



UNITED KINGDOM

SPILOVER REPORT FOR THE 2011 ARTICLE IV CONSULTATION AND SUPPLEMENTARY INFORMATION

The **Spillover Report** and **Supplementary Information** on the United Kingdom were prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. They are based on the information available at the time they were completed on July 11, 2011 and July 14, 2011, respectively. The views expressed in these documents are those of the staff team and do not necessarily reflect the views of the government of the United Kingdom or the Executive Board of the IMF.

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July 11, 2011

KEY POINTS

Issues. Spillover reports explore the external effects of policies in systemic economies, focusing on concerns raised by key partners. In the case of the U.K., these mainly relate to (i) the extent to which the financial sector might be a source or conduit of shocks to the rest of the world, (ii) the impact of U.K. supervision and regulatory policies on efforts to strengthen global financial stability.

Findings. The main messages flowing from staff analysis are:

- **The size and interconnectedness of the U.K. financial sector make it a powerful originator, transmitter, and potential dampener of global shocks.** The U.K. agglomerates core international financial functions making it a key node in “funding” liquidity and balance sheet hedging, providing buoyancy to global markets and acting as a key channel transmitting shocks or stabilizing measures.
- **The stability and efficiency of the U.K. financial sector is therefore a global public good, requiring the highest quality supervision and regulation.** Significant efforts to strengthen supervision will help contain the risks to global stability posed by the sector’s size and complexity. Stronger liquidity, capital and leverage rules should dampen credit cycles and lower systemic risk, as can the U.K.’s macroprudential policies.
- **International co-operation is critical if the U.K. is to fulfill its potential to support global stability.** U.K. financial stability will be weakened (with adverse spillovers) if EU rules constrain U.K. financial regulations at insufficiently ambitious levels or if they limit the ability to use macro-prudential instruments to address emerging risks. Cooperation (both within and outside the EU) would help limit regulatory arbitrage, while development of cross-border resolution frameworks can limit shock propagation through the U.K. if tail risks materialize. Effective home-host co-ordination would also reduce the risk of fragmented pools of liquidity hampering parent banks’ ability to support branches/subsidiaries in periods of stress.
- **The U.K. authorities can make a significant contribution to the surveillance of global systemic risks.** The size and role of the U.K. financial sector puts them at an informational advantage, although data gaps and resources pose challenges.

Approved By
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The report was prepared under the guidance of David Marston by a staff team led by Isabelle Mateos y Lago and comprising Gavin Gray and Alvaro Piris, as well as Irena Asmundson, Manuela Goretti, and Karim Youssef (all SPR), Marta Ruiz Arranz (EUR), Vanessa Le Leslé, Katharine Seal, and Manmohan Singh (all MCM). Additional inputs were provided by Trung Bui, Malika Pant, Silvia Sgherri, and Francis Vitek (all SPR), Siret Dinc, Mohamed Norat, and Christine Sampic (all MCM), Eugenio Cerrutti (RES), and Sean Kerr (LEG).

SPILLOVER REPORTS?

Spillover reports examine the external effects of domestic policies in five systemic economies, i.e., the S5, comprising China, Euro Area, Japan, United Kingdom, and the United States. The mere existence of external effects does not imply that policy modifications or collective action is needed—that depends on many considerations, including the presence of economic externalities. The aim rather is to stimulate discussion, providing a global perspective for policy advice in Article IV discussions and input for the Fund’s broader multilateral surveillance. In each case, key partners are asked about outward spillovers from the economy in question, on the basis of which staff choose issues for analysis. To facilitate candor, spillover reports do not cite who raises a specific issue. For this report, the consulted were officials and analysts from the other S5 and from selected financial centers—Brazil, Hong Kong SAR, India, Indonesia, Korea, Mexico, Poland, Russia, Singapore, Thailand and U.A.E.

This report does not try to capture the full extent of the influence of the United Kingdom on the world economy. Rather, it focuses on a few forward-looking issues raised by partners, brings to bear relevant analysis, and describes the reactions of the U.K. authorities. Technical papers underlying the analysis can be found in the Supplement to this paper. A separate forthcoming report summarizes the themes emerging from discussions with the S5.

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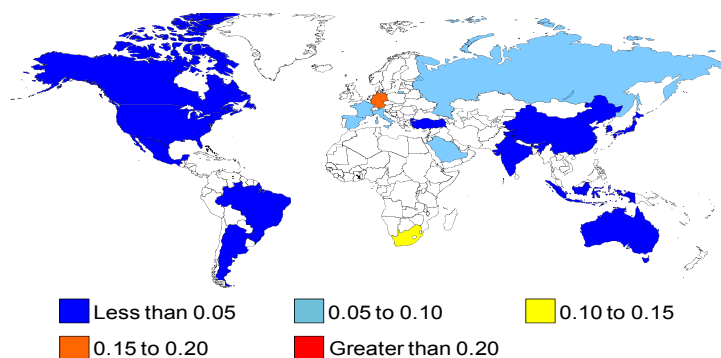
I. CONTEXT

1. **This report examines the systemic impact of the U.K.'s economic and financial sector policies on the global economy.** The U.K.'s potential for spillovers is concentrated in the financial sector. Though the U.K. is the fifth largest economy in the world at about 4 percent of global GDP the potential for systemic spillovers from the real economy is limited despite the economy's comparative openness to trade. This is not to deny that real spillovers to a number of close partner economies could be significant.

2. **Growth spillovers to the other S5 economies are moderate and concentrated on the euro-area in normal times.** Spillovers to other G20 economies also appear moderate

(see Supplement, notes VI and VII). A structural model suggests that the peak impulse responses of output to a range of shocks in the U.K. tend to increase with geographical proximity to the U.K., and is larger for financial shocks than for real shocks. The highest dependence is exhibited by Germany and France, reflecting their strong trade linkages, and there is also

Figure 1. Average Peak Impulse Response (Relative to United Kingdom)



some impact on South Africa (see Figure 1). A sharp but contained increase in U.K. sovereign bond yields—a scenario simulated across the spillover reports for advanced economies—would likely have only a limited impact on bond yields and growth elsewhere (see Supplement, Note VIII). The Article IV staff report suggests that the government's fiscal consolidation plan has significantly reduced the risk of such an event.

3. **Spillovers could be much greater for a range of non-systemic economies that are heavily dependent on trade with the U.K.** Model results are unavailable for these countries, but their high share of exports destined for the U.K. suggests they could face sizable spillovers. Examples include Ireland, Iceland, Norway, and much of the Commonwealth. Spillovers through transfers are also likely to be significant to low income countries (LICs), particularly in sub-Saharan Africa (SSA), which derive around 10 percent of their aid and remittances from the U.K. (See annex 1).

4. **The more substantial systemic spillovers are expected to arise from U.K. financial sector developments and policies.**¹ The remainder of the report lays out the channels through which U.K. markets, institutions, and policies influence the rest of the world, seen both from staff’s analysis, U.K. partners’ concerns, and the authorities’ reactions.

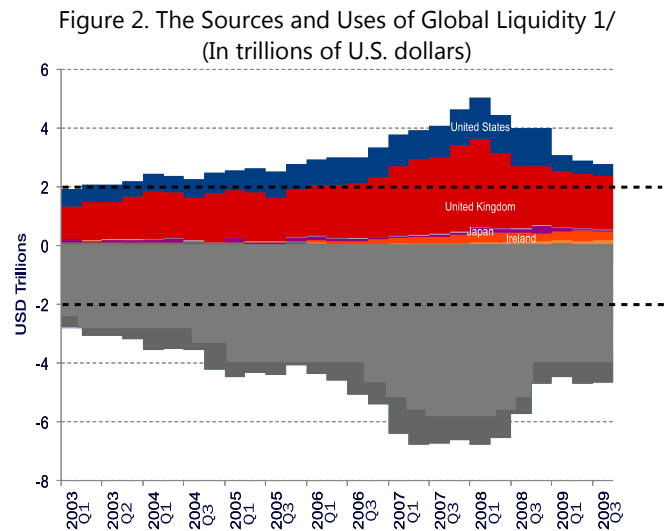
II. THE U.K. FINANCIAL SECTOR’S SYSTEMIC ROLE

Size and role

5. **The U.K. lies at the center of global finance, with U.K.-based banks playing a leading role in global financial intermediation.** It ranks third world-wide in terms of external assets, which are mostly loans, debt securities and derivatives. This reflects U.K.-based banks’ domination of cross-border lending, particularly to other financial institutions (See Supplement, Note I). The U.K. also hosts critical markets and financial infrastructure. It is the center of global foreign exchange (37 percent of global turnover) and money markets (Libor market) and the dominant location for trading international bonds² and derivatives. (see Figure 3 and Supplement, Note II) This agglomeration of financial services has encouraged the development of trading platforms and supporting infrastructure including FX clearing and settlement systems, and the world’s largest central counterparties (CCPs).

High capacity to transmit shocks

6. **The size and role of the U.K. financial system in global intermediation make it a potent originator and transmitter of shocks to the global system.** The U.K. is a significant generator of “funding” globally (See Supplement, notes III to V) and contributor to the buoyancy of global markets. Figure 2, which shows net liquidity creation/import by banks based in a country as opposed to groupwide (such that a positive balance implies that global banks based in a country export funding to the rest of the world), indicates that U.K.-based institutions accounted for



¹ Like the companion FSSA, this report takes a broad definition of the U.K. financial sector, financial institutions based in the U.K.—whether U.K. owned or not—as well as the operations of subsidiaries and branches of U.K. banks abroad.

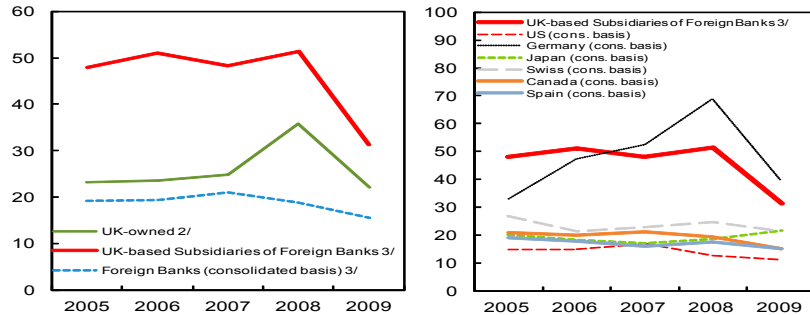
² This includes non-dollar government bonds as well as Eurobonds of all currencies.

more than half of global funding generation during the boom, implying that a shock to their activity would have large global repercussions.³ This owes in part to the broad capacity to rehypothecate collateral in the U.K., which helps generate leverage and transmit liquidity through the financial system (see U.K. FSSA update).

7. In supporting this generation of liquidity, foreign-owned banks in the U.K. leverage their balance sheets, but in their deleveraging transmit shocks. The tendency

for foreign-owned banks to be more leveraged than domestic institutions is true in most countries. The difference in the U.K. is the size of their balance sheets and degree of leverage: during 2005–07 foreign subsidiaries in the U.K. operated at leverage levels roughly double that of the consolidated group, on account of their tilt toward investment banking and derivatives activity (Figure 4). Conversely, in 2008–09, foreign-owned banks reduced their leverage ratios more quickly, showing higher procyclicality in the downturn than domestic institutions (Supplement, Note V).

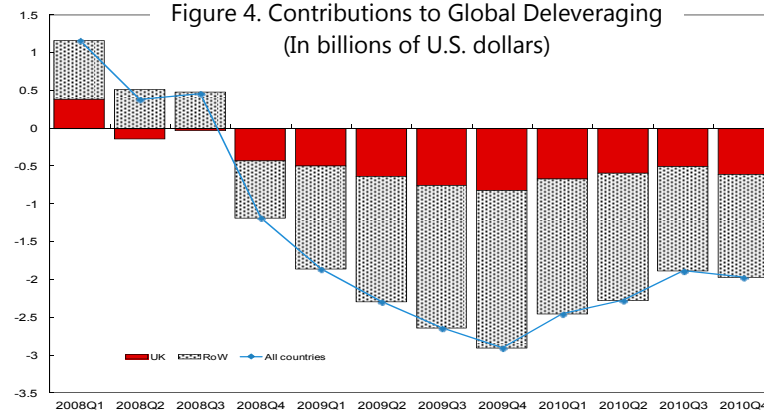
Figure 3. Leverage, 2005–2009 1/



1/ Leverage defined as (Total assets)/(Total Capital).
 2/ Sample includes Alliance & Leicester, Barclays, Bradford & Bingley, HBOS, HSBC, Lloyds, Northern Rock, RBS, Standard Chartered (excludes foreign subsidiaries).
 3/ Sample includes Canadian banks (RBC, TD Bank), German Banks (Deutsche Bank), Japanese banks (Daiwa, Mitsubishi UFJ, Nomura), Spanish banks (Santander), Swiss banks (Credit Suisse), and US banks (American Express, Capital One, Goldman Sachs, JP Morgan/Citigroup, Merrill Lynch/Bank of America, Morgan Stanley).

Sources: Bankscope and staff own estimates.

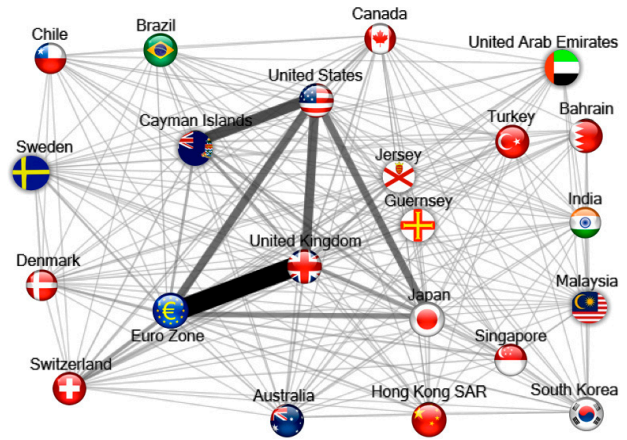
Figure 4. Contributions to Global Deleveraging (In billions of U.S. dollars)



³ Owing to data limitations, this approach does not take into account the impact of the overseas activities of U.K. banks on global liquidity (see Supplement, Note IV for details).

8. **The global transmission consequent on this deleveraging derives from the high degree of interconnectedness of the U.K. with the rest of the world—particularly Europe.** A standard approach to network analysis based on BIS data on international claims shows the U.K.'s links are strongest with the Eurozone, but still significant with the U.S., Cayman Islands (a key offshore center for U.S. banks) and Japan, and smaller financial centers (Figure 5).⁴ The results are driven by business models of the large international banks many of which rely on U.K.-based entities to intermediate global flows, in particular those between the U.S. and the EU (Supplement, Note V).

Figure 5. Propagation of Shocks

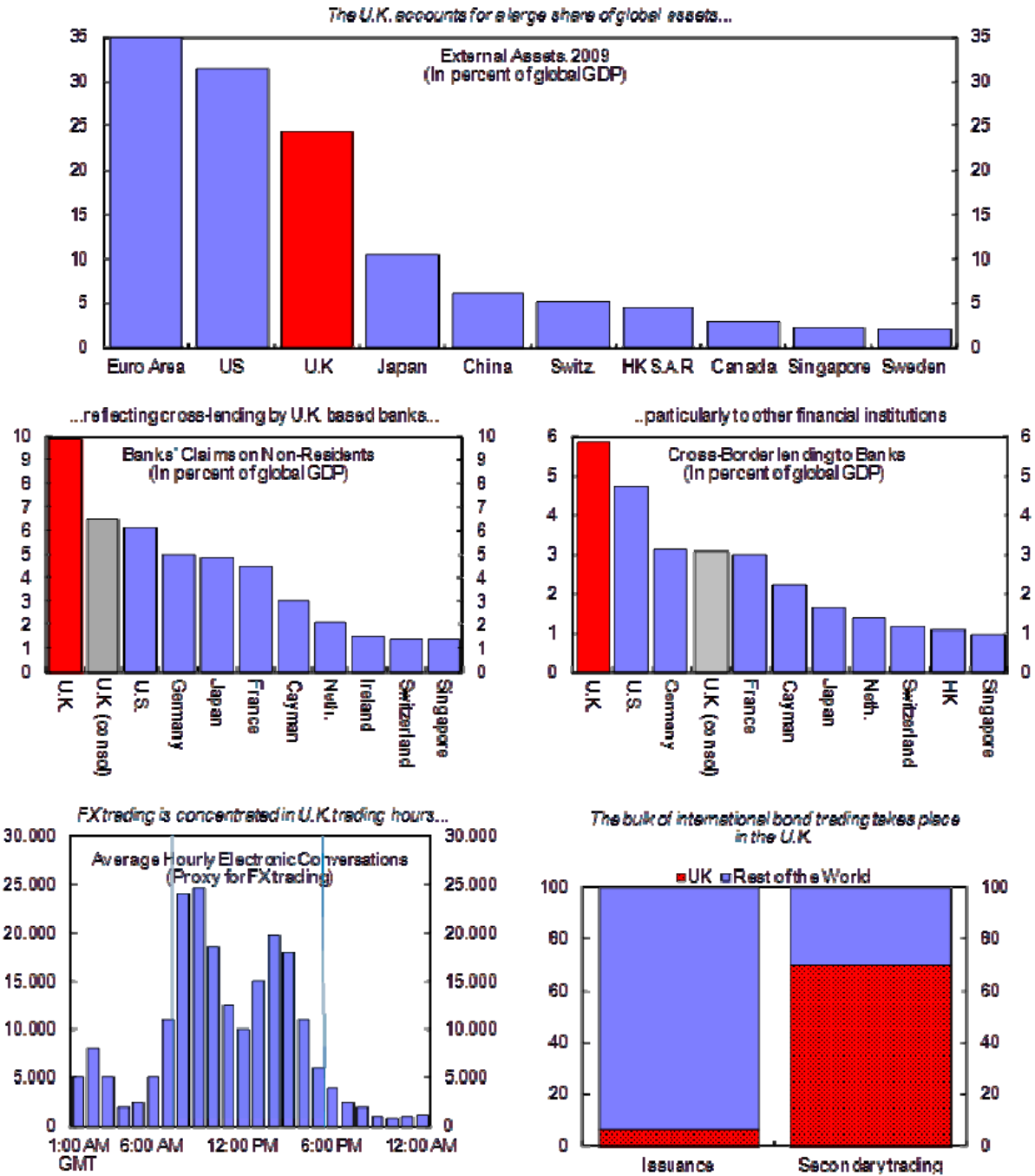


9. **U.K.-based banks deleveraged early, and accounted for 27 percent of the decline in cross-border lending through the first half of 2009 (Figure 6).**⁵ Simulation analysis (see Supplement, Note IX) suggests that such shocks are likely to have a severe effect on countries that depend on the U.K. for short-term funding, particularly financial centers (Hong Kong, Luxemburg and Cyprus). There is also likely to be a large impact on other EU states. Ireland is the most extreme case, with "upstream exposure" (a measure of countries' vulnerabilities to rollover risks from direct cross-border bank lending, and lending by foreign affiliates) to the U.K. exceeding 50 percent of its GDP. But exposure is also significant (5-10 percent of GDP) for large Euro-Area countries such as France and Spain.

⁴ See Understanding Financial Interconnectedness (2010) for further elaboration on the methodology. Espinosa-Vega and Sole (2010) illustrates how financial interconnections can amplify shocks through successive reductions in funding.

⁵ See Hoggarth, Mahadeva and Martin (2010).

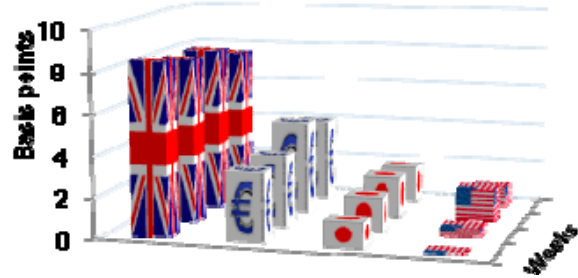
Figure 6. U.K. Financial Sector: Size and Role



Sources: Balance of Payments Data, BIS, and Fund Staff Calculations.

10. **The bond market represents an additional important channel of transmission of financial shocks.** Structural Vector Autoregression (SVAR) results for 10-year government bond yields point to a significant role of the U.K. bond market: more than 50 percent of the initial yield shock in the U.K. spills over to euro area yields, and to a smaller extent to the U.S. and Japan (Figure 7). Given the finding reported above regarding spillovers from a U.K. sovereign shock (paragraph 2), this result is driven by the large volumes of non-UK sovereign bonds traded in London. Equity market spillovers, while significant, are found to be smaller and less persistent. (Supplement, Note VI)

**Figure 7. Bond Market Spillovers
(10-year bond yield, 2000-2009, weekly, eop)**

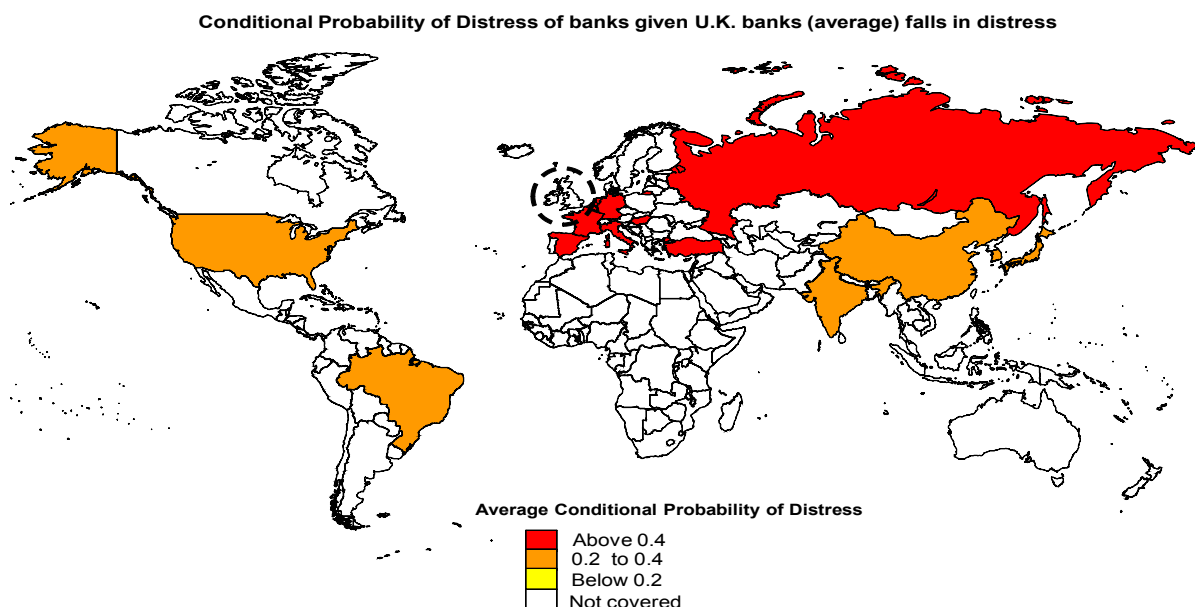


Impact of shocks from the U.K.

