

IMF Working Paper

The Need for "Un-consolidating" Consolidated Banks' Stress Tests

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Research Department

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Abstract

The recent crisis has spurred the use of stress tests as a (crisis) management and early warning tool. However, a weakness is that they omit potential risks embedded in the banking groups’ geographical structures by assuming that capital and liquidity are available wherever they are needed within the group. This assumption neglects the fact that regulations differ across countries (e.g., minimum capital requirements), and, more importantly, that home/host regulators might limit flows of capital or liquidity within a group during periods of stress. This study presents a framework on how to integrate this risk element into stress tests, and provides illustrative calculations on the size of the potential adjustments needed in the presence of some limits on intragroup flows for banks included in the June 2011 EBA stress tests.

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Contents	Page
I. Introduction	3
II. The Recent Evolution in Bank Stress Tests	6
III. A Combined Unconsolidated/Consolidated Stress Test Approach	7
IV. Quantifying the Potential Bias of not Using a Combined Approach.....	11
V. Conclusions.....	16
 Figure	
1. Conceptual Difference between ‘Traditional’ Stress Test and Stress Tests Taking into Account Group Structures	8
2. Banks’ Geographical Distributions.....	13
3. Banks’ share of Profits and Capital Outside EU.....	13
4. Partial and Full Ring Fencing Adjustments	15
References.....	18
Annex I – Mapping Bank Groups.....	20

I. INTRODUCTION

The global crisis and subsequent events have revealed some weaknesses in the stress testing exercises (and other types of early warning exercises) carried out by the public and private sector. Subsequently, the toolbox has been bolstered in recent years, in ways that have addressed a number of methodological issues (i.e., the sophistication of stress tests in technical terms, inclusion of liquidity and contagion, etc.) and scenario-related considerations (i.e., the severity and scope of shocks). Nevertheless, several weaknesses and challenges remain, many of them related to the lack of adequate data, especially from a cross-border context.²

This paper focuses on the limitations of carrying out stress tests using consolidated banking groups' balance sheets and income statements, especially when stress testing international banking groups. Stress tests run at the group level using “only” consolidated data are implicitly based on two assumptions:

- First, they ignore regulatory differences across countries, such as the fact that in many (emerging) countries, the minimum total capital adequacy ratios are often set higher, e.g., at 10-12 percent rather than at the Basel minimum of 8 percent. The introduction of Basel III and other regulatory initiatives additional will potentially add potential cross-country differences (such as countercyclical buffers, systemic risk charges for large banks, etc.) and additional regulations in terms of liquidity and leverage.³
- Second, and even more important (in terms of potential impact), banking group stress testing using only consolidated data assumes a free flow of capital and liquidity within each banking group. Stress tests thus do not take into account the possibility that home/host regulators might limit or even fully obstruct flows within banking groups. The potential impact of limiting the free flow of capital and liquidity is non-trivial, however, and has materialized to some degree during the crisis.

In this context, the contribution of this paper is twofold. First, it details a straightforward conceptual approach on how unconsolidated and consolidated balance sheet data can be combined to take into account banking groups' geographical structure. This more integrated stress test approach has been used during the 2011/12 Czech Republic FSAP, both for solvency and liquidity stress tests and for financial stability analysis (IMF 2012a), and has provided

² Other current challenges include, for example, the modeling of meaningful macro-financial linkages, the incorporation of dynamic impacts (second-round effects, etc.) and running integrated scenarios covering various risk types at the same times in a coherent manner. See Ong and Čihák (2010) and Borio et al. (2012) for recent discussions on stress test limitations, and Cerutti et al. (2011) for the data challenges in the context of systemic risk analysis for global banking.

³ Basel III introduces minimum capital ratios for Tier 1 capital, Core Tier 1 capital as well as capital buffers such as the conservation buffer, countercyclical buffer and a systemic risk charge for large banks.

valuable insight.⁴ Second, this paper provides evidence, within existing data limitations, that an approach using both consolidated and unconsolidated balance sheet data is necessary and relevant due to the potential implications of “ring fencing”—defined in this paper as partially or fully limiting cross-border banking groups’ ability to re-allocate funds from subsidiaries with excess capital and/or liquidity to those in need of capital and/or liquidity.⁵

The European stress tests run by the European Banking Authority (EBA) in 2010-11 as well as the stress tests run by U.S. authorities in 2009 and 2012 are good examples of the mentioned progress in, and limitations of, recent stress tests.⁶ Both exercises undoubtedly came up with a series of conceptual improvements, which increased stress test coverage and sophistication. At the same time, these stress tests were conducted using consolidated banks’ balance sheets, thus, assuming that resources available at one office location could immediately be used in another location. While this assumption is more likely to be valid within countries and/or closely integrated jurisdictions with similar rules (i.e., the European Union), evidence from the past has shown that this is frequently not the case during crisis or stress periods. This is because (at least) some degree of ring fencing by host regulators is not a low probability event at such times. In several cases in the past, while foreign subsidiaries do not necessarily suffer explicit discrimination, regulators imposed additional restrictions covering all/most banks, effectively limiting international banking groups ability to reallocate resources within the group. For example, as documented by Cerutti et al (2010), some bank regulators limited the distribution of profits by subsidiaries of foreign banks despite relatively strong bank fundamentals in 2009. The degree by which host country authorities ring fence the foreign affiliates operating in their territory, as well as the capacity of banking groups for working around host country restrictions (e.g., even by fully or partially selling their subs), are a function of the severity of the crisis.⁷

Ring fencing considerations are potentially important in the cases of several large EU banking groups that have a significant diversified geographical structure, in terms of assets, liabilities

⁴ In addition to analyzing in IMF (2012a) stress at the parent level, the FSAP also involved solvency and liquidity stress tests simulating the impact on the parent and each of the main subsidiaries—a fully fledged bottom up test that confirmed the outcome of the simplified contagion test that was reported.

