



BANK OF ENGLAND

Financial Stability Paper No. 22 – June 2013

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# Which way do foreign branches sway? Evidence from the recent UK domestic credit cycle

Glenn Hoggarth, John Hooley and Yevgeniya Korniyenko

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Foreign bank branches have a significant presence in the United Kingdom's financial sector, more so than in any other major advanced economy. A lot of their business activities are with non-residents but they are also important sources of credit for UK financial and non-financial companies. During the recent crisis, the growth in credit to UK borrowers from foreign branches fell sharply and by much more than from UK-incorporated banks. Using a combination of aggregate and individual bank-level data, this paper explores why foreign branches' UK lending was much more cyclical. Both demand and supply factors appear to have been important. The domestic loan book of foreign branches was more concentrated on cyclical sectors than that of UK-incorporated banks. But it was also the case that their lending to most domestic sectors increased more rapidly in the run-up to the crisis and fell more subsequently. Foreign branches were also more reliant on fickle forms of funding, especially from abroad. Going forward, it is important the Financial Policy Committee and Prudential Regulation Authority closely monitor the risks that foreign branches, particularly large ones, may pose to UK financial stability and to the broader economy.

## 1 Introduction

Branches of foreign banks have a large presence in the United Kingdom; currently they account for around one third of UK-resident banking assets. Their business model though is distinct from that of UK-incorporated banks — UK-owned banks and foreign subsidiaries — with the lion's share of both their assets and liabilities held with non-residents.

But foreign branches are far from simply entrepôts — recycling inflows from abroad back out again. Given their large size, in aggregate, they are important sources of credit for some UK borrowers, especially financial and non-financial companies. Foreign branches — and subsidiaries — can also contribute other benefits to the UK economy. They can increase competition in the domestic financial market and may increase the efficiency of domestic banks through transferring technological and managerial know how. Nonetheless, during the recent crisis, the growth in credit to UK borrowers from foreign branches fell sharply and by much more than from UK-incorporated banks. Using a combination of aggregate and individual bank-level data this paper explores why the growth in bank credit from foreign branches fell so sharply and draws out possible lessons for policy going forward.

## 2 What is the distinction between a foreign branch and a subsidiary?

A foreign branch is legally inseparable from its parent. It is mainly supervised by the home authorities as part of supervision of the banking group as a whole. It is also not separately capitalised. And, retail deposits of a foreign branch, if any, may be insured by the home rather than host country insurance scheme. For example, within the European Economic Area (EEA), deposits placed in the branches of banks from other EEA countries are insured by the home country deposit insurance scheme.<sup>(1)</sup> In contrast, foreign subsidiaries are separate legal entities. Like domestically owned banks, they are authorised and separately regulated and supervised by the host country supervisory authority. They are also separately capitalised and their retail deposits are insured by the host country's deposit guarantee scheme.

A number of factors determine whether a banking group operates abroad through a branch or a subsidiary.<sup>(2)</sup> Attitudes of national authorities to the presence of foreign branches differ across jurisdictions. The UK authorities have, at least in the past, generally adopted an open approach to foreign branches, particularly where the home country regulatory regime is broadly equivalent to that of the United Kingdom. In addition, under EU law, any bank that is incorporated in an EEA country has the right to open a foreign branch in any other EEA country, including the United Kingdom.

The regulatory and taxation arrangements applied to foreign branches and subsidiaries can also differ across host

authorities. These differences are likely to be important in determining the structure of a bank's foreign operation. The banking group's business model may also play a key role. Everything else equal, banks with significant wholesale market operations may prefer to operate cross-border through a branch structure. Funding costs to such a group are likely to be lower given the flexibility to move funds easily and cheaply across the banking group. In addition, branches unlike subsidiaries are sometimes not subject to large exposure regulations by the host authority.<sup>(3)</sup> In these respects, global wholesale banks may consider the United Kingdom to be a particularly attractive location for establishing a branch structure given London's role as an international financial centre. In contrast, a subsidiary structure puts limits on the banking group's ability to transfer funds across border within the banking group. But a global retail bank may prefer a more decentralised subsidiary model focused on raising deposits from host retail customers and lending to the host economy. That said, although the legal distinction between a branch and subsidiary is clear, the business models they adopt, in practice, sometimes overlap.