11. **A shock originating in the U.K. would similarly have sizeable cross-border effects, particularly on global financial centers.**⁶ Changes to the perceived creditworthiness of U.K.-owned banks, proxied by CDS spreads, might lead to spillovers on financial institutions that either trade with them or are seen as having similar business models. The relationship can be quantified through a conditional probability of distress (CoPoD) approach, which examines how shocks to the CDS spreads of one bank in the U.K. impact those of financial institutions elsewhere (Figure 8 and Supplement, Note X).

⁶ Hoggarth et al (ibid).

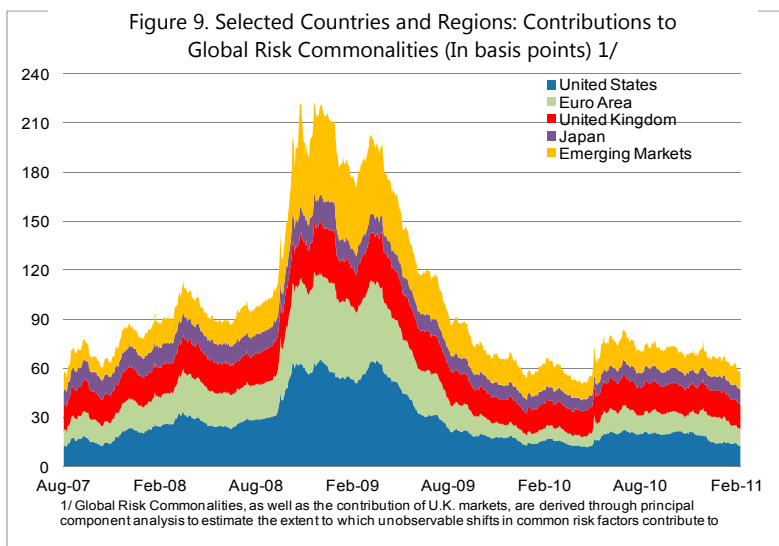
Figure 8. Conditional Probability of Distress of Banks Given U.K. Banks (average) Falls in Distress



The CoPoD analysis confirms that the larger global U.K.-owned banks have a substantial impact on the rest of the world, exceeding that of more domestically focused institutions. They have greatest spillovers on financial institutions in the Euro-Area and emerging Europe, with less of an effect on Latin America or Asia.

12. Shocks from the U.K. have also had a large impact on measures of global financial market risk, explaining around a quarter of its movements

(Figure 9). The weight of the U.K. is as large as that of the Euro-Area, and only slightly smaller than the U.S. The U.K. interbank and stock market seem to exhibit significant volatility spillovers vis-à-vis corresponding asset markets in the U.S. and to a lesser extent the Euro Area (despite, as noted above, smaller level effects in equity markets). It may be noted that this analysis reflects the U.K.'s role both as a *transmitter* of shocks and an *originator* (see Supplement, Note XI).



III. PARTNER CONCERNS

13. The U.K.'s potential to transmit shocks and to contribute to global financial stability is recognized in other financial centers. Many of them suffered liquidity drains

from U.K.-based banks during the recent global crisis. Some financial institutions that had ready access to the U.K. interbank market when liquidity was buoyant were forced to deleverage when their credit lines were cut. Strengthened supervision and tighter regulation in the U.K. were thought likely to contribute to efforts to strengthen global financial stability. Over and above the U.K.'s own policies, interlocutors also recognized the role played by the U.K. in forging the intellectual case for ambitious global financial reforms. Outside financial centers, however, some did not see any exceptionality in the U.K. financial sector and downplayed its impact on Europe and the rest of the world.

14. **Foreign regulators did not feel that the U.K. should draw back from reform for fear of losing business to other jurisdictions.** Most thought that the pull factor of strong emerging market growth was the major explanation for the rising share of financial activity in Asia, with push factors such as regulatory changes of secondary importance. The agglomeration effects binding financial institutions to the U.K. were seen as powerful, and so the U.K. could contribute to global stability without unduly undermining its competitive position. However, market participants warned that should the U.K. exceed materially Basel III and other international regulatory agreements, some might consider the possibility of moving activities outside of the U.K. A number of interlocutors were concerned that measures to address too important to fail (TITF) institutions—such as ring-fencing of capital, liquidity or retail operations—could strengthen stability in the U.K. at the expense of other jurisdictions as improving resolvability of the U.K. entity does not necessarily improve resolvability of the whole entity, could limit resources available to solve problems elsewhere in the group, and create trapped pools of liquidity.

IV. POLICY SPILLOVERS

15. **The U.K. has embarked on a major financial sector reform program—that could have important spillovers, at least transitionally.** The effort is domestically focused, but aligned with the imperatives of global stability. Reforms range across supervision, regulation (including liquidity and capital buffers), and TITF policies. As these reforms impact all “U.K.-based intermediaries”, they affect the business models that use the U.K. for global asset and liability management. The scale and nature of policy spillovers from the U.K. however will be influenced by the policies of other jurisdictions. Uncertainty about the latter—in particular how the EU will go about implementing Basel III (under a new directive “CRD4”)—creates uncertainties about the extent of spillovers from U.K. policies.

16. **Event studies suggest that markets have been keenly aware of the potential cross-border impact of regulatory changes in the U.K.** A systemic risk survey compiled by the Bank of England in the immediate wake of the crisis indicated that financial institutions

saw regulatory and accounting changes as among the top five risks to the U.K. financial system, and one of the two hardest risks for them to manage.⁷ While LIBOR-OIS, a common indicator of liquidity risk, did not immediately react to announcements on changes in U.K. regulation on liquidity standards, other risk measures moved sharply.⁸ The average price to book value of systemically important financial institutions (SIFIs) with a universal banking and investment banking business model relative to their home country index fell sharply on key dates coinciding with announcements or changes in the U.K.'s liquidity regulations (See Supplement, Note XII). A similar effect is seen in the price of hedging against tail risk in key currencies used by global SIFIs in intermediation of most markets via the U.K.

Prudential Oversight

17. **Reforms to strengthen supervision will critically help contain the risks to global stability arising from the size and complexity of the U.K. financial sector.** The build-up of systemic risks in the mid-2000s, including the rise of the shadow banking sector, was possible in part due to the U.K.'s "light touch" supervisory approach. In response, the authorities have begun to increase the resources devoted to supervision and strengthen stress testing, with further efforts required. Maintaining and building upon these improvements should help contain the risk of distress in U.K.-based banks and potential collateral damage abroad.

18. **Strong supervision of CCPs is particularly important if tail risks are to be contained.**⁹ If soundly run and regulated, CCPs could both lower and make more transparent the level of risk in derivatives (See Supplement, Note II). But CCPs also represent large risk nodes, that could face severe liquidity needs and potential losses if a large market participant were to default. Such a situation, if mishandled, could have systemic implications. Establishing an appropriate resolution framework, while ensuring that CCPs have adequate risk management and access to sufficient liquidity during crises will support these efforts.

⁷ Bank of England Quarterly Bulletin, 2009 Q3.

⁸ As suggested in the Bank of England Quarterly Bulletin (2009, Q4), this may be the result of Libor fixings being less indicative of actual transacted rates between banks and as such underestimating true cost of funding.

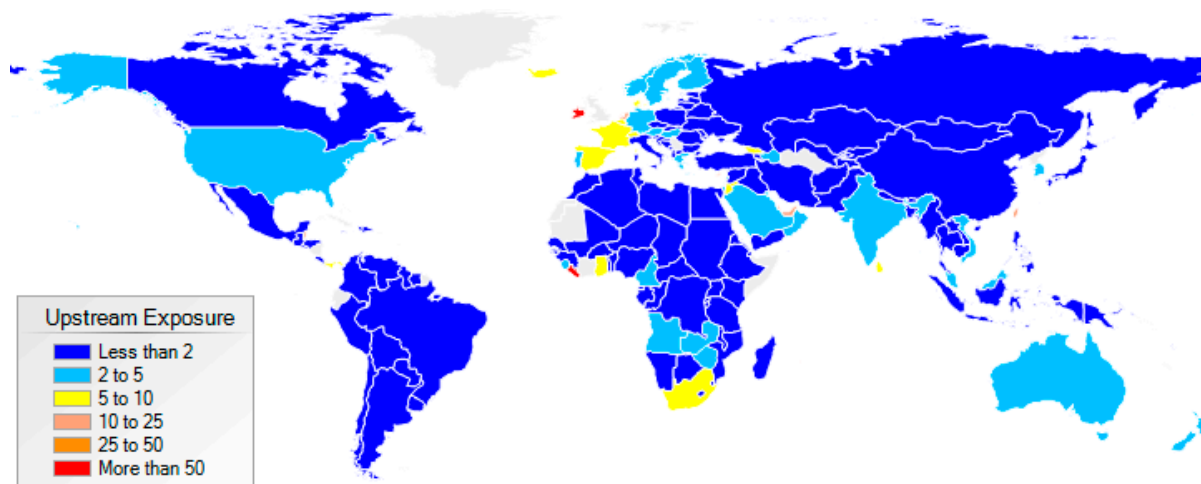
⁹ Adequate regulation and supervision of other critical pieces of market infrastructure is also essential to prevent adverse spillovers. This includes, for instance, CHAPS, the U.K.'s real-time gross settlement system, which provides settlement services for CLS (one of the key global clearers of forex payments).

Liquidity and leverage

19. **The tightening of U.K. liquidity rules will constrain SIFIs, dampen the credit cycle, and should help lower systemic risks.** The new, tougher approach in the U.K. approximates the liquidity coverage ratio (LCR) in Basel III, but the range of assets classified as liquid is narrower, and the required “stress survival period” at three months is longer.¹⁰ Maintaining liquid buffers in several jurisdictions, including the U.K, may raise the aggregate costs of liquidity for SIFIs. The rules regarding intra-group relationships have also been tightened, with supervisors factoring them into assessments of liquidity only if the entity can demonstrate reliable access to group resources. In principle, the new rules should help lower the probability and severity of possible future global crises, although the magnitude of this effect is hard to quantify, and seems subject to diminishing returns.¹¹

20. **Such rules, while key to domestic and global stability, may also accelerate deleveraging, increase intermediation spreads, and lead to tighter credit standards.** An assessment of upstream exposure, highlights very significant levels of funding dependence for a number of key jurisdictions (Figure 10). As it excludes (due to data constraints) dependence that arises from branches and subsidiaries, it provides a lower bound on the impact of a funding shock.

Figure 10. Upstream Exposure to U.K. Banks (in percent of GDP), September 2010



¹⁰ Supervisors are also applying stress tests (using firm-specific and market-wide shocks) to review firms’ own assessments of liquidity needs.

¹¹ See BCBS (2010).

21. **An unintended consequence of the U.K.'s pursuit of self-sufficiency in liquidity could be the emergence of trapped pools of liquidity, potentially detrimental to global financial stability.** If the U.K. tightens liquidity standards and other regulators follow suit, it could become more complicated for global SIFIs to protect subsidiaries in the event of shocks. This risk may be mitigated, however, if in co-ordination with home supervisors, U.K. supervisors exercise discretion and modify liquidity requirements in recognition of reliable access to group resources.

22. **If imposed, a cap on leverage interacting with the policy intention of increased "self-sufficiency" of U.K. based institutions, could also lower risks.** The Basel III agreement assumes that limits on the leverage ratio would enter into force in 2019, although it is unclear if the EU will include this measure in CRD4. If introduced in the U.K., it could limit procyclical expansions in leverage and impose efficiency costs on SIFIs funding themselves through intra-group transactions. However, the impact would depend upon how it is defined and calibrated, in particular whether it is applied at the solo level, as well as to consolidated balance sheets. The former approach could have a more powerful effect by capturing intra-group transactions. A cap on on-balance sheet leverage might also provide an incentive to financial institutions to increase their reliance on off-balance sheet funding sources (Supplement, Note V).

Capital

23. **Given the size of balance sheets in the U.K., increased capital requirements could also contribute to global financial stability.** As is the case for liquidity, increasing capital buffers should lower the risk of and size of crises, although the impact will depend upon whether they are applied at the solo or consolidated level.¹² Increased capital requirements could also carry benefits in normal times by dampening shocks transmitted by the U.K. financial sector and lowering the volatility of output.¹³ New capital requirements for globally important SIFIs will apply to the nodes in the financial network that can most rapidly propagate—or potentially ameliorate—the impact of shocks.

24. **The output costs arising from higher capital requirements in the U.K. are likely to be modest and possibly transitory as banks adjust to the new standards.** They arise from deleveraging, increased intermediation spreads and a tightening in credit standards, mitigated by changes in bank behavior (Figure 11, see Supplement, Note XIII). Simulations

¹² BCBS (Ibid)

¹³ BCBS (Ibid) estimates that a 2 percentage point increase in capital ratios in the U.S. or Euro-Area would lead to 2 percent reduction in the standard deviation of output.

using a macroeconomic model indicate that a 1 percent increase in required capital (if implemented over two years) leads to output losses in the rest of the world that peak at 0.06 percent (this impact does not include the effects of possible offsetting monetary policy reactions). This impact is modest, though large relative to the U.K.'s share of global output. Non-investment grade borrowers, such as some emerging market or mid-sized corporates, could see their funding costs rise due to higher capital requirements on trading books, which are heavily concentrated in the U.K.

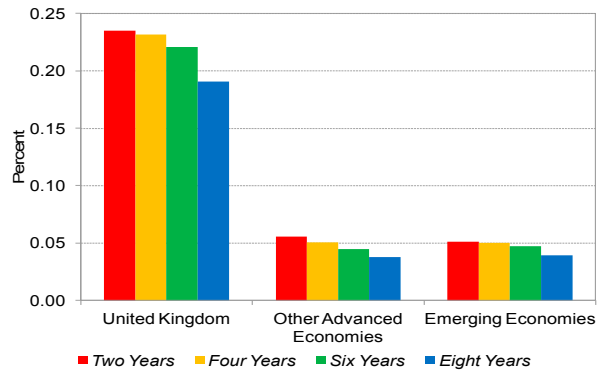


Figure 11. Output Losses from 1% Capital Increase

Macroprudential policies

25. **The U.K. also seems well placed to contribute to the implementation of global macroprudential policies.** The Financial Policy Committee (FPC), the body set up to implement macroprudential policies in the U.K., while having a mandate focused on domestic financial stability, is expected to consider the outward spillovers of its decisions, in particular possible feedback effects on the U.K. financial system.¹⁴ The FPC will be responsible for the U.K. implementation of the Basel III agreement on a countercyclical capital buffer (the only instrument on which there is international agreement so far), which will provide banks with more capital to withstand potential losses after a credit bubble.

26. **The FPC can deliver this role through “jurisdictional reciprocity”, a process for ensuring that macroprudential policies are not arbitrated.** As credit cycles vary sharply across economies, so will appropriate macroprudential standards in each jurisdiction. Any authority opting to apply measures to credit exposures will inform foreign counterparts so they ensure that their banks apply them to relevant exposures. The U.K.'s involvement in this process, whether for credit cycle risks or other systemic issues, would help ensure that internationally active banks do not, for instance, circumvent rules in one country by booking transactions through the U.K.

¹⁴ The FPC will also analyze financial sector vulnerabilities more generally, and make proposals on information gathering or microprudential measures complementing macroprudential policies.

Managing Tail Risks: TITF institutions and Cross-border resolution

27. **A number of U.K. initiatives to address tail risks could have spillover effects.** A requirement that banks develop recovery and resolution plans (RRPs, also known as living wills) could help reduce the risks in the event that a complex institution fails and needs to be broken up. If adopted, the recommendations of the interim report of the Independent Commission on Banking could also have a significant impact on the capital requirements and organization of some internationally active U.K. banks.

28. **However, the absence of an effective cross-border resolution framework raises particular concerns that U.K.-based institutions could propagate shocks in situations of stress.** At present, EU regulations governing the “single market” and “passporting” arrangements limit the options for the U.K. (and other member states) to regulate and supervise U.K. banks that are branches of banks headquartered elsewhere in the EU. Thus, if a parent experiences distress, there is a risk of its U.K.-based branches causing disruption, and vice versa. The present system of “home country” control and resolution does not provide effective incentives for cross-border supervision and resolution, because the absence of ex ante burden sharing arrangements could induce home authorities to neglect prudential developments in other member states. This is a particular issue for the U.K. because it is host to so many branches¹⁵, over which the authorities have limited powers. Nevertheless, it would be hard for the authorities to exercise restraint in the case of an inadequate response by home states. The absence of harmonized resolution frameworks, within or beyond the EU, may induce the U.K. to ring-fence in times of crisis resulting in a suboptimal resolution for groups, exacerbating spillovers.¹⁶

29. **New spillover effects could emerge if the U.K. becomes a base for financial innovation to arbitrage new global regulations.** Its track record at creating new financial products, facilitated by the clustering of services and the depth of markets, makes it a natural location for such activity. New risks might arise if, for example, provisions in the U.S. Dodd-Frank act encouraging the spin-off of proprietary trading and derivatives activity; cross-border differences in margin requirements for derivative trades not cleared through

¹⁵ The U.K. authorities have, by contrast, full powers to resolve foreign subsidiaries.

¹⁶ A recent proposal from the European Commission could alleviate some of these concerns. It would harmonize EU Member States’ legal and institutional arrangements for managing banking crises, bringing closer an integrated framework for crisis prevention, management and resolution.

CCPs; or, differences in the cross-border application of leverage limits, leads to the riskiest activity re-emerging in London¹⁷ (see U.S. spillover report for evidence of such risk).

V. FACTORS DAMPENING OR MODIFYING FINANCIAL-SECTOR SPILLOVERS

30. **Spillovers could be dampened if financial activity progressively moved to other jurisdictions.** Strong economic growth in emerging markets is spurring a shift in global financial activity, particularly to Asia. This trend could be amplified by a prolonged period of uncertainty about U.K. financial sector policies, or if eventual taxation and regulatory decisions drive a large wedge between operating costs in the U.K. and those of other jurisdictions. A fragmentation of SIFIs' activities would diminish the share of global intermediation falling in the U.K. regulatory net, lead to risks falling between the regulatory cracks if other regulators do not widen the regulatory perimeter or developing a comprehensive view of complex institutions becomes more difficult, and complicate the U.K. authorities' efforts to assess global systemic risks.

31. **However, powerful agglomeration effects underpin the U.K.'s competitive position, reducing the incentives to relocate.** The academic literature finds that financial centers are created by clustering effects because of the positive externalities from information sharing and proximity to customers¹⁸; in the U.K.'s case, further externalities arise from market infrastructure and the availability of skilled labor. The few examples of precipitous declines in financial centers have resulted either from severe political instability or a shift in activities from regions to national capitals, rather than regulatory change. So far, no SIFIs have moved out of the U.K., with relocation to date limited largely to hedge funds going to Switzerland. While the U.K. will probably lose market share to fast-growing emerging markets, the pace could be slow, and will depend upon the extent to which any tightening in regulation is matched by other jurisdictions.

32. **Insufficiently strong or insufficiently flexible EU rules would also hinder U.K. efforts to strengthen financial sector regulations, leading to potentially larger spillovers.**¹⁹ If CRD4 requires common regulatory standards across the EU that are not sufficiently strong (above Basel III minima) or does not allow sufficient flexibility for national authorities to use a range of macroprudential tools to mitigate systemic risks (which, to be effective, requires the European Systemic Risk Board to play a prominent role in ensuring

¹⁷ The U.K. authorities are aware of such risks, and are monitoring the possible consequences of, for instance, new funding products that comply with revised liquidity regulations, but could create sizable rollover risks just beyond regulatory horizons (See Bank of England Financial Stability Report (2010)).

¹⁸ See the location of financial activity and the euro (an EMU Study) "HM Treasury" (2003).

¹⁹ This paragraph should be read in conjunction with paragraph 50 of the Staff Report on the 2011 Article IV consultation with the U.K.

home-host coordination and reciprocity), the U.K.'s ability to implement strong regulations to avoid financial instability will be reduced, increasing the spillovers from such instability.

VI. THE U.K. IN GLOBAL SURVEILLANCE—A UNIQUE LENS

33. **The U.K. has unique informational advantages that in principle could strengthen the work of fora charged with the surveillance of emerging systemic risks.** The intersection of U.K. oversight of global intermediaries—though lack of information on the activities of branches is a blind spot— with the hosting of markets and infrastructure provides the U.K. with unique perspectives on global intermediation. There is considerable scope to draw further information from existing data sources. As a treasury hub, trends in cross-border source and use of funds; U.S. dollar and dollar-linked trading; the quality of collateral being pooled and posted in transactions; the cross-border direction of risk mitigation strategies; and, developments in the Libor/OIS markets can be gleaned from operations and markets in the U.K. In addition, the U.K. authorities could potentially observe some risks in less-regulated areas, such as hedge fund activity, which the FSA periodically surveys. While in principle, the U.K. could try to dampen global cycles, its impact would be enhanced though international coordination. As a host supervisor of a subsidiary in a consolidated group, it has the right to demand even higher buffers if it considers that those proposed by the national supervisor are inadequate or have not been applied quickly enough. However, coordination with partner macro-prudential authorities in managing global risk will likely yield more effective results and help reconcile situations where global financial stability and domestic stability considerations do not coincide. In addition, the U.K. could be a major contributor to international work streams monitoring the evolution of use of Intra-Group Guarantees and the Booking Practices of SIFIs to trace how cross-border risks relocate. Finally, the U.K. authorities' capacity to address such risks might be hampered if CRD4 overly constrains the use of a range of macroprudential instruments in response to emerging risks.