⁵ A similar partial ring fencing scenario to assess bank solvency was used during the Spain FSAP (IMF 2012b). Note that this geographical perspective of ring-fencing is different from the activity restrictions embedded in the Volcker Rule (section 619 of the Dodd Frank Act), which restricts deposit-taking banks from engaging in certain types of activities (e.g., proprietary trading).

⁶ See EBA (2011) and Fed (2012) for more details.

⁷ For example, despite the fact that Dexia, National Bank of Greece, and Banco Comercial Portugues announced in late 2010/ 2011 their initial intentions to sell their respective Denizbank, Finansbank, and Millennium profitable subsidiaries in Turkey and Poland, only Dexia was able to do so in June 2012 since the global financial crisis forced potential buyers to focus on increasing capital rather than expanding. In addition, it should be noted that the transfers of excess profits/capital are not the only mechanisms through which banking groups could manage the level of capitalization of their affiliates. For example, it could also be achieved through capital injections via subordinated debt or by “shifting” assets (instead of capital) between different parts of the group. Nevertheless, even though international banks could have some room for maneuver, the scope of this alternative is limited.

and profits. This feature and the fact that the June 2011 EBA stress test released detailed consolidated data motivate this paper's focus on large European banks. Our estimates, using projections based on banks' 2010 data from the EBA exercise, indicate up to 3 percentage points of additional Core Tier I capital needs for banks under very strict forms of ring-fencing from outside EU countries. These results complement Cerutti et al (2010), which showed the potential important impact of different degrees of ring-fencing on banking groups' capital needs by simulating different scenarios using a sample of 25 large European banking groups with subsidiaries in Central, Eastern and Southern Europe (CESE). It should be noted, however, that our numerical results do not necessarily reflect current circumstances—running stress tests to test banks' current resilience was not the purpose of this paper. Many banks have since raised capital and some of them have changed their geographical structure (e.g., by selling subsidiaries).

The magnitude of the estimated adjustments is comparable to Basel III's proposed (up to 2½ percent) Common Tier I capital adequacy capital surcharge to be applied on Global Systemically Important Banks (G-SIBs).⁸ This surcharge would broadly cover our estimate of the full ring-fencing additional capital needs for the most affected banks. Although the Basel III calibration of the level of additional G-SIB capital surcharges does not take ring-fencing explicitly into consideration, the classification of G-SIBs into different risk buckets is based, among the five factors, on global cross-jurisdictional activity and bank size. These two factors are also most important in explaining the results of our analysis. Nevertheless, more simulations based on the proposed fully-fledged stress test and using different ring fencing assumptions (e.g., different severity levels of stress, testing the impact of ring-fencing behavior in different parts of the world, and including all major cross-border banks—US banks, Swiss banks, etc.) are needed to reach a better assessment of any potential capital buffer adjustments needs.

Our more comprehensive stress testing approach helps to gain a better understanding of the potential vulnerabilities of a banking group, both as a whole and relative to its parts (e.g., a specific subsidiary or region). This more detailed view of banking group vulnerabilities would be informative to both banks and regulators, who need to assess how a potential financial crisis in one country or region could affect headquarters and/or specific subsidiaries through the impact in different parts of a group. In this context, the proposed approach and illustrative results also highlights the need of more international cooperation. The establishment of a

⁸ Basel III uses an indicator based approach to group G-SIBs into four categories of systemic importance. The selected indicators reflect the size of banks, their interconnectedness, the lack of readily available substitutes or financial institution infrastructure for the services they provide, their global (cross-jurisdictional) activity and their complexity. The magnitude of additional loss absorbency under Basel III (up to 2½ percent) was established based on: (i) an expected impact approach calibrated using return on risk weighted assets (RORWA) data and a Merton Model (using equity price data); (ii) comparing the long-run economic costs and benefits of higher capital requirements; and (iii) assessing funding subsidies for G-SIBs implied from market data. Basel III's quantitative models produced a additional loss absorbency generally in the range of around 1% to 8% of risk-weighted assets, in terms of Common Equity Tier 1 equivalent, with a central tendency of around 2% to 4%. For more details see Basel Committee on Banking Supervision (2011) and Financial Stability Board (2012).

credible framework for the resolution of cross-border banking groups would help to avoid unilateral and likely more costly solutions (see IMF 2010). Without such a credible international cooperation (which includes burden sharing arrangements), larger capital buffer for international banks that take into account the potential impact of ring-fencing under certain plausible scenarios could be a second best option.

The paper is organized as follows: Section II first provides a brief summary of the state of stress testing. Section III presents the simple approach on how stress testing banking groups using both unconsolidated and consolidated balance sheet data. As an example, Section IV quantifies the importance of taking the proposed combined approach. Finally, Section IV concludes and discusses policy implications of the analysis.