## 3 Stylised facts on foreign branches in the United Kingdom

There are a large number (over 150) of branches of foreign-owned banks operating in the United Kingdom. In aggregate, they account for one third (£2.7 trillion) of the total assets of the UK-resident banking system, equivalent to around 180% of annual UK GDP (Table A).

**Table A** Summary of population of UK-resident banks by ownership (unconsolidated), end-2011<sup>(a)</sup>

	Foreign branches	UK-owned banks	Foreign subsidiaries	All resident banks
Number of banks	155	114	98	367
Average size by total assets, £ billions (median)	2.8	0.5	0.7	1.0
Average size by total assets, £ billions (mean)	17.7	37.4	11.4	22.1
Share of assets held by the top five banks, per cent	55.8	78.9	68.4	43.5
Total assets, £ billions	2,742	4,265	1,118	8,124
Total assets, per cent of annual GDP	180	281	74	535
Market share (per cent) of lending to:				
Total UK private sector <sup>(b)</sup>	14.3	69.0	16.7	100
Households	3.0	78.5	18.5	100
Private non-financial corporations (PNFCs)	20.4	66.9	12.7	100
Other financial corporations (OFCs)	17.2	65.9	16.9	100
Interbank	40.2	44.9	14.9	100

Sources: Bank of England, ONS and Bank calculations.

(a) Includes building societies.

(b) In all currencies, excluding assets held at the Bank of England and intragroup assets (lending to related offices of the same bank).

(1) However, deposits of branches from banks incorporated in non-EEA countries are insured by the host EEA country scheme.

(2) For a more detailed discussion of the arguments see Fiechter *et al* (2011).

(3) In the United Kingdom, for example, individual exposures of UK-owned banks and foreign subsidiaries must not exceed 25% of eligible capital. For foreign branches, the UK authorities rely on the home regulator to enforce large exposure limits on UK-branch activity, which is monitored against the parent's capital base.

**Table B** Composition of UK-resident banks' assets and liabilities (amounts outstanding, end-2011)<sup>(a)</sup>

	Total assets (£ billions) <sup>(b)</sup>	Domestic assets (per cent of total assets)			External assets (per cent of total assets)				Domestic liabilities (per cent of total assets)			External liabilities (per cent of total assets)			
		Total	of which, financial sector	of which, non- financial sector	Total	of which, interbank	of which, intra- group	of which, other	Total	of which, retail	of which, other	Total	of which, interbank	of which, intra- group	of which, other
Foreign branches	2,742	27.6	19.5	8.1	72.4	16.1	28.7	27.5	29.8	0.8	29.1	70.2	14.1	34.0	22.1
Foreign subsidiaries	1,118	68.0	39.2	28.8	32.0	7.8	5.0	19.3	74.5	16.5	58.0	25.5	4.7	7.1	13.7
UK-owned banks	4,265	67.0	33.4	33.5	33.0	5.2	10.2	17.6	74.8	24.3	50.6	25.2	6.9	7.0	11.2
All UK-resident banks	8,124	53.9	29.5	24.3	46.1	9.2	16.1	20.8	59.6	15.3	44.3	40.4	9.0	16.1	15.2

Sources: Bank of England, Bank for International Settlements (BIS) and Bank calculations.

(a) Includes building societies.

(b) The figures for total assets in **Table B** were amended on 19/06/13. Previously the figures for total assets in **Table B** did not incorporate all statistical elements which have been included in the data in **Table A**.

Like UK-incorporated banks, the assets held by foreign branches are highly concentrated with the five biggest branches accounting for more than one half of the total assets of foreign branches in aggregate.