VII. AUTHORITIES' REACTIONS

34. **The U.K. authorities welcomed the pilot spillover exercise for the major systemic economies, which bridges an important gap between the Fund's bilateral and multilateral surveillance.** The authorities noted the timeliness of the U.K. spillovers analysis given the changing domestic and global financial landscape. They also recognized that the report has been a particular challenge because of data limitations, the inherent complexity of the subject, and the lack of existing empirical work on the spillovers from the U.K. financial sector to other countries.

35. **The authorities concurred with the staff analysis that the size and role of the U.K. financial system in global intermediation, underpinned by powerful**

agglomeration effects, has important implications for the origination, transmission and dampening of shocks to the global financial system. They noted, however, that care was needed in the interpretation of spillovers emanating from U.K. headquartered institutions or domestic policy as distinct from the U.K. “host” functions as a recipient or a global conduit of shocks that originate from elsewhere. The authorities stressed that this work should serve as a good foundation for more in-depth analysis, for example on the impact of country-specific policies on the functioning of global liquidity.

36. **The authorities agreed with the staff analysis that the overhaul of U.K. regulation and oversight, while domestically focused, is appropriately aligned with the imperatives of global stability, a view that is also consistent with the U.K. FSAP report.** They recognized that the action taken domestically on capital and liquidity policy has an impact on global asset and liability management, and welcomed the staff judgment that the resulting benefits to global as well as U.K. financial stability exceed any potential liquidity efficiency costs.

37. **However, the authorities underlined that the U.K. can only do so much on its own and that strong cooperation with and reform by global partners are needed to secure stability.** Indeed, they echoed the direct EU-level financial stability risks set out in the report, which have the potential to cause and magnify spillovers from the U.K. In particular those risks arising from EU passporting arrangements in the event of less ambitious EU/EEA standards and from CRD4 limiting the scope for appropriate national discretion in policy making.

38. **The U.K. authorities agreed that the concentration of activities in the U.K. presents some coordination and informational benefits compared to a more globally fragmented financial landscape.** However, they emphasized that effective global surveillance and regulation ultimately requires sustained international cooperation and action, including by all key global financial centers and through ongoing workstreams and processes in international bodies like the IMF, FSB and ESRB. The U.K. authorities could also feed into this through the market intelligence it collects from its regular contact with the private sector in London. More broadly, the authorities confirmed their intention to continue taking a strong leadership role in policy discussions in these fora.

VIII. CONCLUSIONS

39. **The size and role of the U.K. financial system allows it to originate, transmit, and potentially dampen risks and shocks to the global financial system.** The agglomeration of core functions found in the U.K. makes it a central node in “funding” liquidity and balance sheet hedging, providing buoyancy to global markets (and as such contributing to the buildup of global risk)—but equally able to withdraw it abruptly, as

became evident in the crisis. By the same token, any shock originating from the U.K. financial sector would have material implications throughout the global financial system.

40. **The stability and efficiency of the U.K. financial sector is therefore a global public good, requiring the highest quality supervision and regulation.** Significant efforts are underway to strengthen U.K. supervision, particularly of on-site inspections. Stronger liquidity and capital buffers as envisaged will dampen risks and shocks originated or transmitted through the U.K. financial sector, as will improved resolution regimes. That said, given the U.K.'s role, policies that limit leverage and require financial institutions to be more "self-sufficient" in liquidity will affect business models that use the U.K. for global asset and liability management, although the stability benefits will likely exceed potential global efficiency costs.

41. **For optimal results, implementation of this agenda requires cooperation and coordination with global partners.** Cooperation is key with all major financial centers, particularly so with the EU. U.K. financial stability will be weakened (with adverse spillovers) if EU rules constrain U.K. financial regulations at insufficiently ambitious levels or if they limit the ability to use a range of macroprudential instruments to address emerging risks. Similarly, very close home-host supervisor cooperation is essential to ensure that EU passporting arrangements do not undermine financial stability in the U.K. Additionally, the pursuit of "self-sufficiency" in liquidity, if pursued on a strictly national (rather than group-wide) basis, is useful primarily from the standpoint of domestic stability. However, globally coordinated approaches would be preferable in order to avoid the risk of fragmented, trapped, pools of liquidity that could hamper parent banks' ability to support branches/subsidiaries in periods of stress. These would be inefficient and could even increase systemic risk. Thus, it will be important for the U.K. to continue the dialogue with global partners to develop protocols on access to liquidity in periods of stress. Co-operation is also required to develop cross-border resolution frameworks that would reduce the risk of U.K.-based institutions propagating shocks in tail-risk situations.

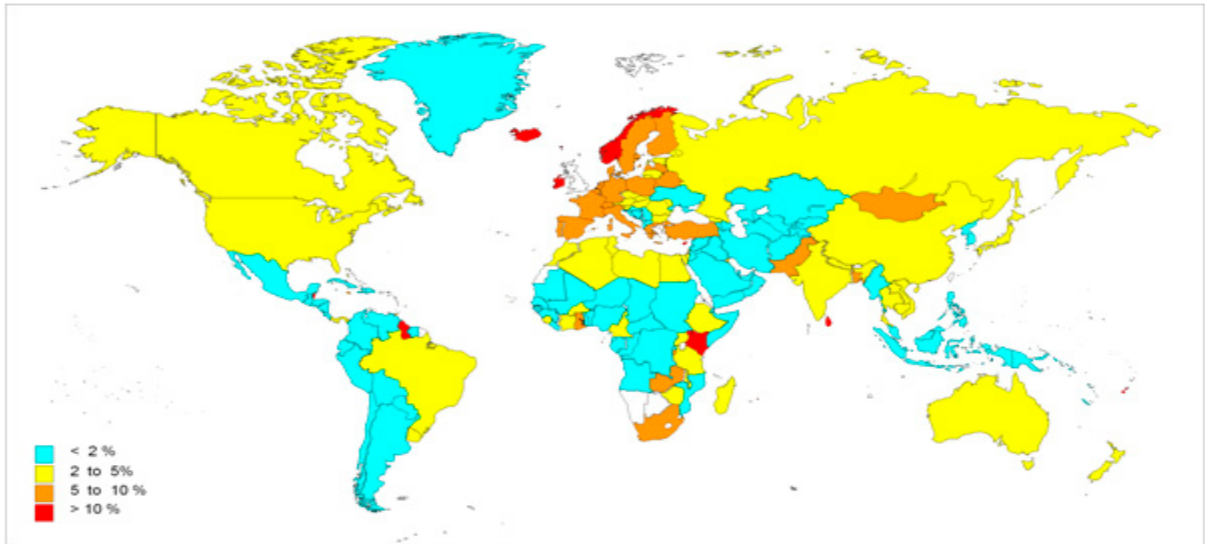
42. **The U.K. authorities, while in principle uniquely placed to contribute to efforts at enhanced surveillance of global systemic risks, face important challenges in doing so in terms of data, resources and authority.** The FPC can observe emerging stress and risks that might arise from the nexus of SIFIs, hedge funds and financial market infrastructure, but remaining gaps in data on systemic risks, including through the activity of branches, would need to be addressed. In this regard, vigilance will be needed on risks being pushed out—in response to regulatory reforms in other jurisdictions—or passported into deep and innovative U.K. markets. Although naturally focusing on domestic stability issues, the newly established FPC should take international spillovers into account.

ANNEX 1. SPILLOVERS TO LOW INCOME COUNTRIES

1. **Spillovers could be significant to a disparate group of mainly small economies that are heavily dependent on trade with the U.K, but for which model results are unavailable.** Examples (with the share of their exports targeted at the U.K.) include

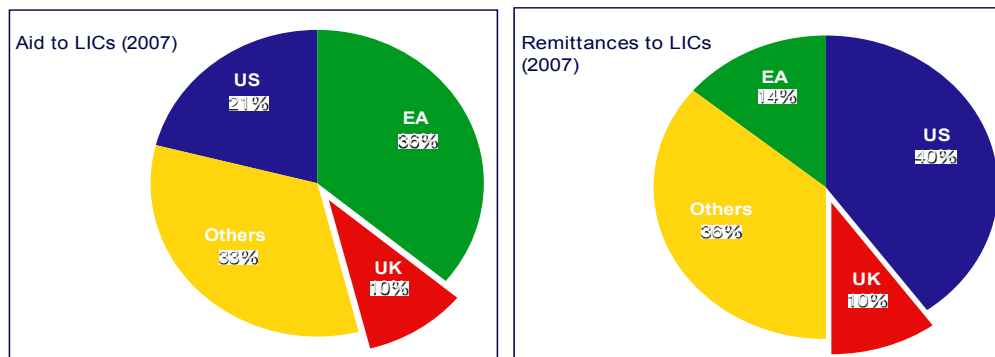
- **Former U.K. colonies (middle-income):** Mauritius (32 percent), Seychelles (24 percent), and St Lucia (16 percent).
- **Former U.K. colonies (low-income):** Gambia and Kenya (11 percent both).

Annex Figure 1. Exports to the U.K. (in percent of total



2. **Spillovers to low income countries (LICs) through remittance flows and aid from the U.K. are significant, particularly for Sub-Saharan Africa (SSA).** This includes substantial remittances to Nigeria (\$460 million, or 26 percent of the total), Uganda (\$373 million, or 62 percent of the total), and Kenya (\$254 million, or 59 percent). The U.K. also accounts for around 10 percent of aid flows to LICs, focused on the poorest countries. In contrast to many other donors, it has not cut aid flows in recessions, and plans to increase aid by 30 percent in real terms in next four years in spite of a major fiscal adjustment effort.

Annex Figure 2. Aid and Remittances to LICs, 2007





UNITED KINGDOM

2011 SPILLOVER REPORT—SUPPLEMENTARY INFORMATION

July 14, 2011

Approved By

Reza Moghadam and Antonio Borges

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I. THE STRUCTURE OF THE U.K. BANKING SECTOR¹

1. The United Kingdom is both home and host to systemically important financial institutions (SIFIs). The “U.K. banking sector” could be defined in several ways (Table 1):

- one focused purely on the **U.K. based assets**, either from U.K. banks or foreign banks’ operations in the U.K. (I+II+III);
- one focused on all assets of **U.K.-owned banks**, in the U.K. and abroad (I+IV+V); or
- a combination of both. There is no consensus definition, and various analyses of the U.K. banking sector may include or exclude any of the items above, depending on the focus.

Table 1. Possible Definitions of the U.K. Banking Sector

United Kingdom	Abroad
U.K. owned banks (I)	Foreign branches of U.K.-owned banks (IV)
Branches of foreign-owned banks (II)	Foreign subsidiaries of U.K.-owned banks (V)
Subsidiaries of foreign-owned banks (III)	

2. U.K.-owned and incorporated banks hold significant assets abroad, while foreign bank subsidiaries and branches hold more than half of U.K.-based banking sector assets (Figure 1):

- *U.K.-based banking assets are dominated by foreign banks*, which hold more than half the total. Of this amount, European banks hold more than half (54 percent), while U.S. banks account for 15 percent.
- *U.K.-owned and incorporated banks represent a small share of U.K.-based banking sector assets.* The top five U.K. banks (HSBC, RBS, Barclays, LBG, and SCB) hold 22 percent of U.K.-based banking sector assets, while foreign-owned and U.K. incorporated banks (e.g., Santander U.K.) own an additional 27 percent.

¹ Prepared by Vanessa Le Leslé (MCM) for the 2011 U.K. Financial Sector Assessment Program Update.

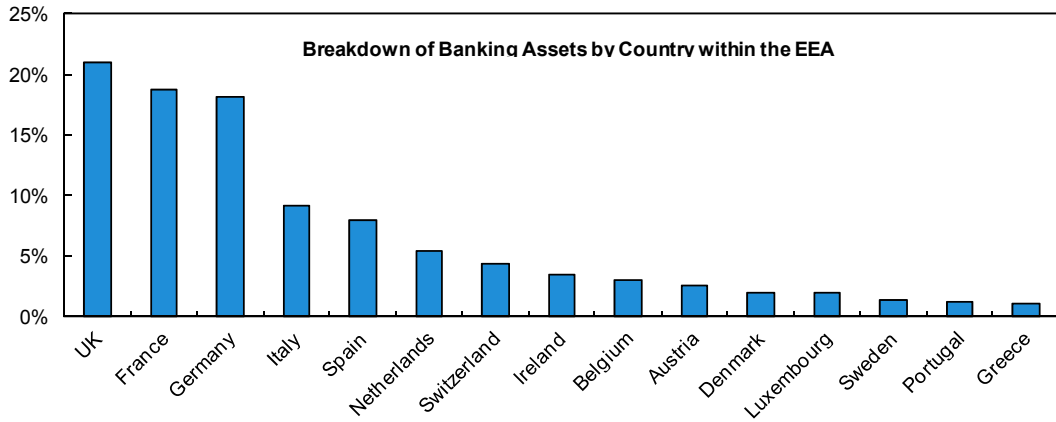
- *Only two of the six major U.K.-owned and incorporated banks have a strong domestic focus.* Specifically, LBG and Nationwide operate almost exclusively within U.K. borders. Conversely, the remaining four major U.K.-owned and incorporated banks have more diversified geographic profiles.
- *U.K.-owned and incorporated banks hold significant assets abroad.* For example, SCB has less than 5 percent of its business in the U.K., while HSBC Holdings Plc has significant operations in the Asian region and other emerging market countries (Figure 2). Separately, Barclays has increased its exposure to the US, following its acquisition of the Lehman Brothers franchise.
- *The U.K.-based portion of U.K.-owned and incorporated banks' assets is less than half of those banks' total assets.* The five major U.K. banks hold 40–45 percent of U.K.-based banking sector assets. According to the British Bankers' Association, the Herfindahl index for the share of total assets of the five largest credit institutions shows that the U.K. is only the twenty-third most concentrated EU market.

3. Foreign banks primarily use London as their international funding and trading platform. London is a major financial hub, offering a broad range of financial and support services, a deep talent pool, comprehensive market infrastructure, all located in a convenient time zone. For these reasons, it is an attractive place for foreign banks to conduct their international investment banking operations.

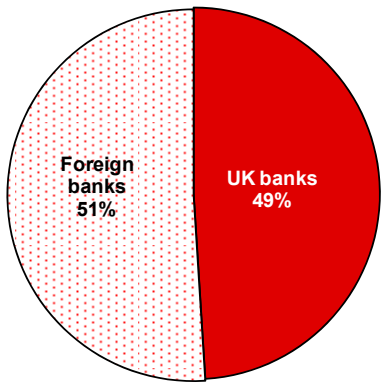
4. There are fewer foreign banks providing traditional loans to the U.K. economy. Santander U.K. (a foreign-owned, U.K. incorporated bank) is a prime example of a foreign bank that grew through the acquisition of local banks to expand its presence in the U.K. retail market.² Irish banks are also active in the U.K. retail market, as are Australian and German banks, lending either to U.K. households or corporates.

² For example, Santander U.K. is a U.K.-owned and incorporated bank, established via the acquisitions of U.K. banks Abbey National, Bradford and Bingley, and Alliance and Leicester. See also Box 1 in the Bank of England Financial Stability Report (London, June 2010).

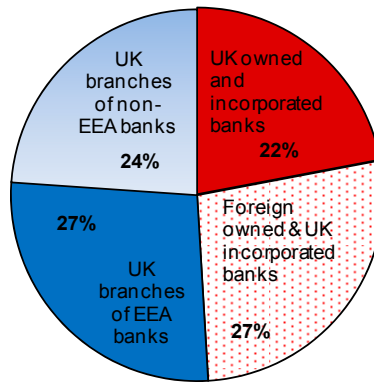
Figure 1. Overview of the U.K. Banking Sector



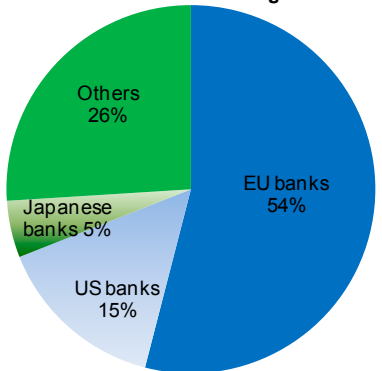
Breakdown of UK banking sector assets



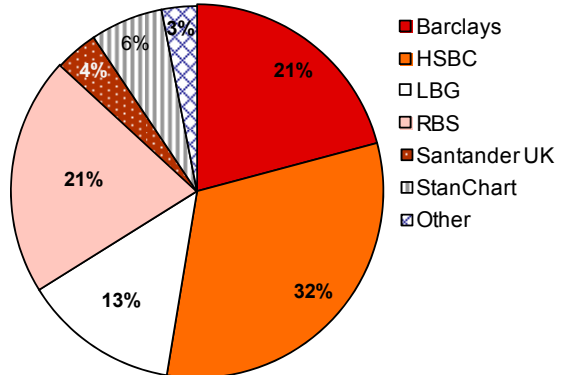
Breakdown of the UK Banking Sector



Breakdown of Foreign banks holdings of UK banking assets

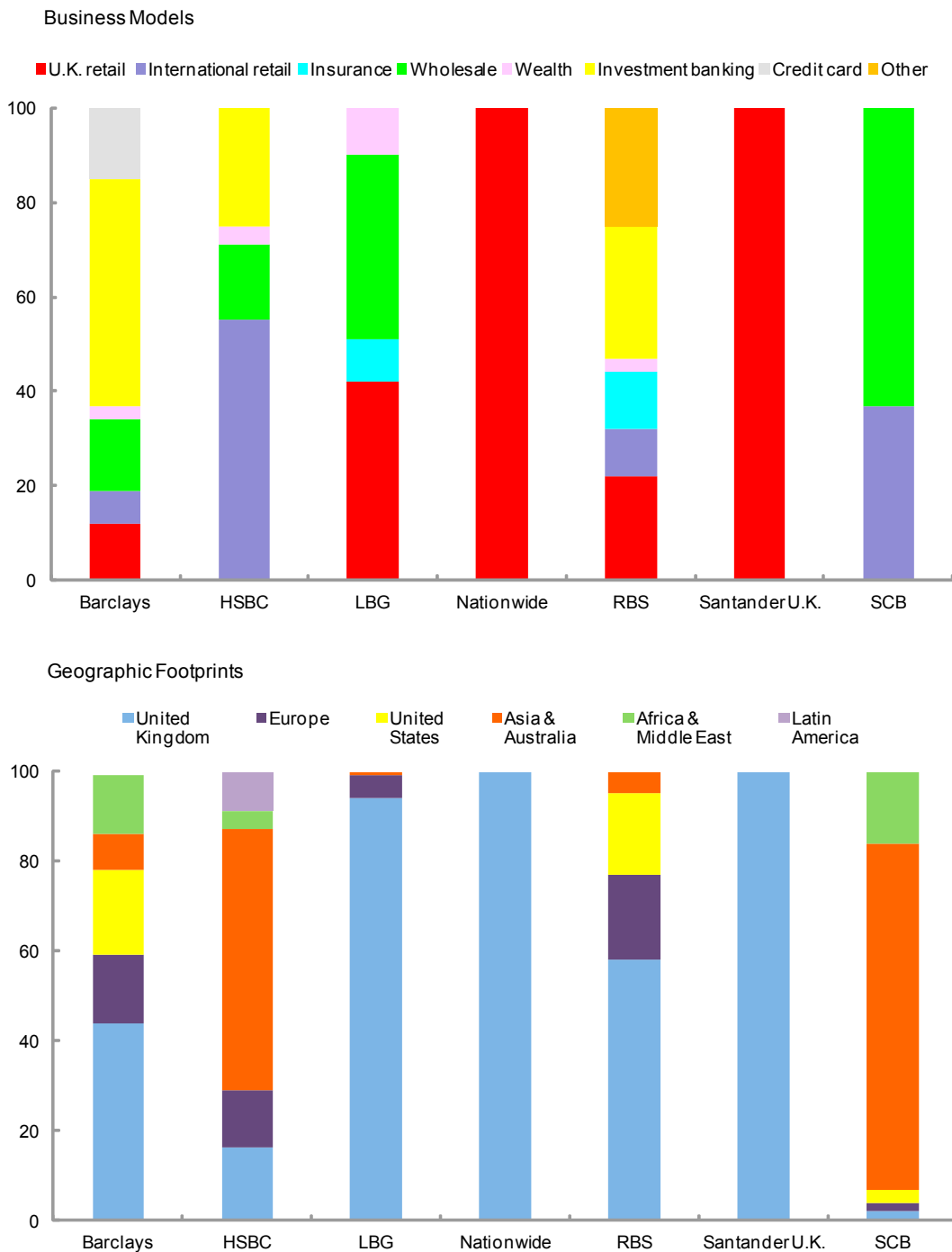


UK Banking System Assets Breakdown by Bank



Sources: TheCityUK; Bloomberg; Bankscope; European Banking Federation; and Fund staff estimates.

Figure 2. U.K. Banks: Differentiated Geographic and Business Models
(As at end-2010, in percent of individual banks' revenues)



Sources: Bloomberg; individual banks' Annual Reports; Fund staff estimates.