II. THE RECENT EVOLUTION IN BANK STRESS TESTS

Stress tests and their application have come a long way. Yet, the crisis demonstrated that stress tests can sometimes suffer from poorly designed calibrated scenarios and omitted shocks, as well as that be based on (too) simplified methods. They can therefore produce results that provide a false view of the degree of financial stability.⁹

Even though more work is needed, some of these challenges have recently been addressed:¹⁰

- The main focus of stress testing has been expanded from solvency risk (including due to market risk) integrating liquidity and contagion risks.¹¹ Stress tests have also been improved in terms of capturing systemic aspects and (to some degree) dynamic effects, in part related to capturing non-linear effects.¹²
- Stress tests have benefited from better data: in terms of breadth, detail and quality. There is still a long way to go for analyzing global banking sector systemic risk vulnerabilities, such as contagion and interconnectivity risks (given that such exercises are often run based on public data only). Many banks disclose only their globally consolidated financial statements, which aggregate their positions across all their subsidiaries and

⁹ A notable example is the stress tests performed in Iceland just before its crisis, which did not indicate the risk in the system. Ong and Cihak (2010) analyzed at a later stage why the stress tests run before the crisis did not flag upcoming stress and showed how they could have been done differently in hindsight. See also Borio, Drehmann and Tsatsaronis (2012) for a critical review of the early warning properties of stress tests.

¹⁰ See also IMF (2012c, d) and Jobst, Ong and Schmieder (forthcoming) in this context for an overview of principles and practices in stress testing.

¹¹ At the IMF, for example, a next generation of stress tests has been developed for solvency risk (Schmieder, Pühr and Hasan, 2011) and liquidity (Schmieder et al, 2012). See IMF (2012c) for a summary of recent approaches for including interdependence among shocks and contagion issues.

¹² Feedback loops are one element that is challenging being captured (, and there have been various contributions to capture non-linear effects in the tail (see Taleb et al, 2012, for example).

branches (at home or abroad), and the information on the geographic structure of banks' operations is thus not preserved. While it is possible to overcome this obstacle using data from affiliates' host country regulators in the case of most emerging markets, this is not the case for several advanced European countries where bank level data (even summary statistics) are confidential.¹³

- A key challenge is to come up with consistent global scenarios (i.e., to know how a specific scenario would affect different countries). This was done in the case of the EU stress test 2011, for example, using a macroeconomic model. Alternatively, benchmark rules (rules of thumb) could be used to translate a macroeconomic scenario into financial risk. Hardy and Schmieder (2012) have established such rules for solvency tests and Schmieder et al (2012) for liquidity tests.

Therefore, despite various elaborations of stress testing techniques in the aftermath of the global financial crisis and the ongoing sovereign debt crisis, important challenges remain to be addressed. The current study deals with two aspects: (i) related to data, i.e., the lack of data to map international banking groups geographical presence; and (ii) the common approach of “only” using consolidated group data when stress testing banking groups.

III. A COMBINED UNCONSOLIDATED/CONSOLIDATED STRESS TEST APPROACH

The current implicit assumption of full capital and liquidity mobility within banking groups is far from trivial. This section presents a simple conceptual framework on how to take into account banking groups geographical diversifications, how to overcome current data gaps, and how to model different degree of ring fencing into the scenarios.

Conceptual framework for a combined unconsolidated/consolidated approach

As depicted in Figure 1, most of the current stress tests follow a “traditional” consolidated top-down approach using mostly consolidated bank balance sheet data. In the “best” case, this consolidated top-down approach partially takes into account the geographical structure of banking groups' business in those cases where the macroeconomic scenario includes specific foreign countries/regions assumptions/parameters when projecting profits, credit and valuation losses.

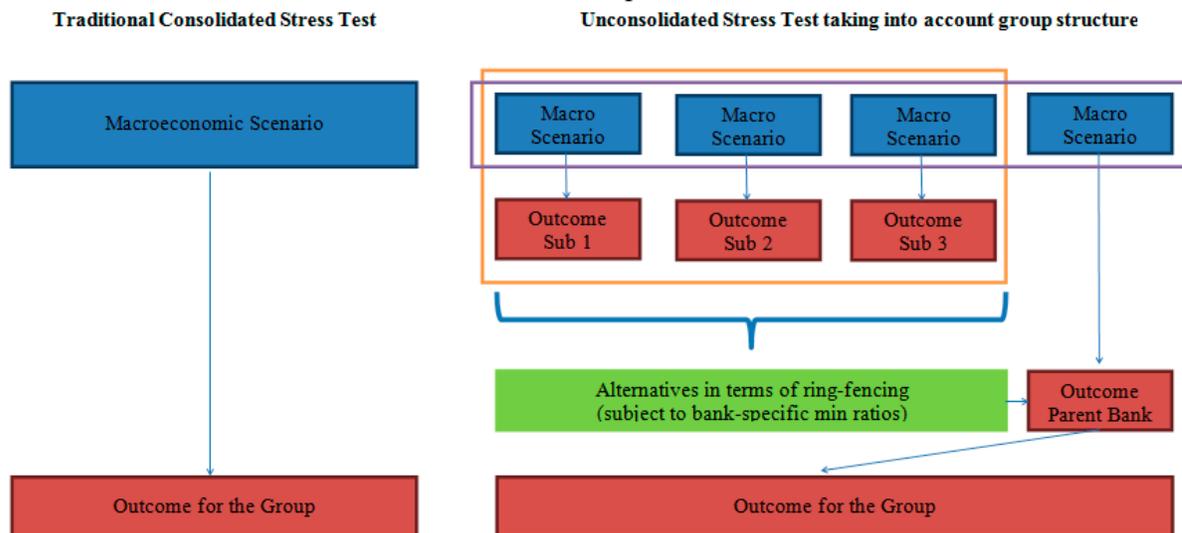
Nevertheless, this is not enough to take fully into account the geographical structure of banking groups, which could include several independent foreign-incorporated bank subsidiaries. These geographical characteristics can be incorporated into the analysis using a bottom-up approach, which we also refer to as unconsolidated approach.