The business model of foreign branches though seems to be very different to that of UK-owned banks and foreign subsidiaries (**Table B**). The assets and liabilities of foreign branches identified as being held with non-residents accounted for 72% and 70% respectively of their total assets at end-2011. For UK-owned banks, the equivalent shares are 33% and 25% and for foreign subsidiaries they are 32% and 26%.<sup>(1)</sup>

Part of this difference is accounted for by the much larger share of cross-border lending and borrowing by foreign branches within their banking group (presumably mainly with the parent bank in the home country). But, they are also more reliant on funding from unrelated non-resident banks than UK-incorporated banks. Therefore, at this high level of aggregation, the business model of foreign branches resident in the United Kingdom is much less domestically oriented than for UK-owned banks and foreign subsidiaries operating in the United Kingdom. This suggests that foreign branches are both vulnerable to external shocks and a potential source of spillovers to other economies.<sup>(2)</sup>

Utilising London's role as a financial centre, a large part of foreign branches' business is likely involved with trading activities in money and foreign exchange markets and with other financial firms both located in the United Kingdom and abroad. For example, securities holdings and interbank lending account for around one half of the assets of foreign branches compared to 40% for UK-owned banks and 30% for foreign subsidiaries.

Nonetheless, because the assets of foreign branches are very large in aggregate, focusing on the sectoral composition of their activities understates their participation in some domestic UK loan markets. Foreign branches provide a significant amount of lending to private non-financial corporations (PNFCs) and other financial corporations (OFCs)

and are important players in the domestic interbank market — having a 40% share (**Table A**).<sup>(3)</sup>

So foreign branches are an important direct source of credit to UK PNFCs and potentially an important indirect source of financing to companies and households via lending to other banks and OFCs. In contrast, foreign subsidiaries have, in aggregate, a smaller share of these domestic wholesale credit markets but have, mainly via Santander, a large share (almost 20%) of the UK household lending market. Also, on the domestic liability side, foreign branches, in aggregate, hardly raise any retail deposits, in contrast to UK-incorporated banks (**Table B**).

In summary, at this high level of aggregation, the business activities of foreign branches are quite distinct from both UK-owned banks and foreign subsidiaries.

#### 4 Changes in UK-resident banks' balance sheets during the 2007–09 credit cycle

A notable feature of the recent boom and bust of credit to the UK private sector from resident banks was the particularly large cyclicity of lending by foreign branches: annual growth in credit reached a peak of 23% at end-September 2007 and then fell to a trough of minus 23% in March 2009 (**Chart 1**).<sup>(4)</sup> In fact, the cycle in credit growth from foreign branches looks very similar to that of foreign banks lending to (unrelated) UK banks and non-banks directly cross-border.<sup>(5)</sup> Credit growth from UK-owned banks and foreign subsidiaries has been less cyclical. Similarly, recent studies of the US (Goulding and Nolle (2012)) and Italian (Albertazzi and Bottero (2013))

(1) An important caveat to these data is that at this level of disaggregation, the residency of some balance sheet items, especially banks' marketable debt liabilities, is unknown (shown within 'other' in **Table B**). Therefore, the shares of external liabilities shown in **Table B** will be understated for all types of UK-resident banks. Based on estimates for UK-resident banks as a whole reported by the BIS, UK banks' external liabilities are larger than their external assets.

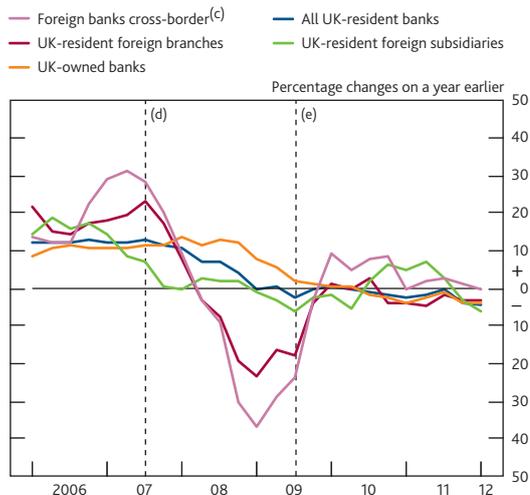
(2) See IMF (2012) which highlights the key role played by the UK-resident banking system as a conduit of shocks from and to other banking systems.

(3) This excludes domestic intragroup lending and to the Bank of England.

(4) The definition of credit includes lending in all currencies and comprises loans and advances, certificates of deposit, commercial paper and bills, reverse repos and securities. The qualitative picture is very similar if securities are excluded.