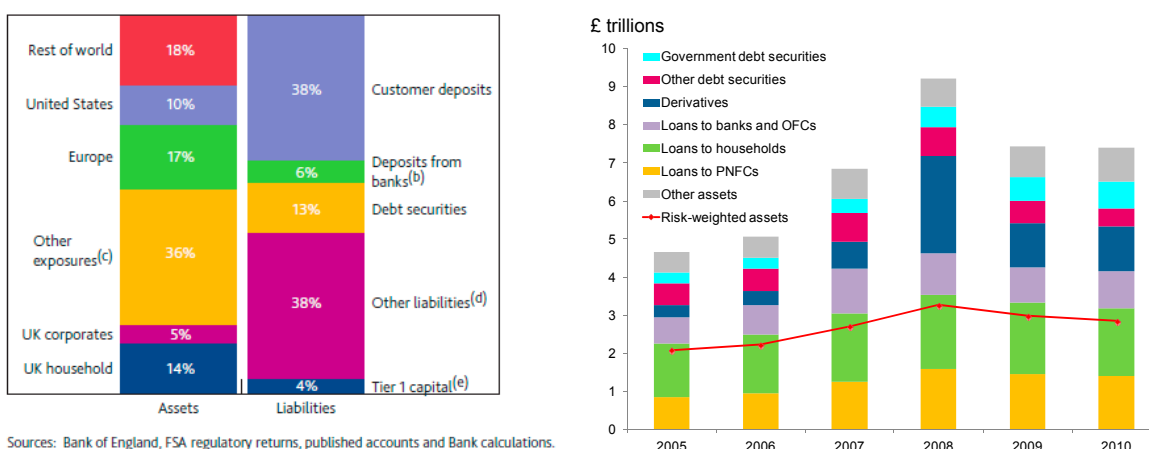
5. The structure of the U.K. banking system has important policy implications, from both regulatory and supervisory perspectives. For instance, EEA banks hold 27 percent of U.K. based banking assets. Set up as branches in the United Kingdom, (through “passporting” rules), they remain under the supervision of their home authority, and the U.K. authorities have very limited oversight powers over them. Conversely, many U.K.-owned banks have significant activities outside the U.K. While the U.K. authorities retain consolidated supervision powers over these groups, individual subsidiaries are also subject to host country supervision and local regulations.

Key Characteristics of U.K. Banks’ Business Models

6. On an aggregate basis, the major U.K. banks are more exposed to international assets (45 percent of their balance sheet) than to pure U.K. assets (only 19 percent). The sizeable international portfolio of the U.K. banks makes them sensitive to economic conditions in Europe, the U.S. and the rest of the world, and highlights their interconnectedness.

7. Loans, to households, corporate, and financial institutions represent the bulk of U.K. banks’ assets, and their share is relatively stable over the last 3 years (Figure 3). The share of derivatives and securities reached a peak in 2008 and has declined since. Overall, RWA increased until 2008 and has declined since as banks continue to de-risk their balance sheets.

Figure 3. Major U.K. Banks: Breakdown of Assets and Aggregate Balance Sheet



8. The U.K. banking sector is polarized in terms of geographic exposures. Three banks have a strong domestic bias, and four are heavily turned toward international activities. Their geographic footprints would be relevant for determining where vulnerabilities lie.

9. The major U.K. banks also have very different business models. The seven banks under review are broadly grouped in two categories: domestic retail banks, with a strong focus on mortgages, and diversified international banks, combining a wider variety of activities, spanning from retail to investment banking, wealth management, and insurance.

II. U.K. FINANCIAL MARKETS AND INFRASTRUCTURE³

10. London is a dominant actor worldwide in most segments of financial markets (see Table 2). In particular, U.K. markets, infrastructure, and UK-based institutions have a large or dominant role across a broad range of global cross-border financial operations. Thus while U.S. equity and bond markets are larger, they are more domestically focused, while London markets are dominant in secondary market trading of international bonds or foreign equity listings. London markets closely related with international banking activities—foreign exchange and derivative markets in particular—are also the most important globally, and some specialist insurance functions serving internationally active firms are located there (notably in transportation). Finally and directly related with the presence of these markets and functions, much of the critical infrastructure of global finance—in the form of central counterparties (CCPs)—is in London.

U.K.-Based Central Counterparties

11. Among the financial market infrastructure located in the U.K., CCPs exhibit the highest concentration of liquidity and credit risks. They provide an integrated range of clearing functions to market participants, including the netting of positions. Their core service is to become principal to every transaction that they clear, which implies that market participants no longer have credit exposures to their trading counterparties, but only to the CCP. Therefore, CCPs concentrate credit risk and would face large liquidity needs if a participant defaulted—due to the need to fulfill the settlement obligations of the defaulting participant, potential losses when the cleared position or related collateral are liquidated, and the cash flows relating to possible hedge transactions.

12. The number of CCPs operating in the U.K. is increasing. There are four at present, with one more expected to begin operations in 2011–12:

- LCH.Clearnet Limited, a subsidiary of the European LCH.Clearnet group, is the traditional U.K. central counterparty. It is also one of the largest CCPs in Europe, serving major international

³ Prepared by Manmohan Singh, Vanessa Le Leslé, and Christine Sampic (all MCM), and Alvaro Piris (SPR), with inputs from Sean Kerr (LEG).

exchanges and platforms, as well as a range of over-the-counter (OTC) markets, including derivatives through SwapClear (for interest rate swaps) and RepoClear (for cash bond and repo trades).

- EuroCCP, a subsidiary of the U.S. DTCC, was set up in August 2008 to clear equities from issuers in 19 markets traded on multilateral trading facilities and stock exchanges in Europe.
- ICE Clear Europe, a subsidiary of the U.S. Intercontinental Exchange (ICE), began providing clearing services for the futures markets of ICE Futures Europe and ICE's OTC energy markets in 2008. In July 2009 it launched separate clearing services for credit default swaps (CDS).
- In addition, U.K. regulators gave approval in December 2010 to Chicago Mercantile Exchange (CME) Group to launch clearing for the OTC derivative trades, for which operations began in London in May 2011, through CME Clearing Europe, a subsidiary of CME.
- Finally, NYSE/EURONEXT has announced a plan to provide a dedicated CCP to clear LIFFE's transactions by 2012.⁴

13. Cross-border and cross-currency clearing is substantial, in particular for OTC

derivatives. LCH.Clearnet Limited operates in U.S. dollars, euros, and sterling and a number of other currencies⁵. SwapClear currently clears more than 40 percent of global interest rate swap transactions, with a total notional principal of US\$248 trillion. RepoClear clears 250,000 traded sides per month in the Austrian, Belgian, Dutch, German, Irish, Finnish, Portuguese, Slovakian, Slovenian, Spanish, and U.K. markets, representing a nominal value of €11 trillion. Until now, most euro-denominated OTC credit derivatives contracts submitted to a CCP have been cleared by ICE Clear Europe: from July 2009 through March 2011, it cleared US\$4.7 trillion in iTraxx indices and US\$917 billion in single name instruments, resulting in US\$633 billion of open interest.

14. The size, growth, and cross-border nature of U.K. clearing activities means a default would have a very large global impact. In particular, moving OTC derivatives contracts to CCPs following the G20 commitment will substantially raise the concentration of liquidity and credit risk,

⁴ Today LIFFE's transactions are technically cleared by LCH Clearnet Limited.

⁵ Australian dollar, Canadian dollar, Swiss franc, Czech koruna, Danish kroner, Euro, Sterling, Hong Kong dollar, Hungarian forint, Icelandic króna, Japanese yen, Norwegian krone, New Zealand dollar, Polish zloty, Swedish krona, South African rand, and the U.S. dollar.

moving derivatives risks from systemically important financial institutions (SIFIs) to CCPs, which are becoming 'risk nodes' in financial markets. As CCPs are clearing more complex, less liquid, and longer-term instruments, their potential need for funding support in a tail risk situation is rising. The failure of a major CCP would affect not only the U.K. domestic financial market, but would also have a cross-border dimension.

Table 2: Global Financial Markets: U.K. Market Share

<i>Products</i>	<i>U.K. market share (in percent)</i>	<i>Rank</i>
International banking		
Cross-border bank lending	18	1
Borrowing	21	1
European investment banking activities	50	1
Insurance market		
Global insurance premiums	\$309 billion	3 (global) and 1 (Europe)
Pension fund assets	9	3 (global) and 1 (Europe)
Equities		
Global foreign equity listing	19	1
Number of international IPOs	6 (12 percent market share)	(17 IPO in Hong Kong/12 in U.S.)
Turnover on LSE	4 of global turnover / 7 of global equity market capitalization	
Bonds		
Eurobonds secondary market	70 (trading by Bookrunners in London)	
Securitization issuance	6	2 (US is 1, with 75 percent)
Fund Management		
Total fund management (source of funds)	9	2 (US is 1, with 50 percent)
Hedge Funds assets	19	2 (US is 1, with 68 percent)
Private equity investment value	13	2 (US is 1, with 36 percent)
Derivatives		
OTC interest rate derivatives	46 (of turnover)	1 (US is 2 with 24 percent)
Exchange-traded derivatives	4 derivative exchanges in the UK: NYSE Liffe is #2 worldwide; LME is #1 for non-ferrous metals; ICE Futures Europe is #1 in Europe and #2 worldwide for energy products.	
Foreign exchange		
Turnover	37	1
Commodities		
Commodity derivatives trading	London and New York main international players	
Bullion markets (gold/silver)	London's LBMA largest OTC market ahead of New York and Zurich, and clears most of the wholesale OTC trades	
Maritime services		
Marine insurance premium	21	London is the leading center for marine and aviation finance.
Leader in shipping finance (13), shipbroking (30-50) and legal services. The International Maritime Organization is headquartered in London.		
Islamic finance		
London has the largest number of "sharia compliant" banks (22), exchange-traded funds (7), and law firms (20) in the West. Issued 31 sukuku on LSE.		

Source: www.TheCityUK.com, "Trends in U.K. Financial and Professional Services", June 2011, latest available data (2009 or 2010)

III. THE ROLE OF THE U.K. IN SIFI BUSINESS MODELS⁶

15. Many global systemically important financial institutions (SIFIs) have developed business models and corporate structures that are heavily dependent on U.K.-based entities.

Through services that these entities provide to the group, they achieve a high degree of global balance sheet integration, particularly regarding liquidity and risk management. As a result, any rebalancing of the global balance sheet of the SIFI along with the services it provides to clients, is linked to the flexibility derived from a seamless interconnection between each SIFI's operations in the U.K. and the rest of the world.

16. A number of factors are behind the U.K.'s integral role in global SIFI's operations. SIFIs

will normally channel excess liquidity from Europe, and to a lesser extent other financial centers (such as Hong Kong, Singapore, and the Middle East) to the U.K. Similarly, the centralization of risk management of global exposures via the clustering of deep foreign exchange and flexible OTC derivatives markets in the U.K. implies that SIFIs can justify the U.K.'s gravitational pull.

17. Centralizing liquidity and risk management enables an integrated SIFIs to allocate liquidity efficiently and to use effectively the risk mitigation markets across multiple dimensions:

- Access to deep and broad-risk-spectrum markets such as foreign exchange, derivatives, and cash instruments facilitates the use of centralized liquidity to generate cost efficiencies, which in turn generates additional liquidity. Some firms achieve this by simultaneously using subsidiaries (to respond to client and market needs), and branch structures (mainly handling intra-firm needs).
- Moreover, the nature of the links through which a SIFI's global integration occurs via the U.K. along with the diversity among SIFIs (in terms of asset and regional focus) leads market and intra-firm interactions, concentrated in the U.K.

18. The efficiency gains arising from SIFI's U.K. operations are substantial but difficult to quantify. For some global SIFIs, around a third of secured funding stems from the U.K., exceeding the U.K.'s share of global cross-border lending. This means that for SIFIs 30 percent of the market

⁶ Prepared by Karim Youssef (SPR).

clearing cost of funding their global intermediation activities (including risk exposures, the taking and offering of leverage) is set in the U.K. market.

19. An example of how such efficiency gains arise is through the large and diverse pool of collateral (initially posted by clients) that global SIFIs manage through their U.K. entities.

Access to the cash-flows from such portfolios gives SIFIs flexibility in structuring synthetic instruments or cash flows in response to client and market needs. Moreover, the iterative and shared use of secured funding collateral (if housed in an omnibus account⁷) among SIFI's broker and dealer entities in the U.K. helps create additional market and balance-sheet liquidity.

20. Global SIFIs' reliance on the U.K. makes these operations important for the efficiency and stability of global markets. This is especially true of derivatives, structured notes, international debt, foreign exchange, and non-U.S. repo markets. The stability and efficiency of these markets are interlinked with the stability of the SIFIs themselves, and the efficiency they derive from their U.K. operations. Consequently, investors and borrowers that depend on SIFIs want them to remain stable but also continue to meet customer demands in a flexible and cost-efficient manner.

IV. THE U.K.'S ROLE AS A GLOBAL LIQUIDITY GENERATOR⁸

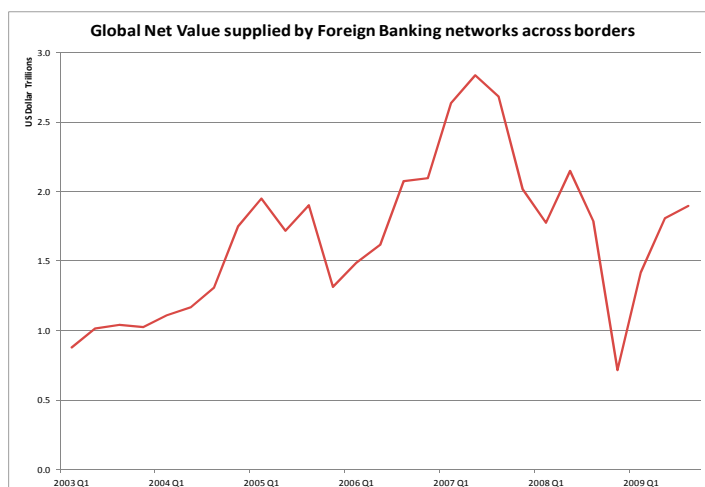
21. Consistent with its role as a global treasury hub, subsidiaries, and branches of international banks operating in the U.K., play an important role in cross-border finance. From a universe of wholesale financial instruments, this note looks at the relative importance of BIS reporting countries in originating cross-border bank claims—as a proxy for where banks pool liquidity and acquire cross-border assets.

⁷ An omnibus account groups together individual client accounts (including those of other brokers, banks, institutional investors, and Funds). It is a unified account, which does not allow for the retention of information about the individual accounts. Omnibus accounts are seen as an efficient way to augment inter and intra-firm operations in different markets and countries. They also allow firms to offer clients the ability to transact via a single firm across markets and countries.

⁸ Prepared by Irena Asmundson, Chris Marsh, and Karim Youssef (all SPR).

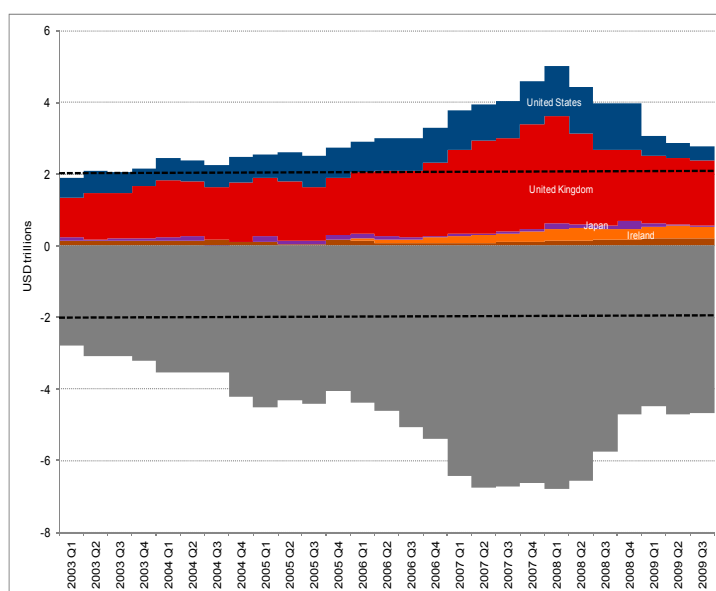
22. The chart shows the evolution of cross-border lending provided by only the subsidiaries and branches of banks operating in BIS reporting countries. The measure is derived

from the difference between banks' international claims on a "locational" or residency basis (which thus includes the activities of foreign subsidiaries in the country in question), and consolidated bank claims. It thus strips out the global activities of banks reporting on a consolidated basis to a given jurisdiction, leaving the activities of banks that report elsewhere but operate a subsidiary or branch in the host jurisdiction.⁹



23. Allocating these claims by BIS country location, the U.K. emerges as the most important liquidity hub.

Between 2003 and the third quarter of 2009, U.K.-based activity contributed in excess of 60 percent of claims on the rest of BIS reporting countries, with the U.S. ranking second with 27 percent of the total. In contrast to the dominance of subsidiaries and branches in the U.K. and U.S. in originating cross-border claims of

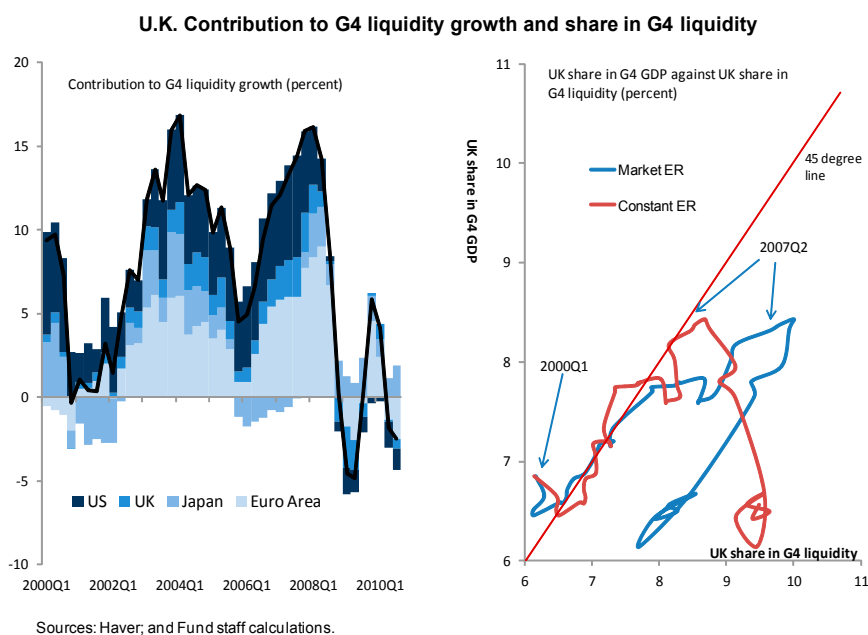


close to \$4 trillion at the peak in 2007 subsidiaries and branches of foreign banks operating in other BIS countries are less important in cross-border finance.

⁹ This measure is a simple proxy, given data limitations. A more accurate measure would require a more complete dataset including both claims and liabilities of the consolidated and locational balance sheets of domestically chartered banks, as well as subsidiaries and branches of foreign banks for every jurisdiction. The proxy measure does not take into account the claims of the consolidated balance sheet of a given country's banks on their own foreign subsidiaries, but captures any claims by the subsidiaries on the consolidated balance sheet.

24. An alternative approach to measuring the U.K.’s contribution to global liquidity captures total liquid liabilities of the global financial sector (analogous to traditional broad money measures of liquidity). For example, the chart below (left panel) shows each country’s contribution to the growth

of total G4 (Euro area, Japan, U.K., and U.S.) liquidity, which grew rapidly after the millennium—though turned negative with the onset of the crisis. The U.K. made a positive contribution through most of the period—though small compared with the larger economies in the group.



25. But how did the U.K.’s relative share in G4 liquidity evolve? The chart also shows the U.K.’s share in G4 GDP and in G4 liquidity (right panel). The 45 degree line gives points where GDP and liquidity move in tandem. From 2000 to 2004, liquidity and GDP shares grew broadly in line, but liquidity share picked up from 2004 before falling back during the crisis (blue line). However, correcting for nominal exchange movements, the U.K.’s share in liabilities in fact grew broadly in line with the share in GDP until the crisis. Since then the U.K. share’s in GDP has fallen more rapidly than its share of G4 liquidity with the severity of the recession.

V. CROSS-BORDER EXPLANATION OF LEVERAGE IN THE U.K.¹⁰

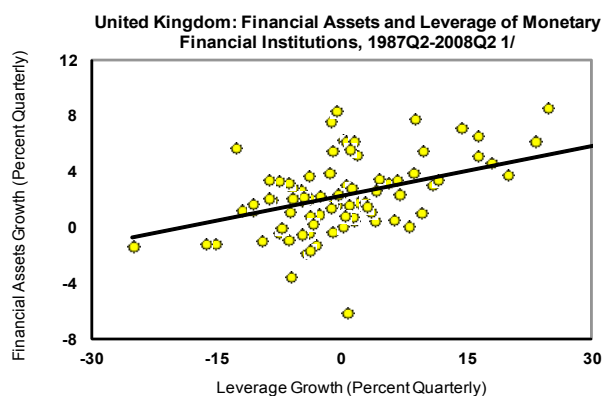
26. This note analyzes stylized facts relating to the leverage ratios of the U.K. banking system, distinguishing between domestic and foreign-owned banks. In recent years, foreign-owned banks in the U.K. have exhibited higher leverage ratios than domestic banks, especially once off-balance sheet assets are accounted for. The financial center role of the U.K. seems to underpin

¹⁰ Prepared by Manuela Goretti, Alvaro Piris, and Karim Youssef (all SPR), and Manmohan Singh (MCM).

these differences in leverage ratios and balance-sheet management, calling for greater cross-border supervisory oversight and coordination to avoid procyclical amplification of boom and bust episodes.

27. Recent empirical literature finds evidence of procyclicality in the leverage of U.K.

banks. Panetta et al. (2009) show a positive relationship between changes in leverage and changes in the balance sheet size of U.K. banks over the past two decades, suggesting active management of balance sheets to increase leverage when asset prices go up and reduce it during downturns (see figure). These results are in sharp contrast with other EU countries where leverage tends to be countercyclical, and with earlier results for the U.S. by Adrian and Shin (2008)¹¹ where commercial banks are found to target fixed leverage levels.



1/Calculations based on national financial accounts. Leverage is defined as the ratio between financial assets and the difference between financial assets and liabilities. Data refer to monetary financial institutions (banks, central banks and money market mutual funds).

