Basel Committee on Banking Supervision). Global Systemically Important Banks: Assessment methodology and the additional loss absorbency requirement. *Basel Committee on Banking Supervision Consultative Document*, 2011.
- BCBS. A framework for dealing with domestic systemically important banks. 2012. URL <https://www.bis.org/publ/bcbs233.pdf>.
- BCBS. Results of the Basel iii monitoring exercise as of 30 June 2012. 2013a. URL <https://www.bis.org/publ/bcbs243.pdf>.
- BCBS. Global systemically important banks: updated assessment methodology and the higher loss absorbency requirement. 2013b. URL <http://www.bis.org/publ/bcbs255.pdf>.
- Sylvain Benoit, Jean-Edouard Colliard, Christophe Hurlin, and Christophe Pérignon. Where the risks lie: A survey on systemic risk. *Review of Finance*, 21(1):109–152, 2016a.

- Sylvain Benoit, Christophe Hurlin, and Christophe Pérignon. Pitfalls in systemic-risk scoring. *HEC Paris Research Paper*, 2016b.
- Martin Birn, Michel Dietsch, and Dominique Durant. How to reach all basel requirements at the same time? *ACPR - Débats économiques et financiers*, n°28, 2017.
- Luis Brandao Marques, Ricardo Correa, and Horacio Sapriza. International evidence on government support and risk taking in the banking sector. 2013.
- Piotr Danisewicz, Dennis Reinhardt, and Rhiannon Sowerbutts. On a tight leash: Does bank organizational structure matter for macroprudential spillovers? *Journal of International Economics*, 109:174–194, 2017.
- Robert Engle, Eric Jondeau, and Michael Rockinger. Systemic risk in europe. *Review of Finance*, 19(1):145–190, 2015.
- Mark J Flannery and Sorin M Sorescu. Evidence of bank market discipline in subordinated debenture yields: 1983-1991. *The Journal of Finance*, 51(4):1347–1377, 1996.
- Xavier Freixas, Jean-Charles Rochet, and Bruno M Parigi. The lender of last resort: A twenty-first century approach. *Journal of the European Economic Association*, 2(6): 1085–1115, 2004.
- FSB. (Financial Stability Board). Reducing the moral hazard posed by systemically important financial institutions. *Basel, October*, 20, 2010.
- FSB. Policy measures to address systemically important financial institutions. 2011. URL http://www.fsb.org/wp-content/uploads/r_111104bb.pdf?page_moved=1.
- FSB. Update of group of global systemically important banks (GSIBs). 2012. URL http://www.fsb.org/wp-content/uploads/r_121031ac.pdf?page_moved=1.
- FSB. Update of group of global systemically important banks (GSIBs). 2013a. URL http://www.fsb.org/wp-content/uploads/r_131111.pdf.

- FSB. Progress and next steps towards ending too-big-to-fail. *FSB Reports to the G20 Press Release*, 2, 2013b.
- FSB. Update of group of global systemically important banks (GSIBs). 2014a. URL http://www.fsb.org/wp-content/uploads/r_141106b.pdf.
- FSB. Adequacy of loss-absorbing capacity of global systemically important banks in resolution. *Consultative document*, 10, 2014b.
- FSB. Update of group of global systemically important banks (GSIBs). 2015a. URL <http://www.fsb.org/wp-content/uploads/2015-update-of-list-of-global-systemically-important-banks-G-SIBs.pdf>.
- FSB. Principles on loss-absorbing and recapitalisation capacity of GSIBs in resolution: Total loss-absorbing capacity (TLAC) term sheet, 2015b.
- FSB. Update of group of global systemically important banks (GSIBs). 2016a. URL <http://www.fsb.org/wp-content/uploads/2016-list-of-global-systemically-important-banks-G-SIBs.pdf>.
- FSB. Second thematic review on resolution regimes peer review report, 2016b.
- Michael. Grill, Jan Hannes Lang, and Jonathan Smith. The leverage ratio, risk-taking and bank stability. *Journal of Financial Management, Markets and Institutions*, forthcoming, 2018.
- Reint Gropp, Christian Gruendl, and Andre Guettler. The impact of public guarantees on bank risk-taking: evidence from a natural experiment. *Review of Finance*, page rft014, 2013.
- Robert Hills, Dennis Reinhardt, Rhiannon Sowerbutts, Tomasz Wieladek, et al. International banking and cross-border effects of regulation: Lessons from the united kingdom. *International Journal of Central Banking*, 13(2):404–433, 2017.

IIF Institute of International Finance. Interim report on the cumulative impact on the global economy of proposed changes in the regulatory framework. 20110.

Anil K Kashyap, Jeremy C Stein, and Samuel Hanson. An analysis of the impact of substantially heightened capital requirements on large financial institutions. *Booth School of Business, University of Chicago, mimeo*, 2, 2010.

Michael King. Mapping capital and liquidity requirements to bank lending spreads. (WP324), 2010.