(5) More broadly, at the global level, the CGFS (2011) find that the growth in lending cross-border by all BIS reporting banking systems has in the past been very cyclical. See also Hills and Hoggarth (2013).

**Chart 1** Annual growth in bank lending to the UK private sector by bank type<sup>(a)(b)</sup>



Sources: Bank of England, BIS and Bank calculations.

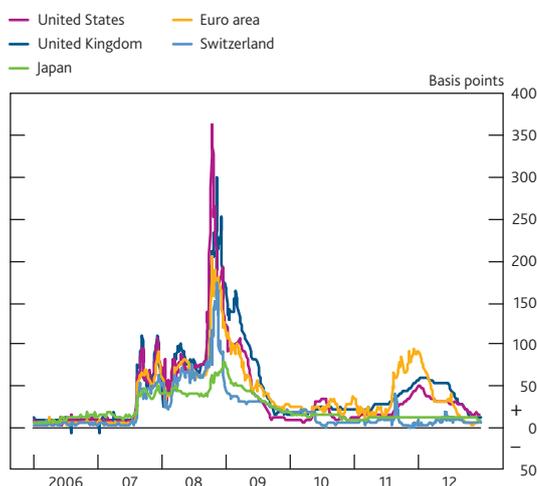
- (a) Data to 2012 Q1.  
 (b) Lending in all currencies, excluding intragroup. Data are not adjusted for securitisations. See the data annex for a more detailed description of the data.  
 (c) Foreign banks' cross-border lending excludes intragroup but includes lending to the UK public sector.  
 (d) Peak (2007 Q3) in annual lending growth by all UK-resident banks.  
 (e) Trough (2009 Q3) in annual lending growth by all UK-resident banks.

banking systems have found that the domestic credit cycle was greater for foreign branches than for domestically owned banks and foreign subsidiaries.

This boom and bust in domestic credit occurred against a background of a series of funding shocks which hit UK-resident banks from abroad.<sup>(1)</sup> In particular, there was a sharp increase in the cost, and fall in the amount, of banks' interbank funding in the wake of Lehman Brothers' failure (Chart 2). But, in addition, financial stress in banks' affiliates abroad may have disrupted funding to their UK operations.

Although there was a generalised reduction in the availability of liquidity globally, the UK-resident banking system seems to

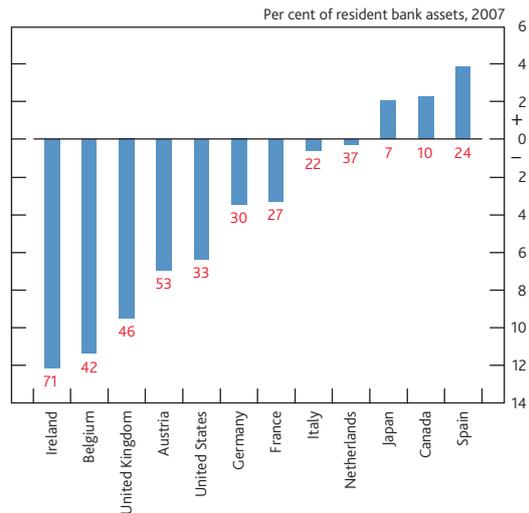
**Chart 2** Libor-OIS spreads



Sources: Bloomberg and Bank calculations.

have been hit particularly hard. The decline in cross-border funding to UK-resident banks as a share of their total assets during 2008–09 was larger than for most other major banking systems (Chart 3).<sup>(2)</sup> This reflected, in part, UK-resident banks' greater reliance on cross-border funding; but they also experienced among the largest per cent fall in external liabilities.

**Chart 3** Change in gross cross-border liabilities of resident banking systems (2007 Q4–2009 Q4)<sup>(a)</sup>



Sources: Bank of England, BIS, IMF and Bank calculations.

- (a) Figures in red are the shares of cross-border liabilities in resident banks' total assets, end-2007.