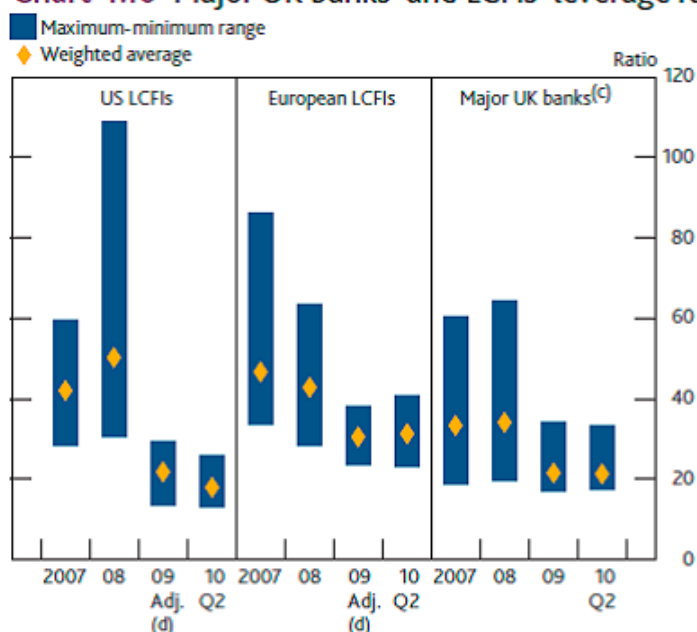
Source: Panetta et al. (2009), Financial sector pro-cyclicality, Questioni di Economia e Finanza, Banca d'Italia.

28. The relatively low leverage ratios of U.K. banks in the post-Lehman period on a consolidated basis could suggest a limited financial accelerator role by the U.K. in the future.

Specifically, recent data released by the Bank of England (see Chart 4.10 of the December 2010 FSR reported below) indicate that major U.K. banks have comparable, if not lower, leverage ratios to those of LCFIs in the U.S. and other European countries. Moreover, domestic ranges appear narrower in the pre-crisis period and the deleveraging process less abrupt than in other countries, notably the U.S., given the lower starting base (Northern Rock is not included in the sample).

¹¹ Tobias Adrian & Hyun Song Shin: "Financial intermediary leverage and value at risk," Federal Reserve Bank of New York, Staff Reports 338 (2008).

Chart 4.10 Major UK banks' and LCFIs' leverage ratios^{(a)(b)}

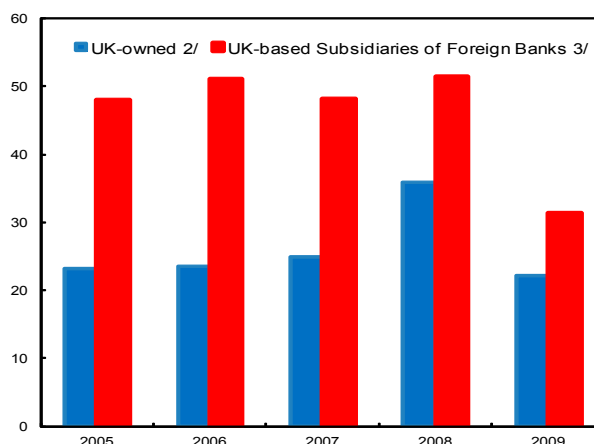


Sources: Bank of England, published accounts and Bank calculations.

- (a) Assets adjusted on a best-efforts basis to achieve comparability between institutions reporting under US GAAP and IFRS. Derivatives netted in line with US GAAP rules. Off balance sheet vehicles included in line with IFRS rules until 31 December 2009. See footnote (d).
- (b) Assets adjusted for cash items, tax assets, goodwill and intangibles. For some firms, changes in exchange rates have impacted foreign currency assets, but this cannot be adjusted for. Capital includes total shareholders' equity adjusted for minority interest, preference shares, goodwill and intangibles.
- (c) Excludes Northern Rock.
- (d) Revision to US GAAP accounting rules on consolidation from 1 January 2010 are applied to end-2009 data giving a clearer measure of leverage.

29. However, consolidated banking data cannot capture the U.K.'s role as a global financial center. In 2009, according to bank-by-bank data for 16 major foreign banks with subsidiaries operating in the U.K., foreign-owned banks' assets accounted for more than 20 percent of total assets in the U.K. banking system. Only Ireland and a few newly-acceded EU countries presented higher shares but for significantly smaller asset bases. Foreign-owned banks in the U.K. exhibit much higher leverage ratios than U.K.-owned banks across time and despite global

Leverage Ratios of UK-based Banks, 2005-2009 1/



- 1/ Leverage defined as (Total assets)/(Total Capital).
- 2/ Sample includes Alliance & Leicester, Barclays, Bradford & Bingley, HBOS, HSBC, Lloyds, Northern Rock, RBS, Standard Chartered (excludes foreign subsidiaries).
- 3/ Sample includes Canadian banks (RBC, TD Bank), German Banks (Deutsche Bank), Japanese banks (Daiwa, Mitsubishi UFJ, Nomura), Spanish banks (Santander), Swiss banks (Credit Suisse), and US banks (American Express, Capital One, Goldman Sachs, JP Morgan/Citigroup, Merrill Lynch/Bank of America, Morgan Stanley).

Sources: Bankscope and staff own estimates.

deleveraging in the past years (see Figure).¹² Leverage averaged 50 for subsidiaries of foreign banks before the collapse of Lehman, against about 27 for U.K.-owned banks. Moreover, in 2008–09, foreign-owned banks adjusted their leverage ratios more quickly, showing higher procyclicality in the downturn than domestic banks. Yet, this was not enough to close the difference in leverage (which still amount to about 10 times equity).¹³ Among the foreign groups in the sample, Japanese, Swiss, and Spanish subsidiaries exhibit on average the highest degrees of leverage compared with domestic banks.

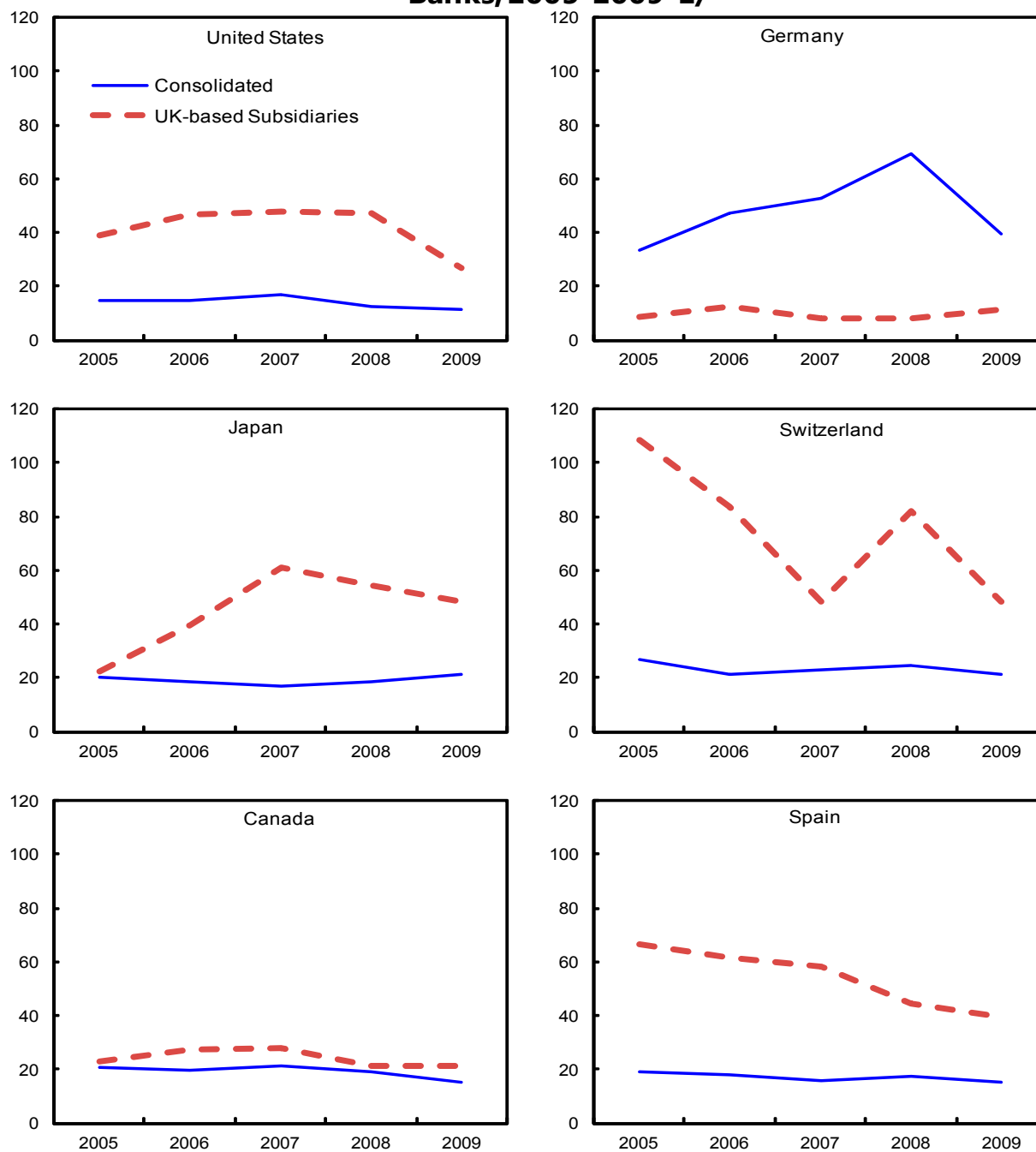
30. U.K.-based subsidiaries also exhibit higher leverage than their parents, as the result of balance sheet management strategies at group level and the U.K.’s role as provider of financial services. The U.K. is a global center for secured and unsecured funding, making available to its customers a wide range of financial products, particularly for the European market, including derivatives and other innovative instruments. Banking groups tend to rely on their U.K.-based activities to lower costs and maximize efficiency gains in their balance sheets.¹⁴ As a result, U.K. subsidiaries of most foreign banks tend to have higher leverage ratios than their group on a consolidated basis, with the only exception of Germany (i.e., Deutsche Bank) in our sample (see chart below). These results support a global role for the U.K. system to act as a liquidity provider and conduit for financial acceleration.

¹² Throughout the analysis, leverage is defined as (Total assets) over (Total shareholders’ equity). Total capital rather than Tier I capital is used given lack of uniform and complete data on the latter. Banks’ coverage varies across charts due to different data availability for on- and off-balance sheet definitions, as specified in the relevant footnotes to the figures.

¹³ Recently released figures for 2010 for some of the banks in sample confirm these results.

¹⁴ See note III, “The Role of the U.K. in SIFI business models”.

Figure 4. Leverage Ratios of U.K.-based Subsidiaries of Foreign Banks, 2005-2009 1/



1/ Leverage defined as (Total assets)/(Total Capital). Sample includes Canadian banks (RBC, TD Bank), German Banks (Deutsche Bank), Japanese banks (Daiwa, Mitsubishi UFJ, Nomura), Spanish banks (Santander), Swiss banks (Credit Suisse), and US banks (American Express, Capital One, Goldman Sachs, JP Morgan/Citigroup, Merrill Lynch/Bank of America, Morgan Stanley).

Sources: Bankscope; and Fund staff own estimates.

VI. A VAR ANALYSIS OF REAL AND FINANCIAL SPILLOVERS FROM THE U.K.¹⁵

31. An analysis of the impulse response functions from a Structural Vector Autoregression (SVAR) is used to gauge the relative importance of real and financial spillovers from the U.K.

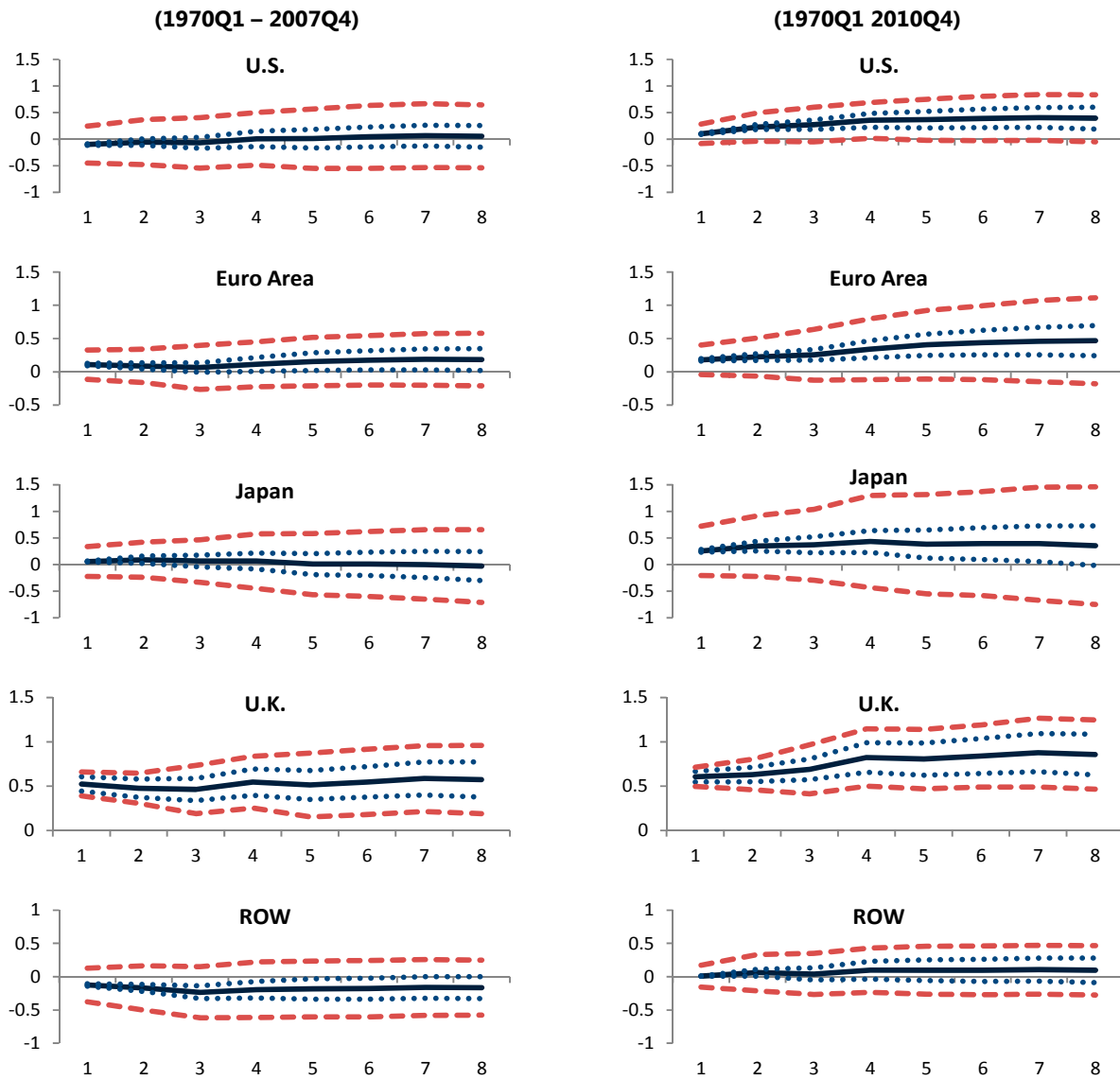
The Bui-Bayoumi (2010) methodology exploits the reduced uncertainty during the “great moderation period” (1980–2007) to estimate the contemporaneous correlations for the SVAR.¹⁶ The sample of countries includes the U.K., U.S., Euro Area, and Japan, as well as a “rest-of-the-world” group including small industrial countries and representative emerging markets to control for contemporaneous global developments. Results vary depending on the selected estimation period:

- **During the great moderation period, growth shocks from the U.K. appear to be concentrated on the euro area, with a contained impact on other countries.** The accumulated impulse response functions (IRFs Figure 5) show a long-lasting impact on the euro area—with a one standard deviation increase in U.K. real GDP (of about 0.5 percent of GDP) raising output in the euro area by almost 0.2 percent at the end of a two-year horizon. However, shocks to other major countries tend to be small and short-lived.

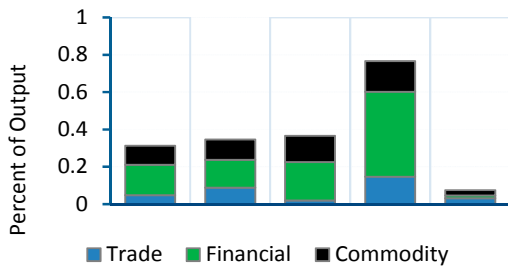
¹⁵ Prepared by T. Bui and M. Goretti (SPR), based on Bayoumi, T. and Bui, T. (2010), Deconstructing the International Business Cycle: Why Does a U.S. Sneeze Give the Rest of the World a Cold? IMF WP/10/239, October.

¹⁶ The analysis builds on the identification method in Rigobon, R. (2003), Identification through Heteroskedasticity, *The Review of Economics and Statistics*, Vol. 85 (4), pp. 777–792.

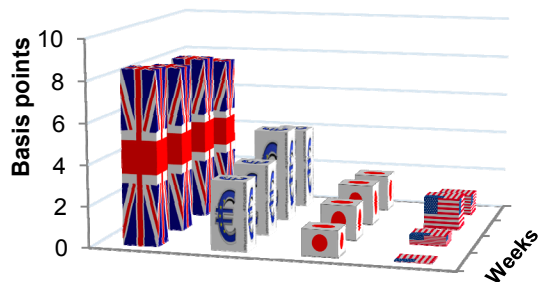
Figure 5. (Accumulated) Impulse Responses of Real GDP to 1-s.d. Structural Shock
 (Red-dashed lines are 95-pct confidence interval including both A-matrix and VAR estimates uncertainty;
 Blue dotted lines are 95-pct confidence interval including VAR estimates uncertainty only)



Growth spillovers by Channels
 (average over 2-year after shock)



Bond Market Spillovers
 (10-year bond yield, 2000-2009, weekly, eop)



- During period of financial stress growth shocks from the U.K. tend to generate more wide-spread and longer-lasting spillovers through financial channels.** The inclusion of the 2008–10 crisis in the estimation period amplifies the role of the U.K., with a 0.6 percent shock to U.K. real GDP leading to long-lasting growth spillovers to all major countries (of about 0.4 percent of GDP).¹⁷ A decomposition of the shocks between trade, commodities, and financial channels shows that the bulk of the growth spillovers from the U.K. during this period stem from the financial sector. Nevertheless, the size of the shocks is also subject to higher uncertainty during stress periods, as exemplified by wider confidence bands for the contemporaneous correlation matrix, especially for Europe and Japan.
- The bond market is identified as an important channel of financial spillovers, consistently with the large share of international bond trading that takes place in the U.K.** SVAR results for 10-year government bond yields—applying the traditional Rigobon identification method over 2000–2009 at weekly frequency—point to a significant role of the U.K., with sizable and long-lasting shocks: more than 50 percent of the initial yield shock in the U.K. spills over to euro area yields, and to a smaller extent to the U.S. and Japan. These results are consistent with the U.K.'s importance as a global bond trading center, accounting for an estimated 70 percent of global secondary trading in international bonds (especially for euro-denominated securities). Similar results for the equity market, while significant, point to smaller and shorter-lived shocks.

VII. NON-FINANCIAL SECTOR SPILLOVERS¹⁸

32. Spillovers from the U.K. economy stemming from outside the financial sector are heavily weighted toward smaller non-systemic economies. Spillovers through trade and remittances are likely to be small given that the U.K. (even if the world's fifth largest economy) accounts for only 4 percent of global output, 3½ percent of global trade, and 2½ percent of global

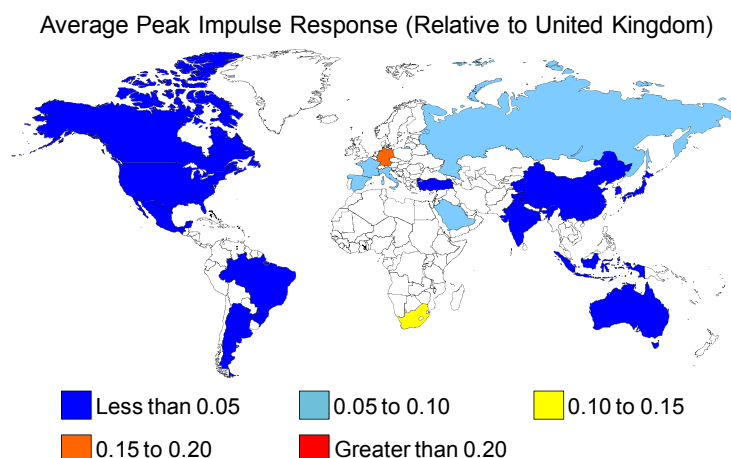
¹⁷ Outward spillovers from the U.S. dominate the "great moderation" period, while they are comparable in size to spillovers from the U.K. once the global crisis time window is included, despite the different relative size of the two economies due to the amplified financial channel in the latter.

¹⁸ Prepared by Francis Vitek and Gavin Gray.

remittances flows. However, the U.K. economy can have a more sizable bilateral effect on a handful of countries—mainly former British colonies—that remain reliant on U.K. export markets, or countries in Sub-Saharan Africa for whom it is the largest source of remittances.

33. Growth spillovers to the other S5 economies are moderate and concentrated on the euro-area in normal times, with longer-lasting effects only during periods of stress. A one-standard deviation shock to U.K. output affects Euro-Area output by 0.2 percent over a two-year horizon; shocks to the U.S. and Japan are even smaller. However, the shocks intensified during the global crisis, operating through financial channels to all major countries. Financial shocks from the U.K. stem from both equity and bond markets, although the latter dominates, reflecting the large share of international bond trading in the U.K. (See Note VI).

34. The spillovers from the U.K. to other G20 economies also appear moderate. A structural macroeconometric model¹⁹ involving international trade and financial linkages is used to derive the impulse responses to a range of shocks in the U.K. (supply, demand, monetary policy, term premium, and equity risk premium). The peak impulse responses of output, based on an average of these shocks, tend to increase with geographical proximity to the U.K., and are larger for financial shocks than for real shocks. The highest dependence is exhibited by Germany and France, reflecting their strong trade and financial linkages, although there is also some impact on South Africa (see figure).