¹³ See Cerutti et al (2011) for more details.

This approach explicitly treats foreign subsidiaries and the parent bank (at unconsolidated terms) as single entities.¹⁴ Take the example of the right hand side of Figure 1 of a parent bank with three subsidiaries. This shows in an illustrative manner:

- **Setup:** The unconsolidated approach allows for a more granular view of stability, but is more complex and burdensome.
- **Scenario design:** The unconsolidated approach explicitly forces one to come up with a consistent global macroeconomic scenario that is broken down to scenarios for the subsidiaries. The scenarios could also include one or more scenarios for the degree of ring-fencing (Green colored box in Figure 1). Together, this determines how the banks' business structure affects its solvency and/or liquidity position under specific circumstances.

Figure 1. Conceptual Difference between 'Traditional' Stress Test and Stress Tests taking into Account Group Structures



The key advantages of the unconsolidated approach is that it forces stress testers to go through a number of thought processes, namely (i) the design of consistent global scenario, broken down to different entities (often into scenarios for specific countries); (ii) a complete understanding of the banks' business model and how it can be affected by different shocks and policy actions; and (iii) help uncover potential policy challenges that could emerge under certain circumstances and allow, in principle, for contingency planning.

¹⁴ In some countries, especially in Latin America, the distinction between branches and subsidiaries is blurring. Foreign branches have been required to follow similar sub regulations (e.g. incorporate capital in the country, etc.). See Cerutti et al (2007) for more details.

Best practice stress tests (using granular scenarios for different geographical regions and/or business lines) will, in principle, similarly allow for the establishment of a detailed view of the risk profile of a bank (as they are based on country-specific macroeconomic scenarios and exposure data, respectively).¹⁵ However, taking a group consolidated perspective does not allow one to simulate the impact of ring-fencing. This can be a key shortcoming.

In addition to that, unconsolidated group-wide tests can also reveal the relative soundness of specific entities within a group (e.g., a subsidiary), which can inform policy-makers (see also IMF 2012a,b for more details). Bottom-up stress tests run by banks are a natural candidate for unconsolidated stress tests given that banks have access to granular data of their own businesses, while the global macroeconomic scenario (and with country-specific impact) could be established by the authorities.

Data issues

A key question is the availability of data to run a meaningful unconsolidated analysis:

- **Best Case:** The first best solution is to get actual bank data (parent bank activities and individual subsidiaries). This option is only available to banks themselves (e.g., for their own internal stress tests and as part of bottom-up stress tests) and to supervisors (provided that detailed supervisory data are provided).¹⁶
- **Available Alternative:** A second best solution is to put together publicly available data on bank subsidiaries, a burdensome job, but which substantially facilitates the understanding of a banks' business. Proxy data could be, for example, using the residual of group data and data for major subsidiaries.

Ultimately, the burden of putting together data and establishing a meaningful stress test has to be compared against the potential gain in insights one would expect. For a banking system which is mostly domestically-owned and where banks do not have foreign subsidiaries, the value-added would be rather limited. This is different when the presence of international banks is important. The consolidated approach assumes that there would be a free flow of capital and liquidity within each banking group, which is not necessarily appropriate in the presence of international banks.

¹⁵ The European stress tests (EBA 2011) simulated country-specific stress levels, for example, and applied it to the exposures banks have in certain countries. It did not consider any risks of ring-fencing.

¹⁶ The availability of supervisory data would allow for a fully-fledged implementation of the BU approach. Subsidiaries' capital and liquidity calculations could account for potential differences (e.g. risk weights) between the group level and its subsidiaries. For example, even though a host country sovereign debt could have a very low risk/high liquidity weight for a subsidiary due to local regulations, the group level risk weight of the same claim on the local government could have a much higher risk weight following an international credit agency assessment.

How to introduce ring-fencing?

After computing the impact of the macro assumptions for each subsidiary—in terms of solvency and/or liquidity, and taking into account the different national regulations (e.g., hurdle rates)—the next step is to define a set of assumptions as to how banks' profits, excess capital and/or liquidity can be transferred within the banking group (see Box 1 for arguments for and against ring-fencing; see Cerutti et al 2010 for more details). We propose three different alternatives to simulate this issue, but the final choice should be tailored to the objectives of the stress test at hand, and the severity of the scenario:¹⁷

- 1) *No ring-fencing* assumes that parent bank's profits, as well as subsidiaries' excess liquidity *and* excess capital buffers can be used to cover capital shortfall in any of the subsidiaries. With the exception that the unconsolidated approach would take into account different country regulations (e.g., minimum capital, etc.), this case is basically covered by the implicit assumptions in the current consolidated approaches.
- 2) *Partial ring-fencing* assumes that parent bank's profits and *only* subsidiaries' profits and/or excess liquidity, but not excess capital, can be re-allocated within a group.
- 3) *Full ring fencing* assumes that no transfers between any of the group's affiliates (including from the parent bank to subsidiaries) can take place.

Besides ring-fencing in a narrower sense, the scenarios could also consider limits on any profit, capital or liquidity generated by sales of assets. Parent banks could try to overcome some form of ring fencing by local authorities through selling part or all of the subsidiaries' assets. This case is especially relevant when assuming full ring-fencing. In such circumstances, the macroeconomic environment that is being modeled would be important, with significant repercussions on the asset value of banks.