There could be a number of reasons why the UK banking system was particularly vulnerable to cross-border funding shocks. One factor may be the larger presence of foreign branches in the UK banking system than in other major systems (Chart 4). At end-2007, foreign branches represented 45% of the total resident banking system assets in the United Kingdom, compared to an average of 5% in euro-area countries and 9% in the United States. And, as suggested below, foreign branches in the United Kingdom may have been more likely to face a bigger funding shock than other types of UK-resident bank.

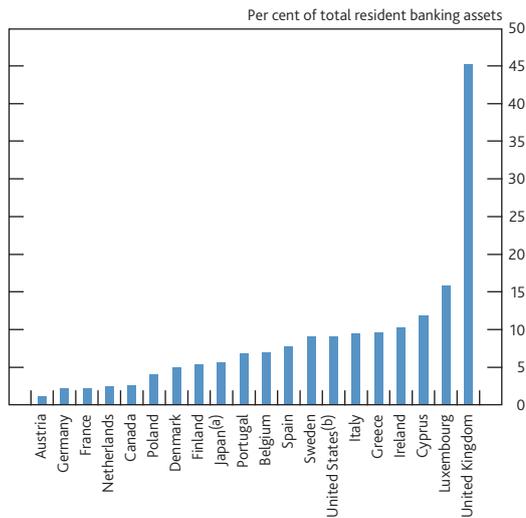
Another potentially important explanation for the cyclicity of lending by all UK-resident banks during the crisis is changes in the demand for credit from UK borrowers. Given the very different domestic lending portfolio of foreign branches from UK-incorporated banks (Table A), it is possible that the cycle in demand particularly affected foreign branches.

#### 4.1 Aggregate data

Aggregate data can provide an indication of the extent to which changes in external funding shocks explain, or at least

- (1) Recent research by the Bank of England has found an important role for supply factors in explaining the domestic credit cycle. See, *inter alia*, Bell and Young (2010) and Aiyar (2011).  
 (2) The cross-country dimension of this issue is discussed in more detail in Hoggarth, Mahadeva and Martin (2010).

**Chart 4** Assets of foreign branches as a share of total resident banking system assets, end-2007



Sources: National central banks and Bank calculations.

(a) Data for Japan include foreign subsidiaries.

(b) Branch data for the United States are based on the foreign banking offices' series in the US Flow of Funds.

were associated with, differences in the amplitude of the domestic credit cycle.

This is done by analysing changes in the composition of bank balance sheets by type of UK-resident bank, at the aggregate level, before and in the wake of the recent financial crisis. In particular, **Charts 5** and **6** show respectively how balance sheets changed during the previous domestic credit boom (from 2005 Q1 through to end-2007 Q3) and bust (end-2007 Q3 to 2009 Q3).<sup>(1)</sup> The end of the bust phase is defined as the period when the growth in total domestic credit to the private sector (including interbank lending) stopped falling. This coincided with when UK banks' spreads returned close to pre-crisis levels (**Chart 2**).<sup>(2)</sup>

### Pre-crisis period

During the previous boom, the domestic assets of all three types of UK-resident banks grew sharply (**Chart 5**). But the growth in domestic credit from foreign branches far outpaced that from other bank types; between 2005 Q1 and 2007 Q3, foreign branches increased domestic lending by almost 50%, compared to 30% for UK-owned banks and foreign subsidiaries. The growth in lending to PNFCs by foreign branches was particularly strong, accounting for over 40% of the increase in total UK-resident banks' lending to PNFCs over the period (**Chart 7**). Consequently, the market share of lending to PNFCs taken by foreign branches increased from 23% to 28%. In contrast, UK-owned banks' credit grew particularly rapidly to other financial companies (**Chart 5**). The external assets of UK-resident banks, especially of UK-owned ones, also grew rapidly, suggesting that through lending cross-border, UK banks were also contributing to credit booms abroad.

But these large expansions in domestic and external assets were funded in different ways. Almost two thirds of the growth in UK-owned banks' total assets was financed from domestic rather than external sources — the converse was the case for foreign branches. In particular, foreign branches funded much of their boom in domestic credit by increasing their net borrowing from the rest of their banking group abroad.