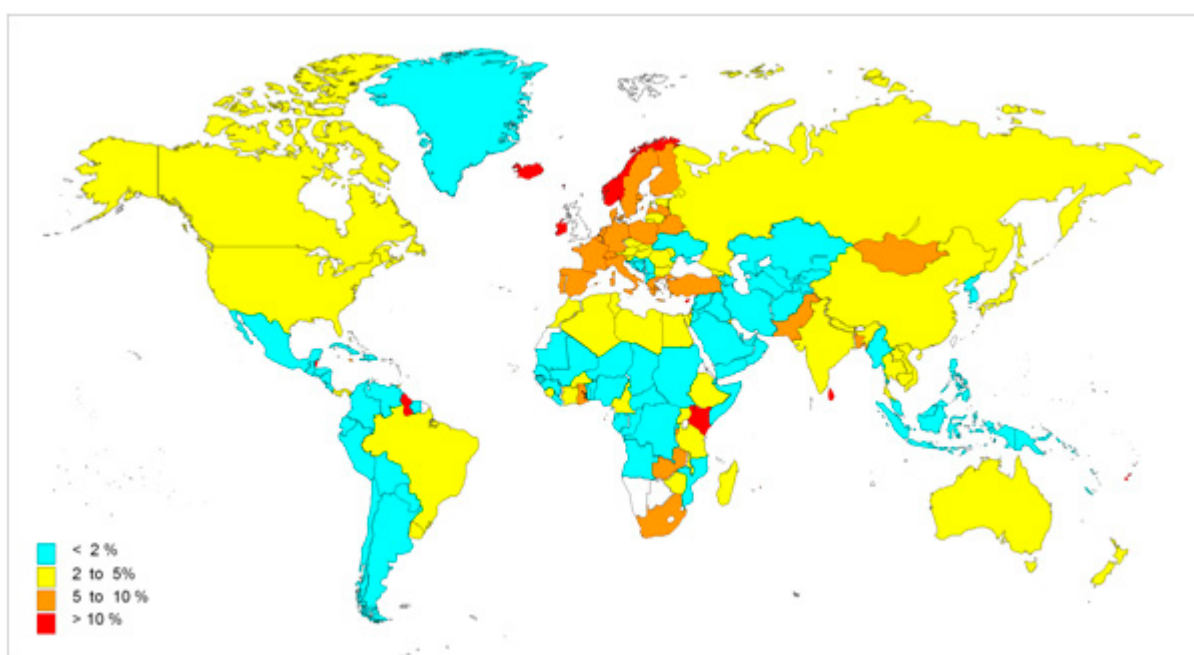


35. Spillovers could be much greater to a disparate group of mainly small economies that are heavily dependent on trade with the U.K., but for which model results are unavailable (Figure 6). Examples (with the share of their exports targeted at the U.K.) include the following:

¹⁹ Vitek, F. (2010), Monetary policy analysis and forecasting in the Group of Twenty: A panel unobserved components approach, International Monetary Fund Working Paper, 152.

- **Small European economies:** Ireland (18 percent) and Iceland (14 percent). While 26 percent of Norway's exports are also directed to the U.K., this may include oil and gas products that are relatively invariant to demand conditions in the U.K.
- **Former U.K. colonies (middle income):** Mauritius (32 percent), Seychelles (24 percent), and St Lucia (16 percent).
- **Former U.K. colonies (low income countries):** Gambia (11 percent) and Kenya (11 percent).

Figure 6. Exports to the U.K. (in percent of total)



VIII. SPILLOVERS FROM A SOVEREIGN DEBT SHOCK²⁰

36. This note presents simulation results for sovereign debt stress scenarios originating in the U.K. and featuring alternative degrees of financial market contagion. These simulation results are generated with a refined version of the structural macroeconomic model of the G20

²⁰ Prepared by Francis Vitek (SPR)

documented in Vitek (2010) (see Figures 7, 8, and 9).²¹ A similar exercise was performed in the other spillover reports on advanced economies. It does not reflect a judgment of likelihood of any of the scenarios examined.

37. The first scenario assumes an episode of sovereign debt stress contained within the U.K. A sudden loss of confidence in fiscal sustainability in the U.K. is represented by a positive term premium shock, which in isolation would raise long-term nominal interest rates in the U.K. by 450 basis points on impact. Heightened risk aversion also afflicts its stock market, represented by a positive equity risk premium shock, which in isolation would reduce U.K. equity prices by 60 percent on impact. Finally, loss of confidence by households and firms causes them to postpone consumption and investment expenditures, decreasing domestic demand by 1 percent, while a fiscal consolidation by the government reduces it by a further 2 percent. This contained episode is estimated to generate weighted average peak output losses of 3.6 percent in the U.K., of 0.1 percent in other advanced economies, and of 0.1 percent in emerging economies.

38. Under the second scenario, heightened risk aversion in the U.K. spreads to bond and stock markets worldwide. This scenario augments our first scenario with term premium shocks, which raise long-term nominal interest rates in all other advanced economies by 30 basis points, and all emerging economies by 45 basis points. In addition, equity risk premium shocks reduce equity prices in all other advanced economies by 5 percent, and all emerging economies by 7½ percent. Finally, loss of confidence decreases domestic demand in all other economies by 0.2 percent, while **fiscal consolidation reactions reduce it by a further 0.2 percent in other advanced economies.** This contagious sovereign debt shock is estimated to generate weighted average peak output losses of 3.8 percent in the U.K., of 0.7 percent in other advanced economies, and of 0.6 percent in emerging economies.

39. The third scenario combines bond and stock market collapses worldwide with a run on sterling. It augments the second scenario with an exchange rate risk premium shock, which in isolation would depreciate the pound by 30 percent in nominal effective terms on impact. The implied real effective appreciation pressure on other currencies is disinflationary, raising the scope for monetary policy loosening to mitigate output losses in affected economies. This contagious

²¹ Vitek, F. (2010), Monetary policy analysis and forecasting in the Group of Twenty: A panel unobserved components approach, International Monetary Fund Working Paper, 152. The calibration of the impact of the sovereign debt shock on U.K. and other markets is based on empirical studies for the United States, scaled by the relative size of the relevant financial markets.

sovereign debt shock is estimated to generate weighted average peak output losses of 3.3 percent in the U.K., of 0.7 percent in other advanced economies, and of 0.6 percent in emerging economies.

40. In all the scenarios, the model probably underestimates the overall fallout from sovereign debt stress, as it does not take into account the impact on bank balance sheets.

Figure 7. Peak Output Losses

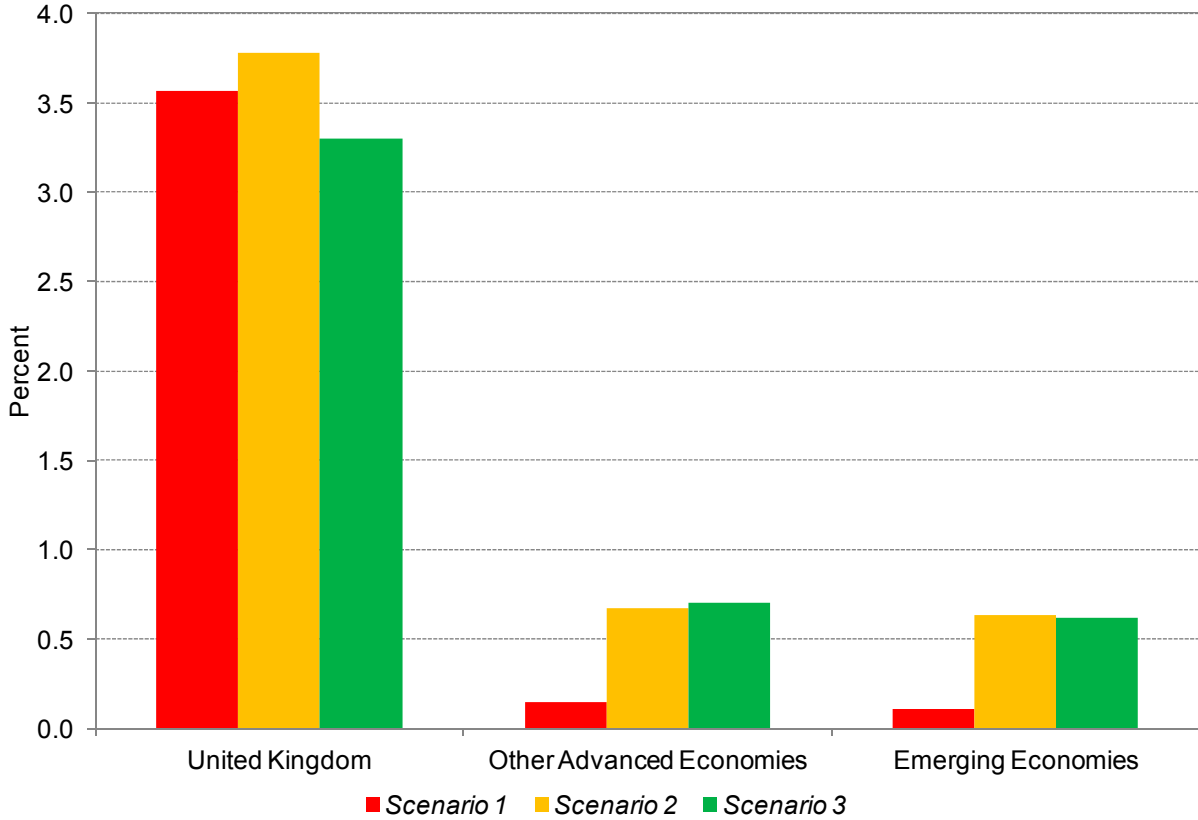
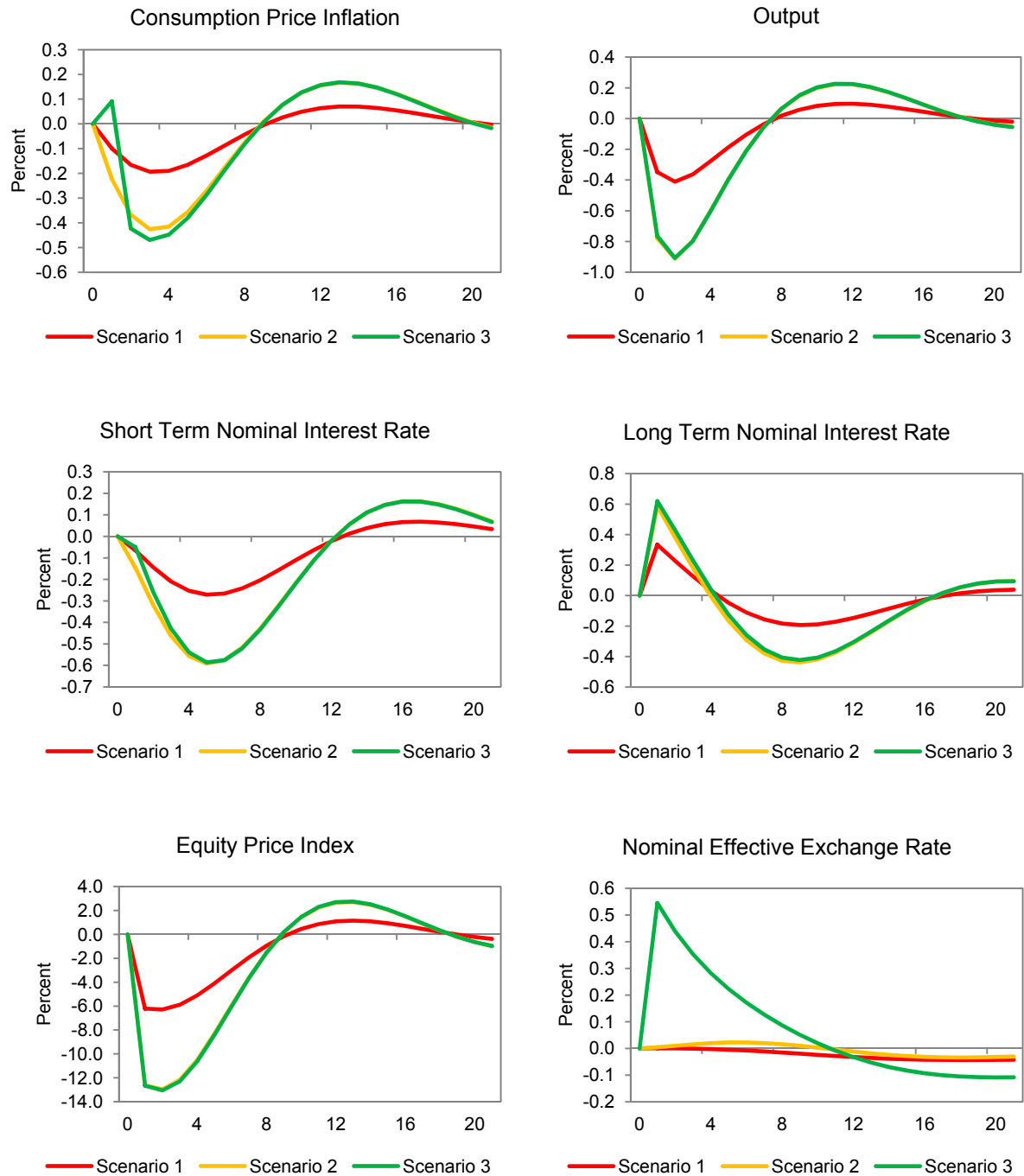
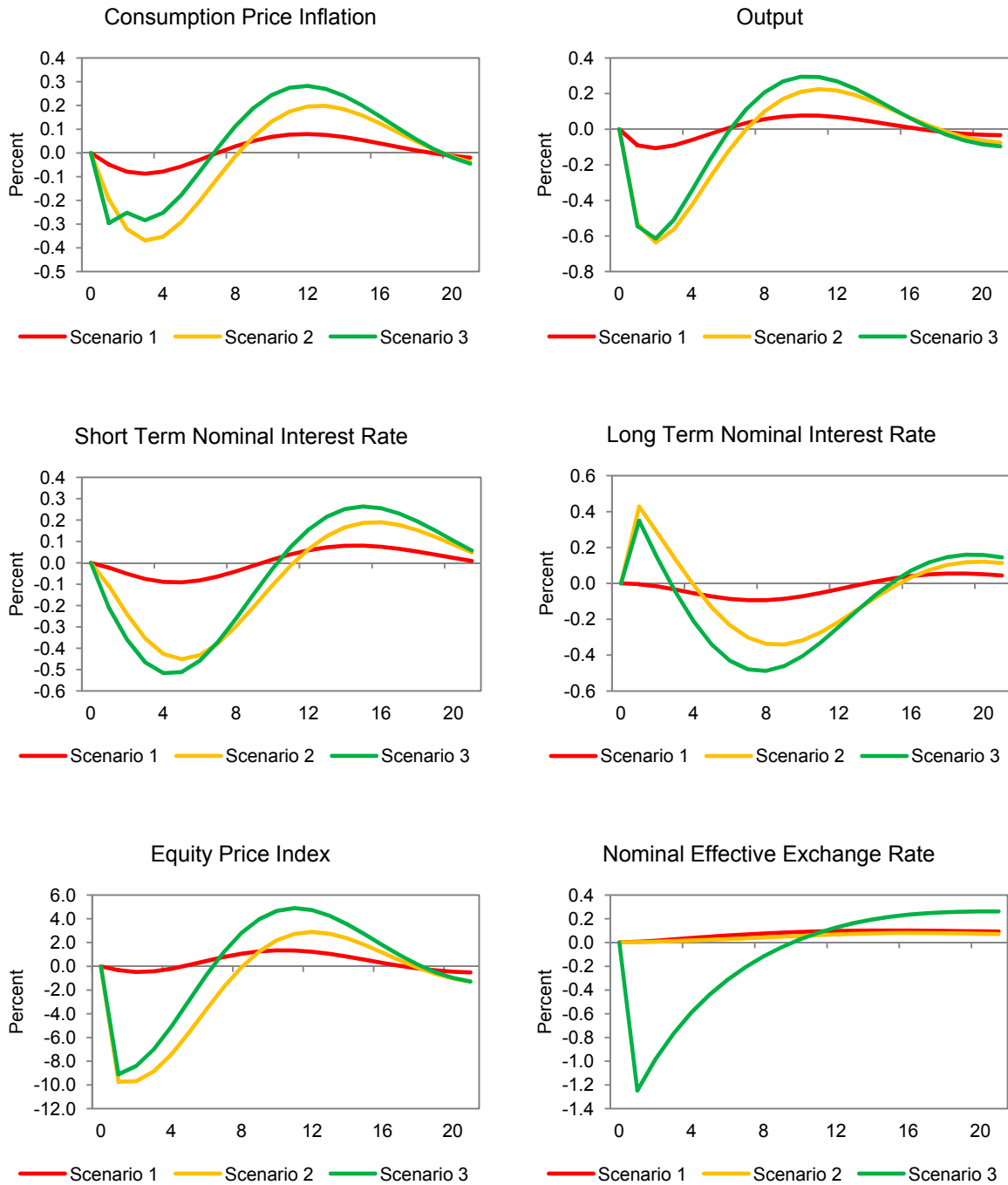


Figure 8. Impulse Responses for a Representative Advanced Economy



Note: These impulse responses are output weighted averages across the nine advanced economies under consideration.

Figure 9: Impulse Responses for a Representative Emerging Economy



Note: These impulse responses are output weighted averages across the 11 emerging economies under consideration.

IX. UPSTREAM VULNERABILITY EXPOSURE TO U.K. BANKS²²

41. Upstream exposure is a summary measure of a borrowing country's exposure to rollover risk in the event of a crisis in its creditor countries. It captures the risks from both direct cross-border lending from banks in upstream creditor countries, as well as lending by foreign affiliates funded by creditor countries' parent banks. It does so by combining consolidated banking statistics (compiled by the BIS) with bank-level data.

42. A borrowing country *j*'s upstream exposure is defined as:

$$\text{Upstream Exposure}_j = \text{Cross border claims}_{ij} + \text{Local claims}_{ij} * (1 - \text{Min}(\text{deposit loan_ratio}_{ij}, 1))$$

where: *Crossborder claims_{ij}* captures the BIS level of direct cross-border claims from country *i* on country *j*; *Local claims_{ij}* the BIS level of affiliates' claims of parent banks from country *i* on country *j*; and $1 - \text{Min}(\text{deposit loan_ratio}_{ij}, 1)$ proxies the proportion of loans that are not financed by local consumer deposits.

43. The higher the deposit to loan ratio, the lower is the share of local claims financed by parent bank resources (or wholesale financing, which is implicitly assumed to be correlated with the parent bank problems). If affiliates' bank level data are unavailable, the borrowing country's national deposit-to-loan ratio is used to widen the sample. Using affiliates' total assets minus local deposits as a proxy for how much lending by affiliates is funded by their parent banks produces similar results—especially among developing countries—but would severely limit country coverage (e.g. individual bank-level data on branches is not reported in many countries).

44. Financial centers (e.g. Hong Kong, Luxemburg, and Cyprus) and some other EU countries (e.g. Ireland, Netherlands, and Belgium) were the most exposed countries (relative to GDP) to a shock in the U.K. domestic banking system as of September 2010 (see Figure 10).

²² Prepared by Eugenio Cerutti (RES)

A similar picture emerges (see Figure 11) if exposure is expressed instead relative to host country banking assets, although this approach also highlights higher exposures in some developing economies.

Figure 10. Upstream Exposure to U.K. Banks (in percent of GDP), September 2010

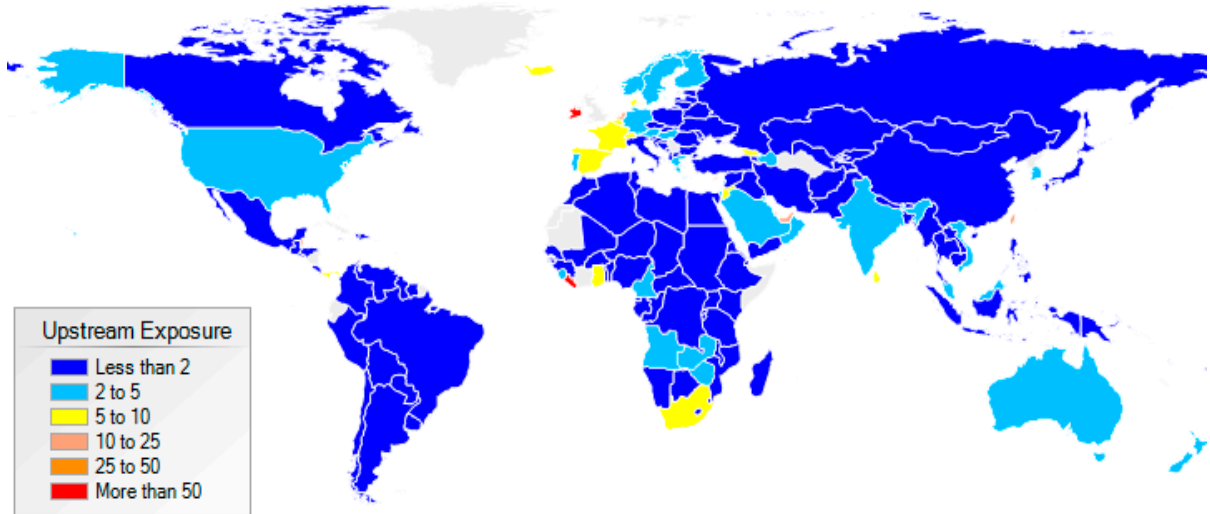
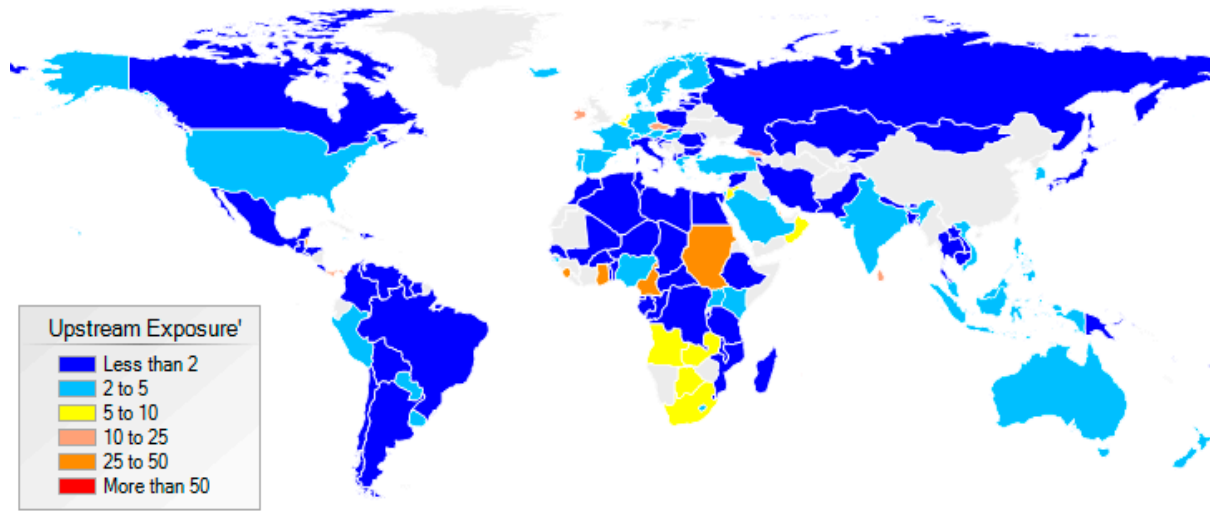


Figure 11. Upstream Exposure to U.K. Banks (in percent of bank assets), September 2010



X. ASSESSMENT OF SPILLOVERS FROM THE U.K. BASED ON CONDITIONAL DISTRESS PROBABILITIES²³

45. This note uses market spreads to analyze the spillovers from financial distress in U.K. banks. The results are presented in a heat-map showing the sensitivity of banks in other countries (both developed and emerging markets) to developments in the U.K. The sample consists of banks from the following countries: France, Germany, Italy, Netherlands, Spain, Brazil, China, Hungary, India, Japan, Korea, Russia, Turkey, and the U.S. One major bank from each country (apart from the U.K.) is used.