The intention of local authorities to ring fence bank operations is likely to have an impact on banks' behavior, and banks may not, during periods of severe stress, be able to overcome constraints by selling subsidiaries' assets. For example, numerous banking groups (e.g. Dexia and NBG in Turkey, and BCP in Poland) were not able to quickly sell profitable subsidiaries even after publically announcing their intentions—many banks had to postpone the sale until market conditions improved. There can also be an adverse market reaction to potential fire-sales of affiliates during crises, due to the classical lemon problem linked to valuation uncertainty of assets.

¹⁷ Cerutti et al (2010) included a fourth alternative: near-complete ring-fencing, which assumed that only transfers from the parent to any of the subsidiaries are allowed as an intermediate alternative between partial and full ring fencing. Since we are not interested in the results of the stress tests for a particular subsidiary, we did not include it.

Box 1. Arguments For and Against Ring-Fencing

The arguments in favor of centralized cross-border bank structures and against ring-fencing rely on efficiency and financial stability considerations (e.g., benefits of diversification when country-specific shocks hit). From a *cross-border bank's perspective*, the ability to freely re-allocate funds across its affiliates is essential for achieving the most efficient outcome.

Similarly, a centralized cross-border bank structure may yield benefits for the *host country economies* as well. De Haas and van Lelyveld (2010), for example, show that the ability of international banks to attract liquidity and raise capital allows them to operate an internal capital market, which provides their subsidiaries with better access to capital and liquidity than what they would have been able to achieve on a stand-alone basis, and hence may help to reduce the pressure to scale back lending during economic downturns. For both home and host authorities, the absence of ring fencing facilitates diversification and can thus make the group as a whole more stable, for example, against shocks in the parent home country.

However, there are also arguments in favor of ring-fencing. For a *host country regulator*, the decision to impose ring-fencing would typically be driven by macro-financial stability considerations, such as the need to protect the domestic banking system from negative spillovers from the rest of the group, or more generally, to increase reserves for the whole domestic banking system when the magnitude of the impending output collapse and bank losses associated with a crisis abroad are uncertain. In these cases, there is a clear tradeoff between cross-border/global and host countries' objectives, especially if the latter have not been fully affected by the crisis.¹

¹/ There is not always a tradeoff between global and individual country objectives. For example, there may not be such a conflict of interest when ring-fencing/capital controls are implemented when a banking system is receiving substantial inflows in order to preserve financial stability.

IV. QUANTIFYING THE POTENTIAL BIAS OF NOT USING A COMBINED APPROACH

Using figures from the June 2011 EBA stress test, this section illustrates, with a cross-country example, potential implications if the tests had explicitly considered potential ring-fencing. As noted above, the example is meant for illustrative purposes and does not necessarily reflect the current situation of banks, many of which have raised capital and changed their legal and/or geographical structures since. Nevertheless, the magnitude of the impact can provide a benchmark of what cross-border banks might encounter under highly adverse conditions.

The base case, which implies no-ring-fencing, is given by EBA figures. Two adjustments—partial and full ring fencing—are calculated to account for the possibility that non-EU regulators ring fence the foreign deposit-taking affiliates (i.e., bank subsidiaries) in their jurisdictions.¹⁸

¹⁸ Due to data limitations, the cross-country example presented here is not a full fledged unconsolidated type of stress test exercise as proposed in the previous section. For example, EBA projections of capitalization of net

(continued...)

Facing potential spillovers from an external shock (e.g., a EU shock), a non-EU host country regulator could opt to ring fence their foreign bank affiliates, in that they could impose restrictions on intra-group cross-border transfers. This is especially important in the cases of several European banking groups that have significant diversified geographical structures, in terms of both assets and profits.

Banks' Geographical Characteristics

Even though the data released by EBA only offered a consolidated view of the banking groups, it is possible to put together a picture of the banking groups' operations inside and outside the EU by comparing publicly available balance sheet data of deposit-taking affiliates with the group consolidated statements.¹⁹

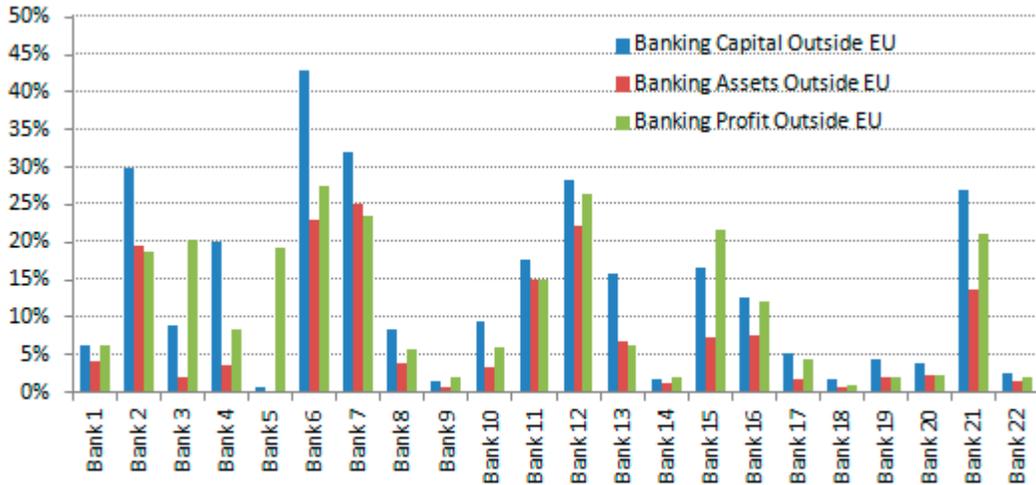
For 51 banking groups of the 91 included in the EBA June 2011 stress test, we were able to map their banking operations outside EU (See also Annex 1). Figure 2 (selected sample of 22 large and international banks, with more than EUR 100 billion and 2 percent or more profit share from outside EU) shows that there is substantial heterogeneity among large European banking groups in terms of geographical structure.²⁰ About 2/3 of the banking groups operate almost exclusively within the EU and the portion of their income (average of 2006-2010), capital and assets outside the EU are below 5 percent. On the other hand, 15 percent of the banking groups have a large presence outside the EU, with many of them having more than 20 percent of their profits and capital from bank-deposit affiliates located outside the EU. In addition, the shares of capital and income outside the EU was generally larger than the shares of assets, indicating that operations outside the EU require more capital than within the EU—which could be driven by higher capital requirements as well as by higher risks—and are also more profitable.