### Crisis period

There were important differences in lending patterns between UK-owned banks and foreign branches during the subsequent decline in the growth of domestic credit to the private sector (2007 Q3–2009 Q3). Whereas the domestic assets of foreign branches fell sharply, those of UK-owned banks continued to expand, albeit at a much slower pace than during the previous boom. The reduction in domestic credit from foreign branches was especially focused on bank and non-bank financial companies and, to a lesser extent, on the non-financial corporate sector. This reduction had a material impact on these markets, with the foreign branch share of the stock of lending to other (unrelated) banks and to OFCs falling by 3 percentage points and 8 percentage points respectively during the bust period. Branches accounted for almost one half of the contraction in the stock of domestic interbank lending over the period (**Chart 7**). Domestic assets of foreign subsidiaries also fell during the crisis, although by less than those of foreign branches.

Studies of bank lending in other countries during the crisis have also found different behaviour by foreign and domestically owned banks. In a very large sample of over 5,000 banks in 137 countries, Claessens and van Horen (2012) found that during the global crisis, the growth in domestic credit was substantially lower for foreign than domestic-owned resident banks while De Haas and van Lelyveld (2011) found that domestic credit growth fell twice as much for affiliates of multinational banks than for domestic-owned banks.<sup>(3)</sup>

Looking at the movement in the other components of banks' balance sheets highlights some likely causes of why domestic deleveraging in the United Kingdom was more acute for foreign branches than for UK-owned banks.

#### 4.1.1 A shock to cross-border wholesale funding

Foreign branches seemed to face a bigger wholesale funding shock, particularly cross-border, than UK-incorporated banks. Cross-border interbank funding fell more, in per cent terms, for foreign banks than for UK-owned banks (**Chart 6**). Also,

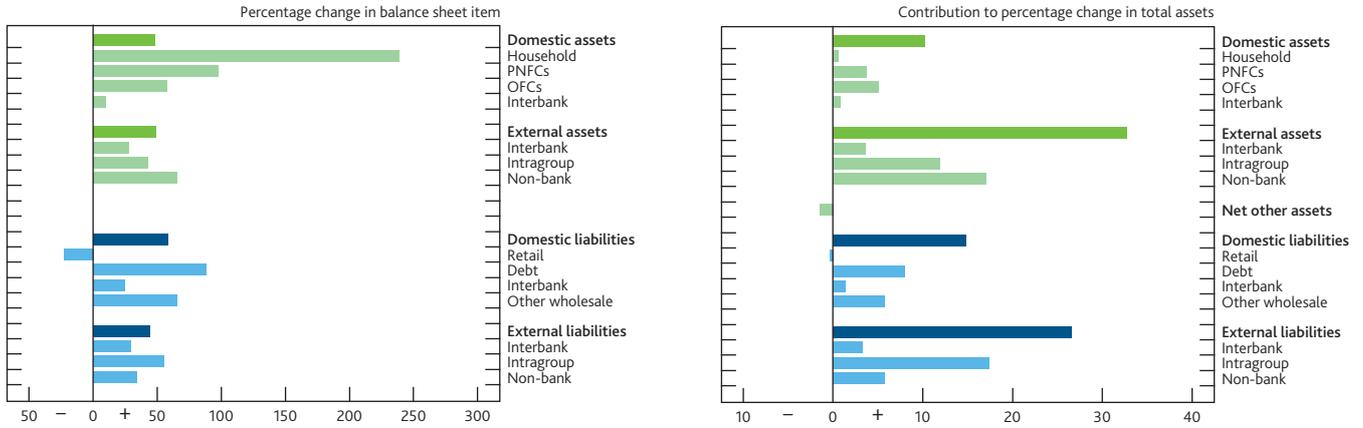
(1) End-2005 Q1 was the first period of data availability on this basis.

(2) Changes in the raw balance sheet data have been adjusted for valuation changes due to exchange rate movements and for known structural breaks and reporting errors. See the data annex for a more detailed description of the data.