Sebastian C Moenninghoff, Steven Ongena, and Axel Wieandt. The perennial challenge to counter too-big-to-fail in banking: Empirical evidence from the new international regulation dealing with global systemically important banks. *Journal of Banking & Finance*, 61:221–236, 2015.

Sebastian Schich and Oana Toader. To be or not to be a GSIB: Does it matter? *Journal of Financial Management, Markets and Institutions*, 2/2017:169–192, 2017.

Débats économiques et financiers

17. F. Borel-Mathurin, P-E. Darpeix, Q. Guibert, S. Loisel, "Principaux déterminants de la stratégie de revalorisation dans le secteur de l'assurance-vie en France", Juillet 2015.
18. H. Fraisse, J. Hombert et M. Lé "The competitive effects of a bank megamerger on access to credit", Octobre 2015.
19. B. Camara, F-D. Castellani, H. Fraisse, L. Frey, J-C. Héam, C. Labonne and V. Martin "MERCURE : a macroprudential stress testing model developed at the ACPR", Octobre 2015.
20. C. Labonne and C. Welter-Nicol "Cheap Credit, Unaffordable Houses", Décembre 2015.
21. F. Vinas, "The real effects of universal banking on firm's investment: Micro-evidence from 2004-2009", Avril 2016.
22. I. Argimon, M. Dietsch, and A. Estrada, "Prudential filters, portfolio composition and capital ratios in European banks", Août 2016.
23. M. Dietsch, K. Düllmann, H. Fraisse, P. Koziol and C. Ott "Support for the SME Supporting Factor - Multi-country empirical evidence on systematic risk factor for SME loans", Octobre 2016.
24. O. de Bandt, B. Camara, A. Maitre and P. Pessarossi "Optimal capital, regulatory requirements and bank performance in times of crisis: Evidence from France" Octobre 2016.
25. Eugenio Avisoa "European banks' technical efficiency and performance: do business models matter? The case of European co-operatives banks", Décembre 2016.
26. B. Camara, P. Pessarossi and T. Philippon "Back-testing European stress tests", Janvier 2017.
27. E. Chrétien and V. Lyonnet "Traditional and Shadow Banks during the Crisis" Mai 2017.
28. M. Birn, M. Dietsch, D. Durant "How to reach all Basel requirements at the same time?" Juin 2017.
29. H.Fraisse "Restructuration de la dette des ménages : les effets d'un moratoire sur le redépôt en surendettement" Octobre 2017.
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32. F. Borel-Mathurin, S. Loisel and J. Segers "Réévaluation de la charge en capital en assurance après un choc important : points de vue théoriques et empiriques" Décembre 2017.
33. A. Violon, D. Durant, O. Toader "L'impact de la désignation des GSIBs sur leur business model" Mars 2018.

Economic and Financial Discussion Notes

17. F. Borel-Mathurin, P-E. Darpeix, Q. Guibert, S. Loisel, "Main determinants of profit sharing policy in the French life insurance industry", July 2015.
18. H. Fraisse, J. Hombert et M. Lé "The competitive effects of a bank megamerger on access to credit", October 2015.
19. B. Camara, F-D. Castellani, H. Fraisse, L. Frey, J-C. Héam, C. Labonne and V. Martin "MERCURE : a macroprudential stress testing model developed at the ACPR", October 2015.
20. C. Labonne and C. Welter-Nicol "Cheap Credit, Unaffordable Houses", December 2015.
21. F. Vinas, "The real effects of universal banking on firm's investment: Micro-evidence from 2004-2009", April 2016.
22. I. Argimon, M. Dietsch, and A. Estrada, "Prudential filters, portfolio composition and capital ratios in European banks", August 2016.
23. M. Dietsch, K. Düllmann, H. Fraisse, P. Koziol and C. Ott "Support for the SME Supporting Factor - Multi-country empirical evidence on systematic risk factor for SME loans", October 2016.
24. O. de Bandt, B. Camara, A. Maitre and P. Pessarossi "Optimal capital, regulatory requirements and bank performance in times of crisis: Evidence from France" October 2016.
25. Eugenio Avisoa "European banks' technical efficiency and performance: do business models matter? The case of European co-operatives banks", December 2016.
26. B. Camara, P. Pessarossi and T. Philippon "Back-testing European stress tests", January 2017.
27. E. Chrétien and V. Lyonnet "Traditional and Shadow Banks during the Crisis" May 2017.
28. M. Birn, M. Dietsch, D. Durant "How to reach all Basel requirements at the same time?" June 2017.
29. H. Fraisse "Household Debt Restructuring: The Re-default Effects of Debt Suspensions" October 2017.
30. J. Hombert and V. Lyonnet "Intergenerational Risk Sharing in Life Insurance: Evidence from France" October 2017.
31. P. Pessarossi, J-L. Thevenon and L. Weill "Does high profitability hamper stability for European banks?" December 2017.
32. F. Borel-Mathurin, S. Loisel and J. Segers "Reevaluation of the capital charge in insurance after a large shock: empirical and theoretical views" December 2017.
33. A. Violon, D. Durant, O. Toader "The Impact of the Identification of GSIBs on their Business Model" March 2018.



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