income are only available at the banking group aggregate, without including the breakdowns among the different parts of the group. See also footnote 21.

¹⁹ In the final analysis, the country coverage under “EU countries” includes the 27 EU member countries, plus Switzerland and Norway.

²⁰ The outside EU profits included only banking related activities (e.g. profits in affiliates that operate as banks), but not subsidiaries that perform non-banking activities, which are more difficult to ring fence. This explains why some banks have a low share of banking profits outside the EU. In addition, to reduce the impact of income volatility, we use five year 2006-10 averages of net income.

Figure 2. Banks' Geographical Distributions 1/

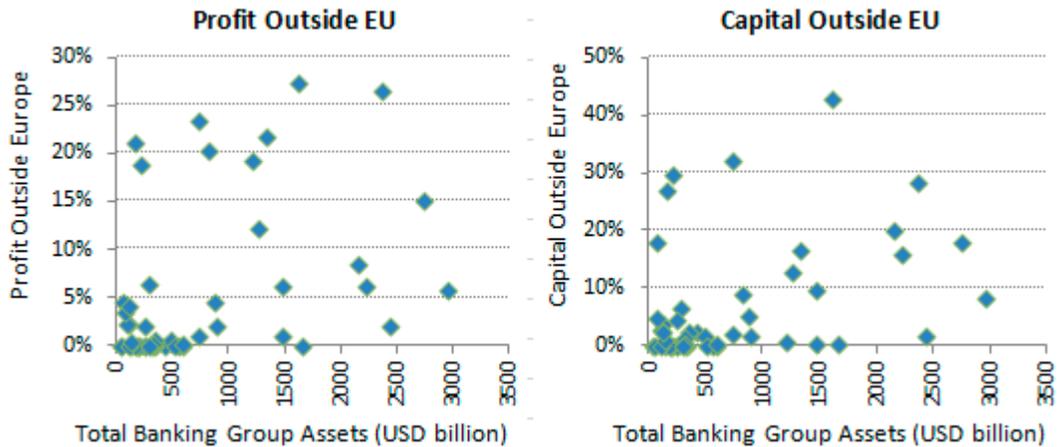


Source: Authors' estimates based on Bankscope and Central Bank data as of Dec 2009.

Note: 1/ Banking groups share of outside EU activities through deposit-taking affiliates (See Annex I for all 51 banking groups included in EBA for which we found data)

The share of non-EU activities through deposit-taking affiliates does not seem to be closely related to the home country of the parent bank. Although, for example, the large Spanish banks included in the sample have a large share of activity outside the EU, the rest of the Spanish banking system does not have a large international presence. Italian, Austrian, UK, and Greek banks also display a large heterogeneity in this respect.

Figure 3. Banks' share of Profits and Capital Outside EU 1/



Source: Authors' estimates based on Bankscope and Central Bank data as of Dec 2009.

Note: 1/ Banking groups share of outside EU activities through deposit-taking affiliates (See Annex I)

There is also no uniform pattern across banking groups if we consider size (total assets). Two clear business models though are highlighted by the data (see Figure 3). Traditional, retail-oriented banks have a more substantial presence outside the EU (i.e., about 20 percent of more of profits) than the remaining banking groups, independently of their size. And the remaining banks, which include some banks with sizeable investment business, display an overall lower share of deposit-taking affiliates' assets, profits and capital outside the EU.