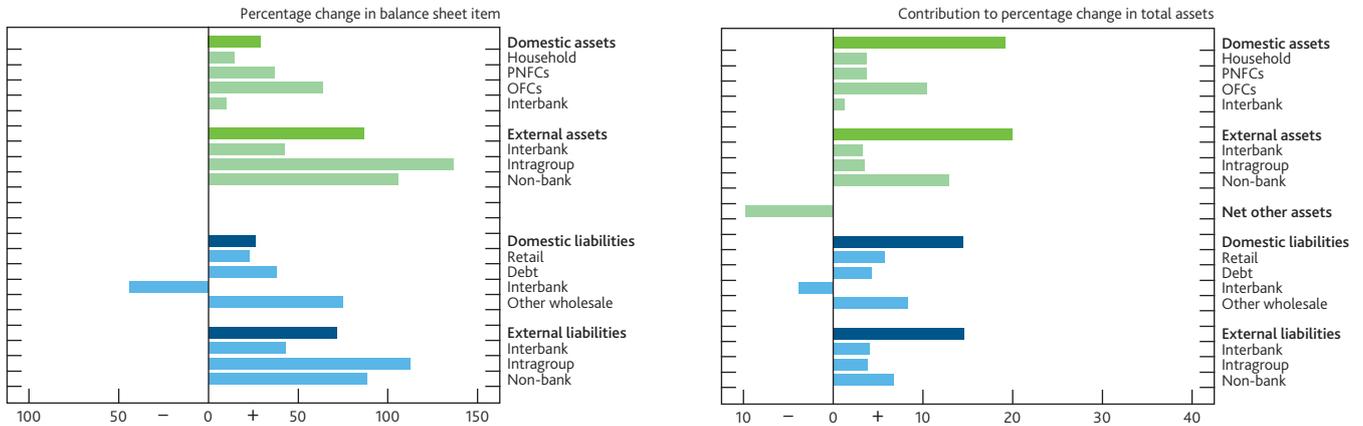
(3) Note though, these studies focus on a comparison of foreign subsidiaries rather than branches with domestic-owned banks.