46. Spillovers are measured by averages of estimated Conditional Probabilities of Distress (CoPoD) in banks given distress in five U.K. banks²⁴. The CoPoDs are estimated using linear and non-linear dependence between CDS spreads²⁵. Averages of CoPoDs from January 2010 to early 2011 are used, which covers a period of market turmoil for many European sovereigns and banks (particularly in the Euro-Area). Distress is defined as a (hypothetical) credit event that triggers CDS contracts²⁶. For example, if the CoPoD in Bank A given distress in Bank B is 0.5, CDS market prices indicate that there is a 50 percent probability of a (hypothetical) credit event in Bank B being followed by a credit event in Bank A. CoPoDs therefore represent the market's assessment of potential spillovers through channels such as direct exposure to governments and banks, deleveraging or market confidence. CoPods do not convey any information on the direction of contagion or causation of distress.

²³ Prepared by Gavin Gray, Siret Dinc, Mohamed Norat, and Malika Pant.

²⁴ The U.K. banks included in the model comprise Barclays, HSBC, Lloyds, RBS, and Standard Chartered.

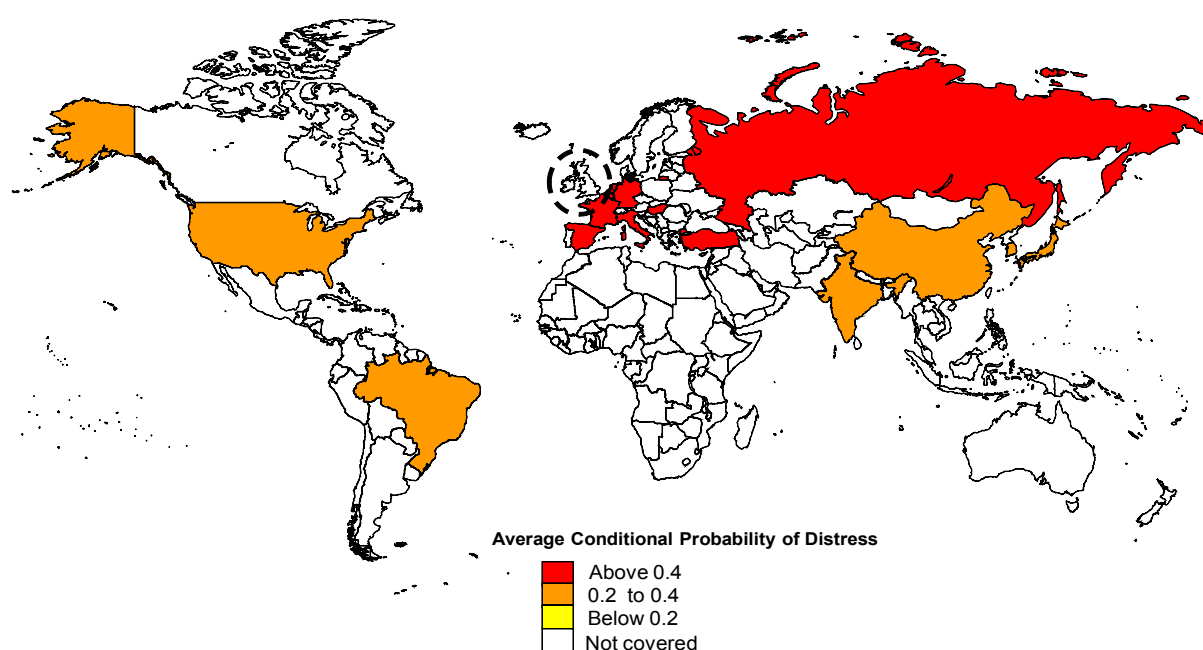
²⁵ The CoPoDs are estimated as in Segoviano (2006), "Consistent Information Multivariate Density Optimizing Methodology," Financial Markets Group, London School of Economics, Discussion Paper 557, Segoviano (2006), "The Conditional Probability of Default Methodology," Financial Markets Group, London School of Economics, Discussion Paper 557, and Segoviano and Goodhart (2009), "Banking Stability Measures," IMF Working Paper, WP/09/04.

²⁶ A credit event could be a default or a restructuring in which bondholders are forced to bear losses. The mapping from CDS spreads to probabilities of distress assumes a fixed recovery rate of 40 percent given distress.

Bank-to-Bank Spillovers

47. **The estimated spillovers from U.K. banks are large, but concentrated on Europe (see Figure 12).** The largest distress spillovers would fall on banks in the Euro-Area, Hungary, and Turkey. Spillovers to Latin American, Asian, and the U.S. banking systems are smaller but still sizable. The most internationally oriented U.K. banks (HSBC, Standard Chartered, and Barclays) have the strongest impact on other banks, while the impact from more domestically oriented institutions (RBS and Lloyds) is understandably more muted.

**Figure 12. Conditional Probability of Distress of Banks Given U.K. Banks
(Average) Falls in Distress**



XI. CONTRIBUTION OF THE U.K. TO “COMMON RISK” IN GLOBAL FINANCIAL MARKETS²⁷

48. **This note develops a methodology for assessing the impact of U.K. financial markets on global risk perceptions, and concludes that its impact is significant.** As the world has become globalized, financial assets have become increasingly correlated and influenced by

²⁷ Prepared by Silvia Sgherri (SPR).

unobservable global “common factors”, also known as “risk commonalities”. Overall, the U.K. is estimated to contribute up to 20 percent of changes in risk commonalities, a similar effect to that of the Euro Area albeit smaller than that of the U.S. While the U.K. interbank and stock market have significant effects, corporate bond spreads appear less significant.

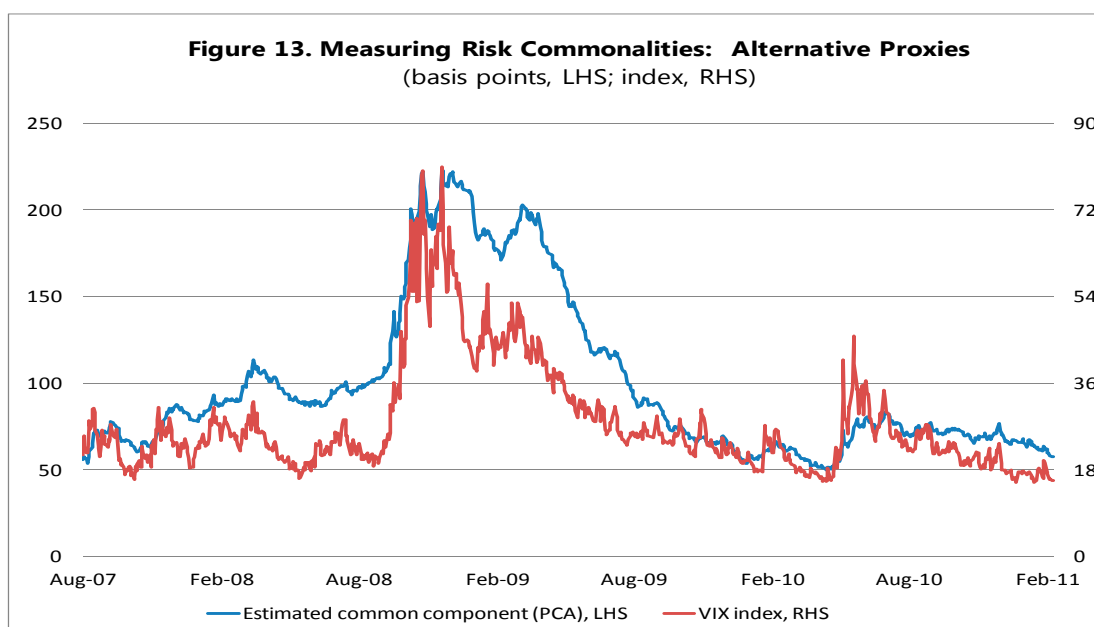
49. The methodology relies on principal component analysis, which is used to estimate the extent to which unobservable shifts in common risk factors contribute to observed changes in asset-specific expected returns. As international investors react to shocks by rebalancing their portfolios in asset markets that would otherwise be unrelated, any change in investors’ willingness to bear risk—or any common shock—is deemed to raise the co-movement across asset returns. By assuming that risk premiums embedded in selected asset yield differentials are determined jointly in the market and influenced by both asset-specific factors and a common factor, the latter component can be identified and stripped out. In other words, if there is an increase in the (risk-neutral) probability of default for all assets considered—which is likely to have happened during the global financial crisis—this would likely be picked up in the principal component, along with shifts in investors’ attitude toward risk.

50. The contribution of U.K. asset markets to the estimated common risk component is gauged by adding up the contribution to the common risk component of all asset markets in the region. The analysis also permits an assessment of the extent of volatility spillovers from individual U.K. asset markets across borders and across markets, once we abstract from “risk commonalities”.

51. The analysis relies on the set of risk premiums embedded in the following yield differentials:

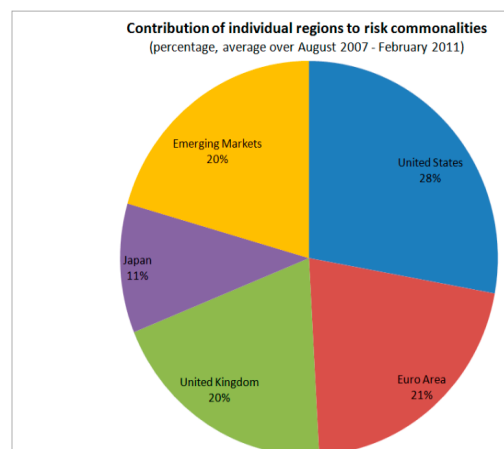
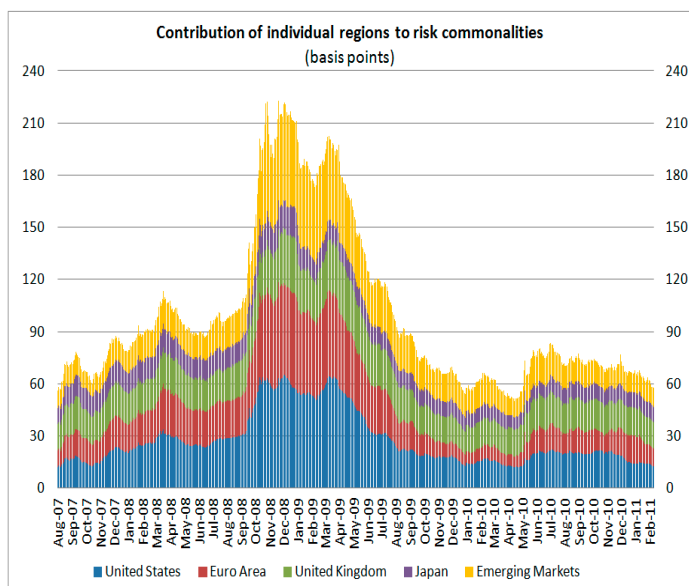
- U.S. asset-backed commercial paper (versus the 3-month U.S. Treasury bond yield);
- 3-month U.S. dollar, euro, sterling, and yen London interbank offered rates (versus their corresponding overnight index swap rates);
- U.S., euro-area, U.K., and Japanese high-yield financial and industrial corporate bonds (versus their respective benchmark 10-year government bond yields);
- U.S., euro-area, U.K., and Japanese equities (whose implied risk is computed as the earnings price ratio versus their respective benchmark 10-year government bond yields);
- 10-year sovereign bonds (over Bunds) for peripheral euro-area countries (including Greece, Ireland, Portugal, and Spain);
- Asia, Europe, and Latam emerging markets bonds (whose implied risk is given by their global EMBI+ spread versus the 10-year U.S. Treasury bond yield).

52. The estimated unobserved factor indicates that the common risk component ratcheted up sharply during Spring 2010 (see Figure 13) as sovereign pressures in peripheral European countries intensified. But the rise in risk commonalities was not as severe as it had been during the Lehman bankruptcy.²⁸

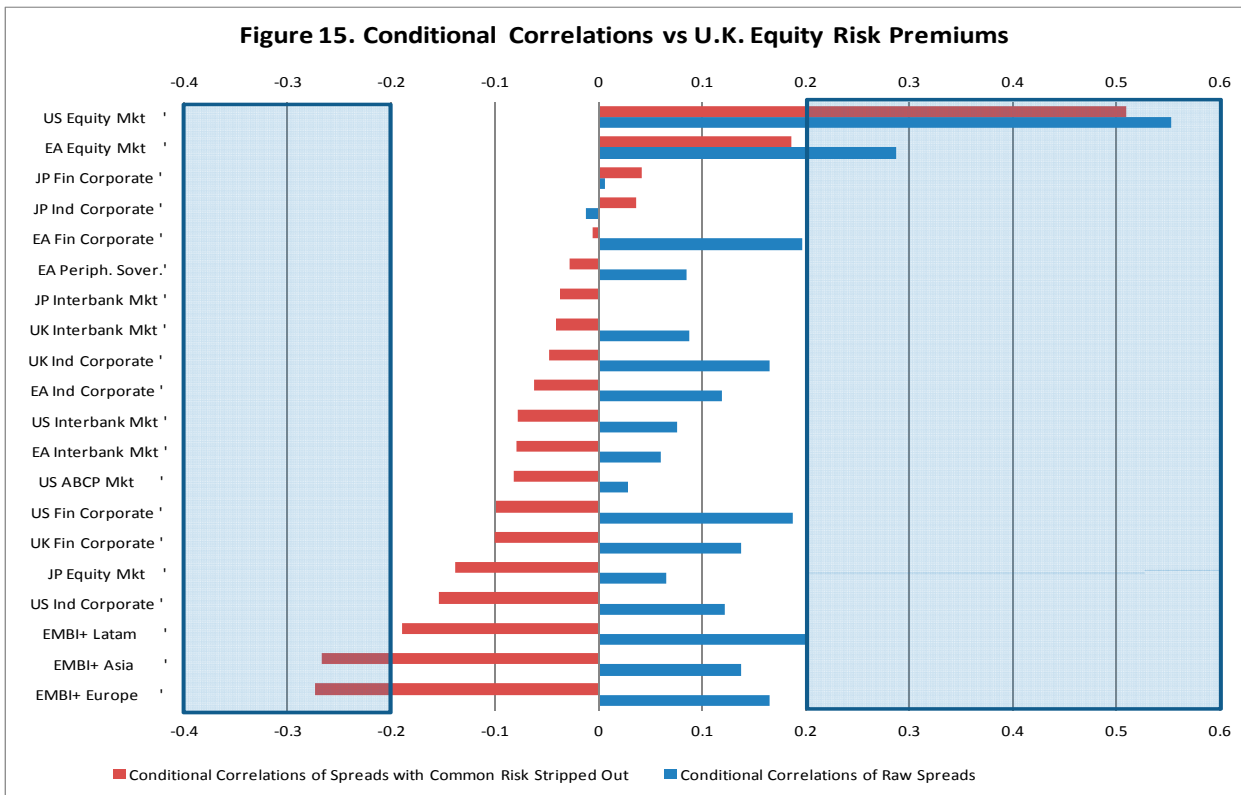
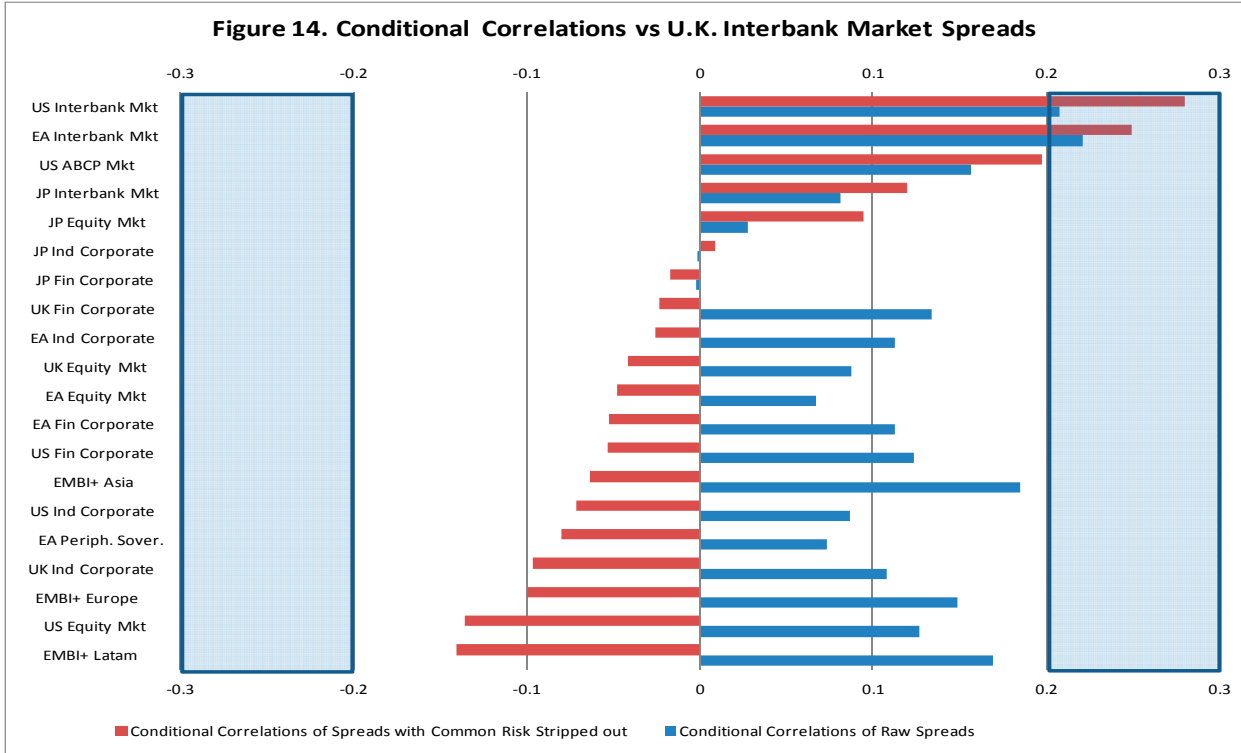


53. The analysis suggests that U.K. financial markets have played a non-negligible role in transmitting financial shocks to the rest of the world. In particular, the U.K. is estimated to contribute to one-fifth of the changes in risk commonalities—which is smaller than the contribution from the U.S., but broadly in line with the one of the Euro Area and the emerging markets.