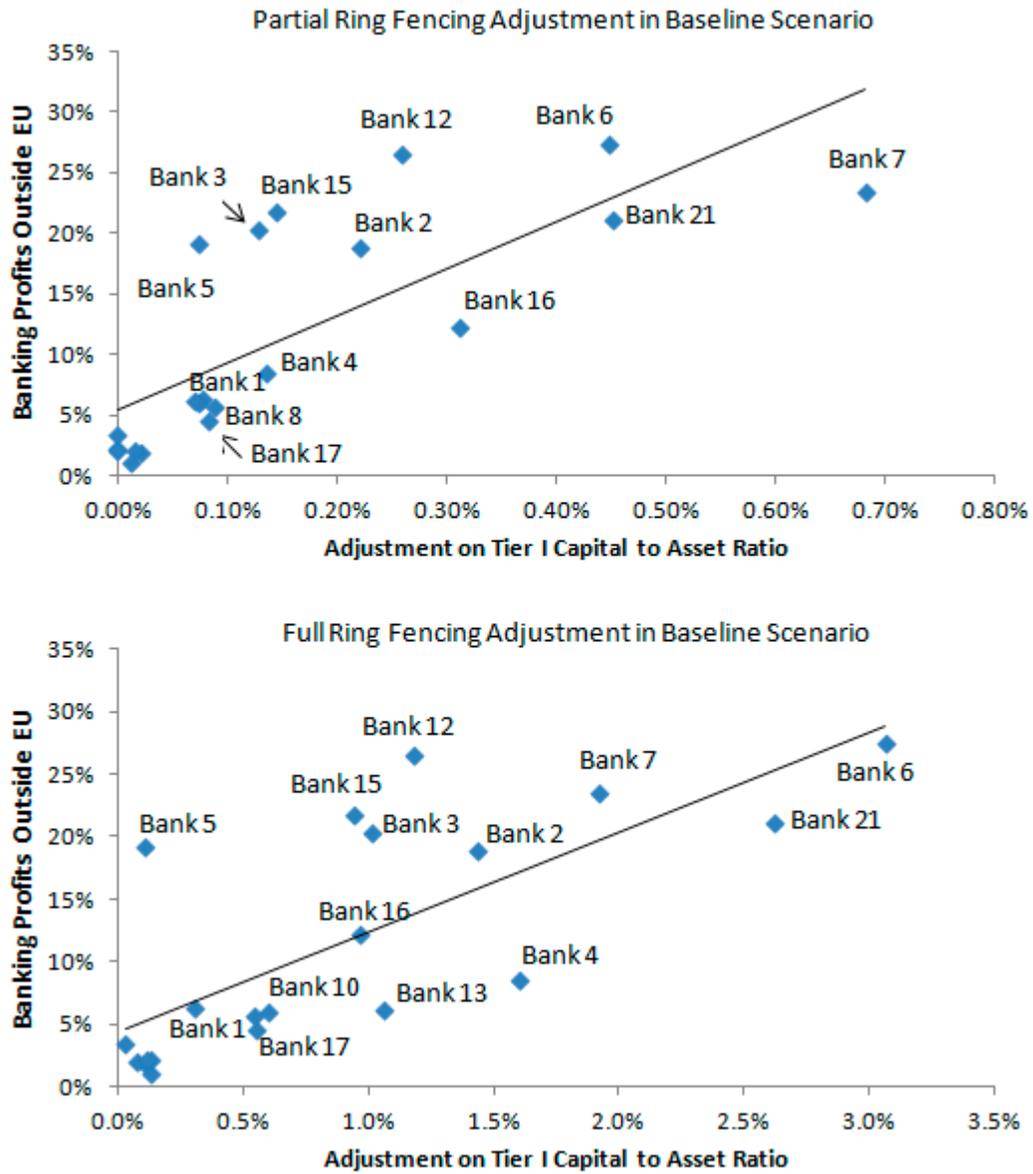
Ring Fencing Adjustment Estimates

The EBA tests provided two main projections, a baseline scenario (based on macroeconomic baseline projections by the EU Commission at that time) and a double dip scenario for a two year horizon (2011-2012). Following section III, we estimate the impact of both partial ring fencing and full ring fencing for each EBA scenario.

The *partial ring-fencing* adjustment deducts, from the EBA profit projections, the share of profits generated outside the EU. Accordingly, the results indicate that the EBA *baseline scenario* overestimates banks' core Tier I capital ratios by 0 to 0.7 percentage points (see Figure 4). This impact is a function of the share of profits from outside the EU, with the remaining heterogeneity being a function of the importance of stress test profit projections on bank capital buffers.²¹ Several banks with sizeable profit buffers partly earned outside the EU exhibit the largest adjustments to their Core Tier I capital ratios. Other banks with large shares of profit from outside the EU have relatively lower adjustments in their Tier I capital ratio (due to the fact that their profit buffer under stress is less sizeable relative to their capital buffers).

²¹ Long-term (5-year) profit averages have been used to avoid drawing conclusions based on overly favorable or unfavorable figures, which is commonly done for stress testing. Moreover, since EBA reported profit projections are only available on the aggregate, our calculations are conservative since we are adjusting the EBA projected aggregate profits as a function of our calculated bank profit share. In the current context, where the crisis center is in Europe, bank's projection of profits within Europe could be negative in several cases.

Figure 4. Partial and Full Ring Fencing Adjustments



Source: Authors' estimates based on EBA, Bankscope and Central Bank data.

This partial ring fencing context, where “only” profits cannot be re-allocated within the group, is important under the current circumstances for some countries/banks. Diversification benefits from better performing economies (especially emerging markets) are, for example, particularly relevant for banks in peripheral European countries.

The *full ring-fencing scenario* assumes that both the profits and the excess capital buffers of non-European affiliates cannot be re-allocated to Europe. The impact for the European part of

the international banking group tends to be larger than in the partial ring fencing context.²² In a full ring-fencing context, where a European parent bank cannot access the excess capital buffers of outside EU affiliates (i.e., subsidiaries) and the subsidiaries cannot be sold without incurring book losses, the adjustment could be up to 3 percent of their core Tier I capitalization in Europe (see Figure 4, bottom figure). As expected, full ring-fencing mostly affects the same banks, i.e., those with meaningful income and capital outside the EU.²³

V. CONCLUSIONS

The analysis presented in this paper is an example of how the proposed unconsolidated approach extends best practice stress tests if one seeks to gain a better understanding of risks faced by international banking groups. As shown, provided that the data are made available (first best) or proxied (second best), the outcome of unconsolidated stress tests taking into account different degrees of ring-fencing can differ considerably from “traditional” consolidated top-down stress tests. Moreover, the need for explicitly taking into account the business structure of international banks provides a better understanding of the potential vulnerabilities of the single (large) banks as such, and financial risks more generally.

What are the policy implications of this analysis? First, the establishment of a credible framework for the resolution of cross-border banking groups would help to avoid unilateral and likely more costly solutions (in terms of capital requirements). Such frameworks could reduce the incentives for, and the incidence of, ring fencing by the home/host country authorities.

Second, in the current context of non-fully-fledged resolution and burden-sharing mechanisms (even among EU members), setting minimum capital requirements for cross-border banking groups would have to take into account the potential risks of ring-fencing, especially during crisis times. More work on estimating different ring fencing scenarios across international banks is needed in order to assess the potential additional capital buffer needs and/or whether they are already covered by the Basel III proposed capital G-SIB surcharges.²⁴ These larger capital buffers—together with sound liquidity levels—would not only provide capital buffers in the

²² Theoretically, the adjustment under the full ring fencing context could imply, if a larger share of bank capital buffers are within EU than outside, that the European part of an international banking group would end up with a higher core Tier I capital ratio in the full ring-fencing calculations than in no ring-fencing.

²³ The difference in the order of banks most affected in the full ring-fencing case versus the partial ring-fencing captures the full ring-fencing assumption that capital buffers cannot be re-allocated. The ring fencing adjustments in the EBA adverse scenario projections are not much different in size from those calculated with the EBA baseline scenario figures, but the final adjusted Core Tier I capital levels in the adverse scenario are lower since both the ring-fencing adjustments and lower EBA projected profits interact together

²⁴ Although ring-fencing has not been formally included as a factor in Basel III proposed capital G-SIB surcharges, the proposed top bucket level (2½ percent additional Tier I buffer) and the fact that G-SIB classification across buckets would be a function of banks’ global cross-jurisdictional activity and bank size, implicitly accounts for both our estimated level of capital adjustment needs and two important drivers (bank size, international outreach) of ring-fencing risks.

potential presence of ring fencing, but they could also reassure host country regulators that the banking group has enough capital buffers to withstand ring fencing by other host regulators, thereby avoiding pre-emptive actions. In other words, host regulators in a country would have fewer incentives to ring fence well-capitalized foreign subsidiaries just in anticipation of what would be the impact on the banking group when other host regulators ring fence the banking group subsidiaries under their supervision.

Third, the analysis also highlights that not just the size of a banking group capital buffers is relevant but also the geographical location of those buffers within the banking group matter. The need for higher capital buffers for cross-border banking groups could be larger if some recent reform proposals, rational from individual country perspectives (e.g. separating UK retail business from the rest of the banking group and increasing capital buffers on those operations), trigger new higher levels of ring fencing—even among OECD countries. Moreover, even without a crisis, if the geographical distribution of banking groups' capital buffers changes enough (due to regulatory reforms in parent banking group countries), it is not unthinkable that (some) host country regulators might also increase subsidiaries' capital requirements (even if this involves covering both domestic and foreign banks) in order to offset significant changes in the geographical distribution of capital buffers. These elements highlight that further international cooperation is essential in order to avoid undesired outcomes.

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ANNEX I – MAPPING BANK GROUPS

Our analysis covers 51 banking groups from the EBA sample from 13 countries, and thus most of the 91 banking groups included in the June 2011 EBA stress test (See Table A.1 for summary statistics). It is based on publically available data from Bankscope and bank regulators, when available.

The geographical presence of each banking group outside EU countries was built by mapping, as of December 2009, the authorized deposit-taking institutions of several advanced and emerging countries (see list of countries below). Once the affiliates of each EBA banking groups were identified, balance sheet data were downloaded from Bankscope, and, if data was not available in there, then bank regulators websites were used as secondary source. The final coverage for foreign affiliate data was almost complete in most countries (with the exception of Algeria and Jordan). Income data on foreign branches are used when available.

EU+ Countries: Norway, Switzerland, and the 27 current EU members (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom).

Non-EU Countries: Albania, Algeria, Argentina, Armenia, Australia, Barbados, Belarus, Bolivia, Bosnia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Croatia, Dominican Republic, Egypt, El Salvador, Georgia, Guatemala, Honduras, India, Indonesia, Jamaica, Japan, Kazakhstan, Korea, Malaysia, Mexico, Morocco, New Zealand, Nicaragua, Pakistan, Panama, Paraguay, Peru, Philippines, Russia, Serbia, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uruguay, US, and Venezuela.

Table A.1 - Summary of Banking Groups Geographical Presence (51 Banking Groups)

	Minimum	Maximum	Average	St.Deviation
Total Group Assets (USD billions) 1/	43.3	2964.3	735.9	785.9
Percent of Assets outside EU 2/	0.0%	25.2%	3.5%	6.5%
Percent of Capital outside EU 2/	0.0%	43.0%	6.5%	10.3%
Percent of Profits outside EU 2/ 3/	0.0%	27.4%	5.3%	8.2%

Source: Authors' estimates based on Bankscope and Central Bank data

1/ Bank Group Assets as of Dec 2009

2/ Share of total asset/capital/profits located in deposit-taking affiliates operating in selected OECD and Emerging countries.

3/ Based on 2006-2010 average.