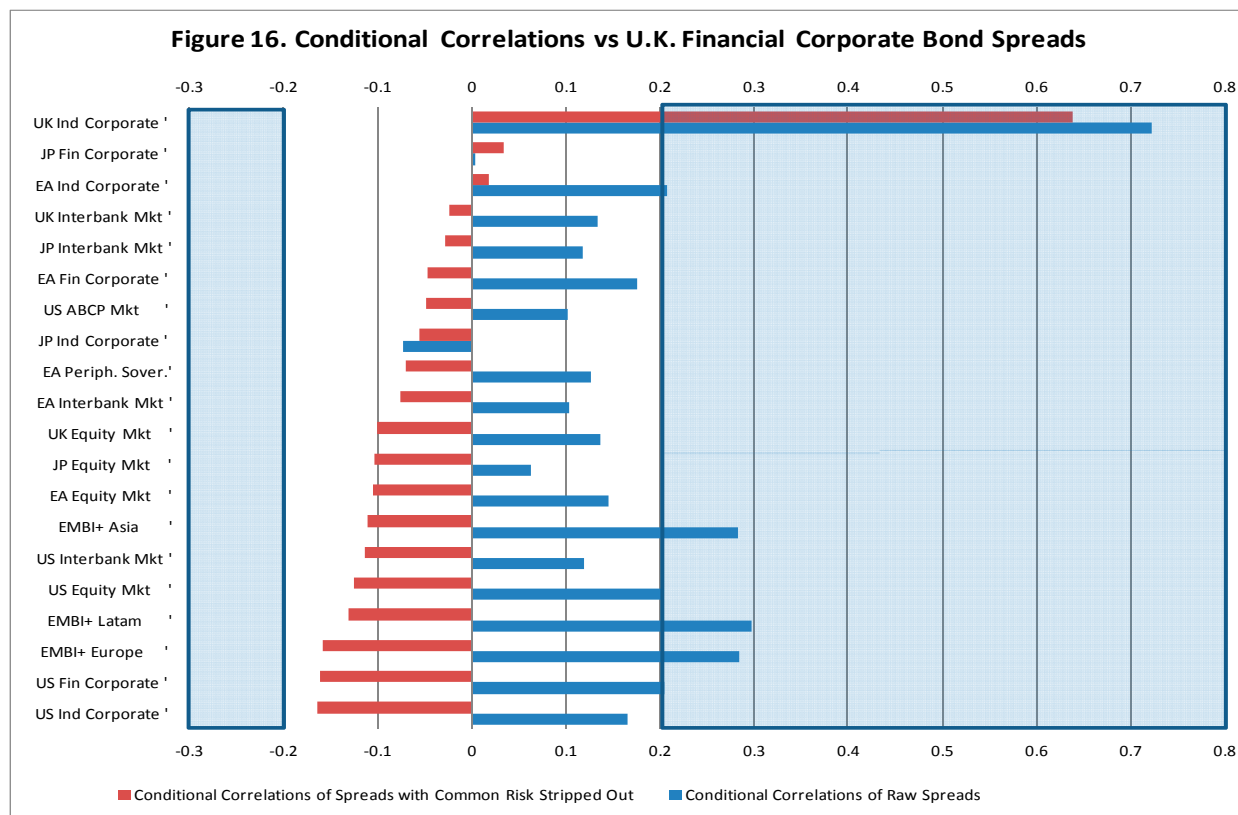
²⁸ The importance of risk commonalities varies over time, being greater at time of generalized stress in financial markets. On average, over the sample August 2007–February 2011, risk commonalities are found to explain about one-third of the total volatility for the portfolio considered.



54. The U.K. interbank and stock market seem to be characterized by significant volatility spillovers vis-à-vis corresponding asset markets in the U.S. and—to a lesser extent—the Euro Area. Specifically, while “raw” cross-market correlations (blue bars in the charts below) indicate that “observed” volatility co-movements across assets and borders tend to be widespread, an examination of cross-correlations of spreads where the common risk component has been stripped out (red bars) reveals that specific volatility to the U.K. interbank and equity markets is more likely to spread across corresponding markets in the U.S. and the Euro Area than across different markets (with the exception, perhaps, of spillovers between the interbank markets and the U.S. asset-backed commercial paper, see Figures 14 and 15). This seems also to confirm the existence of effective hedging positions in EMBI+ bond markets vis-à-vis stock market risk in the U.K., the U.S., and the Euro Area.



55. By contrast, volatility spillovers from the U.K. financial corporate bond market to the rest of the world appear limited (see Figure 16). Once the common risk component is stripped out, specific volatility spillovers from the U.K. financial corporate bond market are likely to be felt only in the bond market of U.K. non-financial corporations, signaling only an interrelation in the perceived riskiness of the two domestic bond markets.



XII. CROSS BORDER MARKET IMPACT OF LIQUIDITY POLICY ANNOUNCEMENTS: EVENT STUDIES²⁹

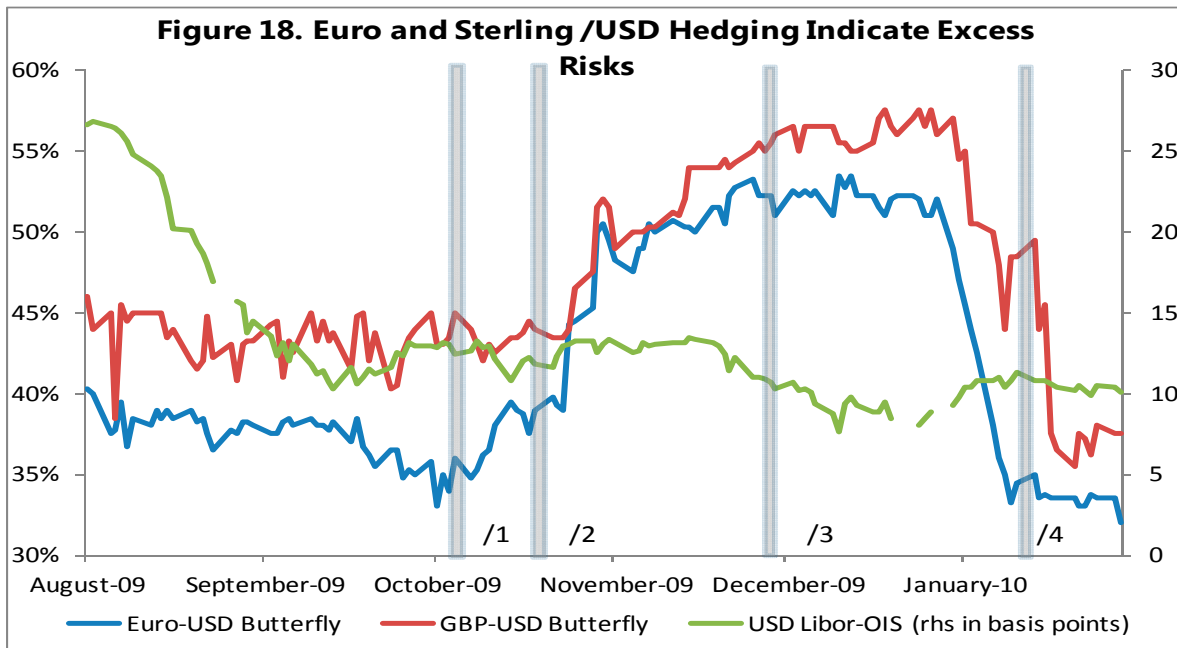
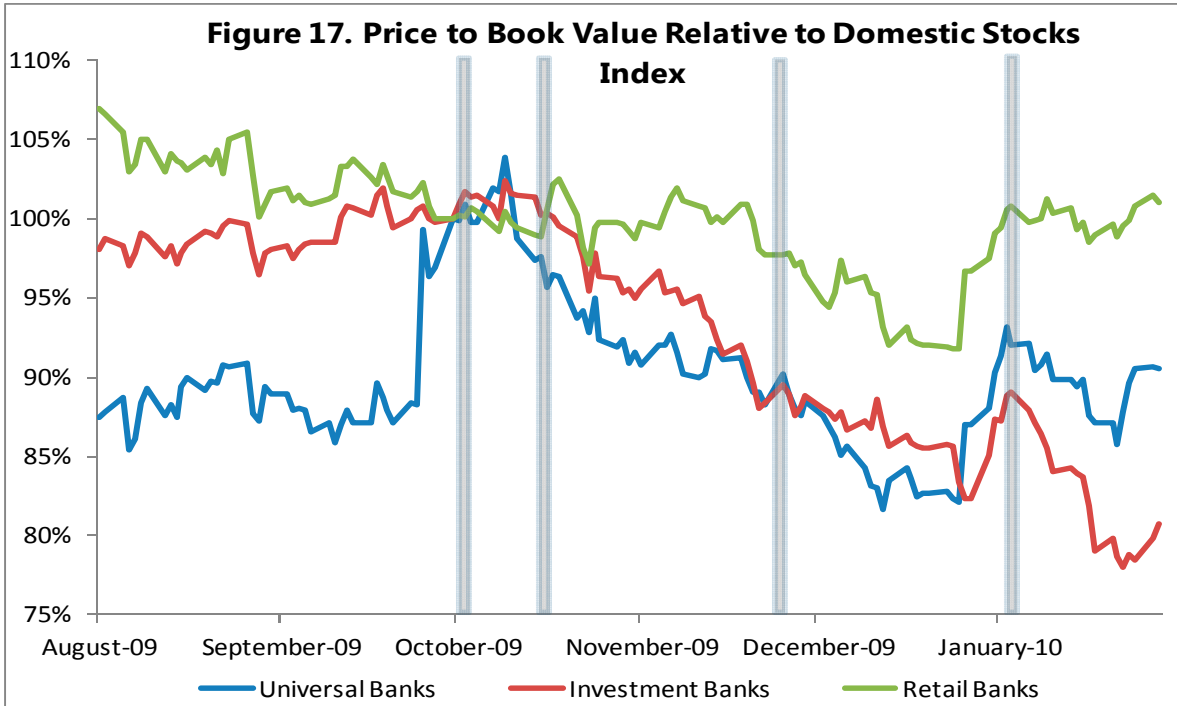
56. The potential for regulatory changes on liquidity in the U.K. materially impacted market prices of SIFIs and instruments they use to facilitate global intermediation. Event studies suggest that announcements on changes in U.K. regulation on liquidity standards coincided

²⁹ Prepared by Karim Youssef (SPR).

with sharp reactions in the value of traded equity instruments of global systemically important banks. Moreover, while commonly used proxies for funding pressures did not immediately react, the price of hedging cross currency exposures—another indication of market funding pressures—rose sharply.

57. Markets reacted to U.K. announcements on liquidity regulation by punishing SIFIs with universal and investment banking business models. The average price to book value of SIFIs with a universal and investment banking business model relative to their home country index fell sharply on key dates coinciding with U.K. announcements on liquidity. On the other hand, the reaction of equity prices of commercial banks was not as pronounced. An interpretation of this is that markets viewed changes in U.K. policy on liquidity as having a materially negative impact on the business models of those banks with business models that rely significantly on the U.K. to efficiently pool and allocate liquidity on a global scale (see Figure 17.).

58. Some indicators of U.S. dollar funding pressures exhibited sharp reactions to U.K. announcements. While LIBOR-OIS, a common proxy indicator of liquidity risk, did not immediately react to announcements on changes in U.K. regulation on liquidity standards, the cost of employing the so-called butterfly strategy to hedge against sharp movements in the exchange rate moved sharply (see Figure 18.). This is indicative of a rise in market's fear that sharp movements in exchange rates will directly impact their ability to continue accessing cross currency based funding sources (see text Box).



- /1 Oct. 5 & 9, 2009 Initial FSA Policy Statement on Liquidity and Conference on Liquidity
- /2 Oct. 22, 2009 FSA publishes study on cumulative impact of Liquidity reform
- /3 Dec. 1, 2009 New Liquidity regime comes into effect
- /4 Jan. 13, 2010 FSA Letter to CEO's detailing Firm Liquidity Risk Management requirements

Box 1: Alternative Measures of Cross-Currency Funding Risk

In the absence of market distress or excess uncertainty, the price of borrowing U.S. dollars in the short-term funding markets can be gauged by observing USD Libor fixings. However, anecdotal evidence suggests that in the wake of the crisis, Libor fixings have become less indicative of the actual price of borrowing. As a result, commonly used indicators of liquidity risk such as the spread between Libor and OIS may not be as informative as they once were. By implication, it becomes a necessity to uncover alternative ways of gauging liquidity risk.

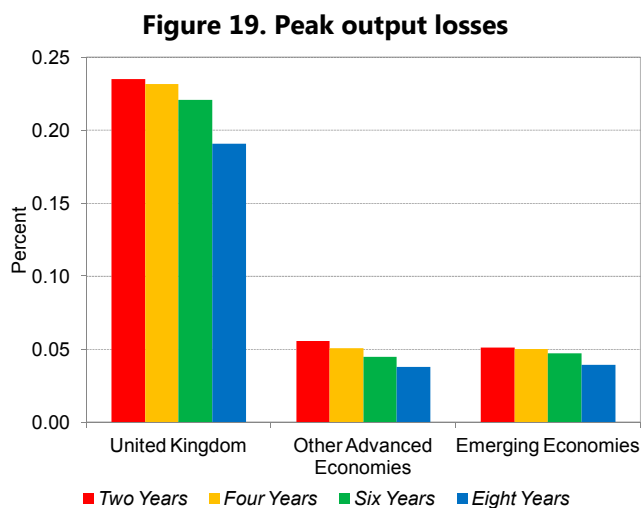
A simple deconstruction of the Libor-OIS relationship (why the spread indicates funding pressure) implies that the relationship between domestic rates and Libor should remain close to parity (~ 10 basis points). By extension this parity can be translated into a relationship between the pricing of short-term funding and interest-rate parity between currency pairs. As such, an alternative to an outright short term borrowing contract underpinned by a Libor fixing, can be a currency swap agreement with an implicitly priced “borrowing rate” premium to account for valuation changes along with other embedded risks. For example a U.S. dollar—Euro currency swap will normally mean that the swap payer (i.e. the party receiving liquidity upfront in exchange for periodic payments of rate changes over time) is long U.S. dollar cash and short EUR/USD exchange rate risk.

Normally, this type of transaction is a hedging vehicle; however, when a currency swap is used as a funding vehicle it requires a hedging instrument of its own. FX options can easily fill this role. One particular option based strategy allows a discounted if not costless hedging of FX risk embedded in the currency swap, namely an FX butterfly. The butterfly allows the party exposed to exchange rate risk to mitigate large movements in a given currency pair.

XIII. AN ESTIMATE OF THE OUTPUT COST OF REGULATORY REFORM³⁰

59. One approach to estimating the negative impact on short-run activity of increased capital requirements or lending spreads is to use a macro-econometric model. Using such an approach, based on an extended and refined version of the model in Vitek (2009), suggests peak output losses from a 1 percent increase in capital requirements, or an increase in lending spreads of 12 basis

points, range between 0.04 and 0.06 percent for advanced economies (reflecting their dependence on credit provided by U.K.-based banks), and 0.04 to 0.05 percent for emerging markets (see Figure 19). While the U.K. has strong financial links to the U.S., Germany, and France, the impact on the latter two economies is larger, suggesting that their more bank-based financial systems will suffer a greater impact from regulatory reform.



60. The simulations in this note are derived from an extended version of a macro-econometric model of the world economy, disaggregated into its 15 largest economies (Vitek, 2009). These scenarios abstract from monetary policy and assume that effects of the increase in capital requirements are transmitted exclusively via a permanent increase in the spread between commercial bank lending and deposit rates (calibrated at a 0.12 percent increase in the interest rate spread per 1 percent increase in capital requirement³¹). The negative impact on the U.K. economy spills over to other economies via trade and exchange rate linkages. To capture cross-border bank

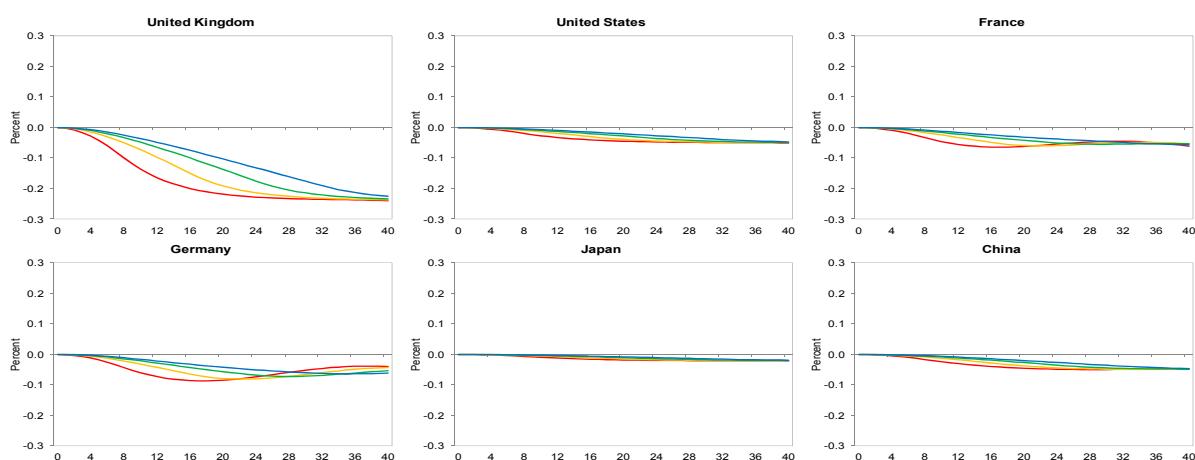
³⁰ Prepared by Alvaro Piris and Francis Vitek (SPR).

³¹ This follows the work reported by the Macroeconomic Assessment Group “Final report: Assessing the Macroeconomic Impact of the Transition to Stronger Capital and Liquidity Requirements”, BIS, December 2010. FSA estimates for the U.K. are marginally lower (by less than one basis point).

lending channels, increases in lending spreads are imposed on the other economies proportionally to the share of credit provided by U.K.-incorporated banks.

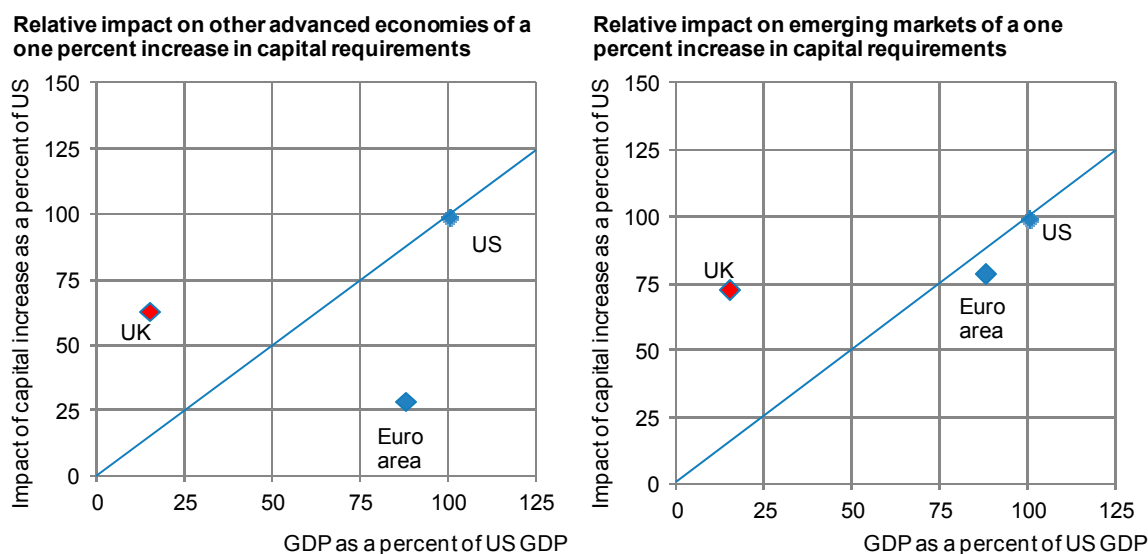
61. A binding one percent increase in capital adequacy requirements (or equivalent rise in lending spreads) in the U.K. is estimated to generate a peak output loss of 0.19 to 0.24 percent in the U.K., depending on the speed of implementation. In other advanced economies, the estimated weighted average peak output loss ranges between 0.04 and 0.06 percent, reflecting their dependence on credit provided by U.K. incorporated banks (see Figure 20). In emerging economies, this peak output loss ranges between 0.04 and 0.05 percent, reflecting their trade openness and managed exchange rate regimes.

Figure 20. Impulse Responses of Output to a Capital Adequacy Requirement Increase



Note: Depicts the impulse responses of output to a binding one percent capital adequacy requirement increase in the United Kingdom implemented over a two year ■, four year ■, six year ■, and eight year ■ period.

62. While the effects are modest, simulations for other economies in the model also yield small impacts. The U.K. impact is, in fact, disproportionately large considering its relative size in GDP or trade flows: while U.K. GDP is about a sixth of U.S. GDP, the impact of a capital increase on other economies in the sample is over 60 percent of the U.S. impact for other advanced economies and over 70 percent for emerging markets (see figure below). For comparison, and while somewhat understated by exclusion of the bank lending channel from the model for this simulation, the Euro area has a smaller effect (it lies to the right of the diagonal). Using trade flows rather than GDP as a benchmark yields a similar conclusion with respect to the U.K.



63. These results are subject to a number of caveats. Firstly, the model does not allow for changes in bank behavior, that may cause them to retrench further in activities or countries perceived as “noncore” to save capital. It also does not capture the effects of competition in moderating the impact of a capital increase on lending spreads (though this concern may be lessened by the fact that banks in many countries will be applying the new rules in parallel), or that market conditions for bank capital and funding will change over time and have a (possibly much larger) impact on lending spreads. If higher capital were to induce investors to accept lower returns on equity, lending spreads would not have to rise as much (see Admati et al, 2011, although market interlocutors were skeptical this mechanism would operate).³² The model operates through standard macroeconomic relationships, and thus does not model bank behavior or balance sheets, or capture other aspects of the transmission of financial shocks.

64. As noted elsewhere, macroeconomic channels may be relatively unimportant in the case of the U.K. For example, while raising lending spreads is one channel through which banks may react to increased capital requirements, they may also more directly restrict the quantity of new lending, which could have an even larger effect on credit supply and economic activity. Using a bank-by-bank approach, Francis and Osborne (2009) find that a 1 percent increase in capital requirements in 2002 would have reduced lending (total risk-weighted assets) by 1.2 (2.4) percent

³² Admati, A.R., P.M. De Marzo, M.F. Hellwig and P. Pfleiderer, “Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why bank Equity is Not Expensive”, available at: <http://www.gsb.stanford.edu/news/research/admati.etal.html>

after four years, although they do not estimate the impact on economic activity.³³ Finally, possible effects on long-run aggregate supply are not captured by the model. These may be small, implying that modest short-run impact could be counteracted by easier monetary policy, and that costs will be outweighed by benefits in terms of increased financial stability.³⁴

³³ Francis, W. and M. Osborne, “Bank Regulation, Capital and Credit Supply: Measuring the Impact of Prudential Standards”, FSA Occasional Paper no. 36, September 2009.

³⁴ See for example Angelini, P., L. Clerc, V. Cúrdia, L. Gambacorta, A. Gerali, A. Locarno, R. Motto, W. Roeger, S. Van den Heuvel and J. Vlček, “BASEL III: Long-term impact on economic performance and fluctuations”, BIS Working Paper no. 338, February 2011.