**Chart 5** Pre-crisis changes in balance sheets of UK-resident banks (2005 Q1–2007 Q3)

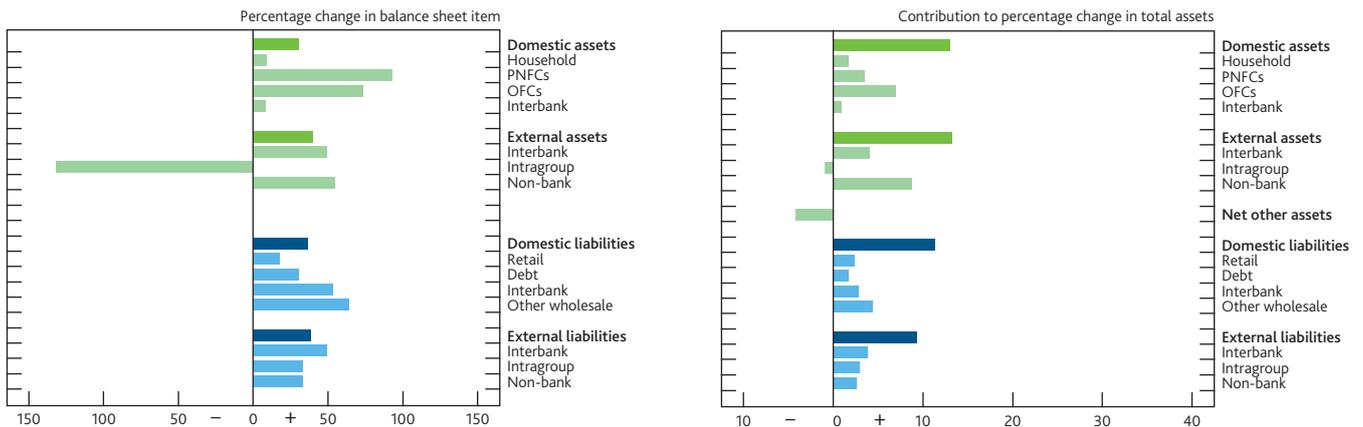
**Foreign branches**



**UK-owned**



**Foreign subsidiaries**

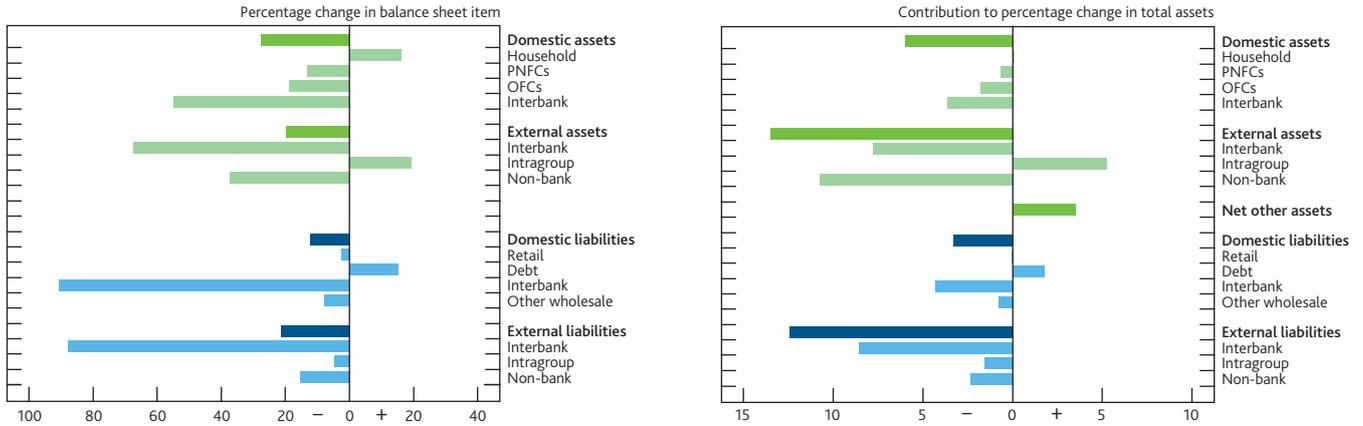


Notes: Net other assets sums the gross claims less liabilities of the following balance sheet components: domestic intragroup, central monetary institutions, public sector, equity and unclassified (domestic and foreign). Aggregate data are not adjusted for securitisations and loan transfers.

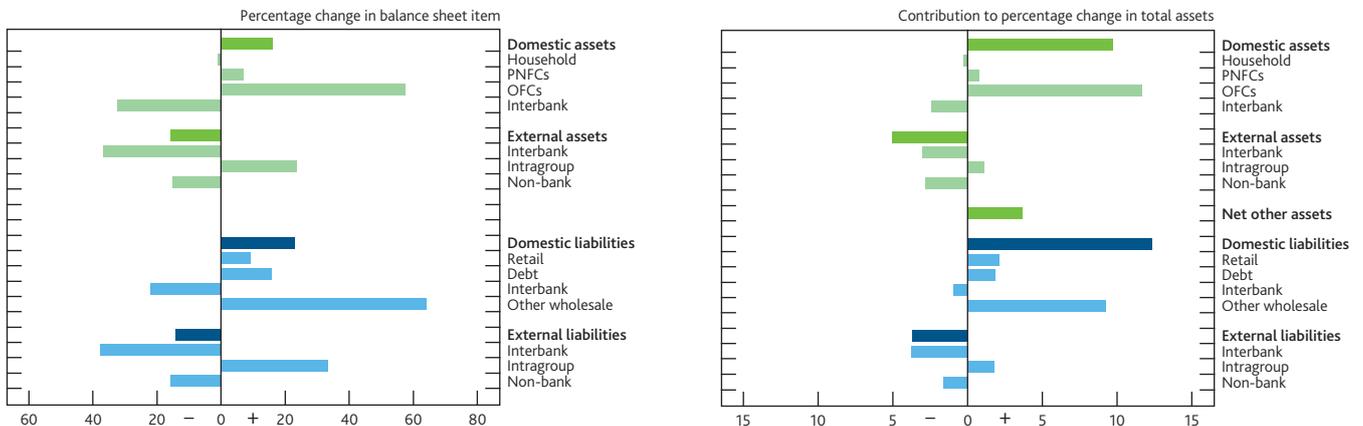
Source: Bank of England.

**Chart 6** Changes in balance sheets of UK-resident banks during the crisis (2007 Q3–2009 Q3)

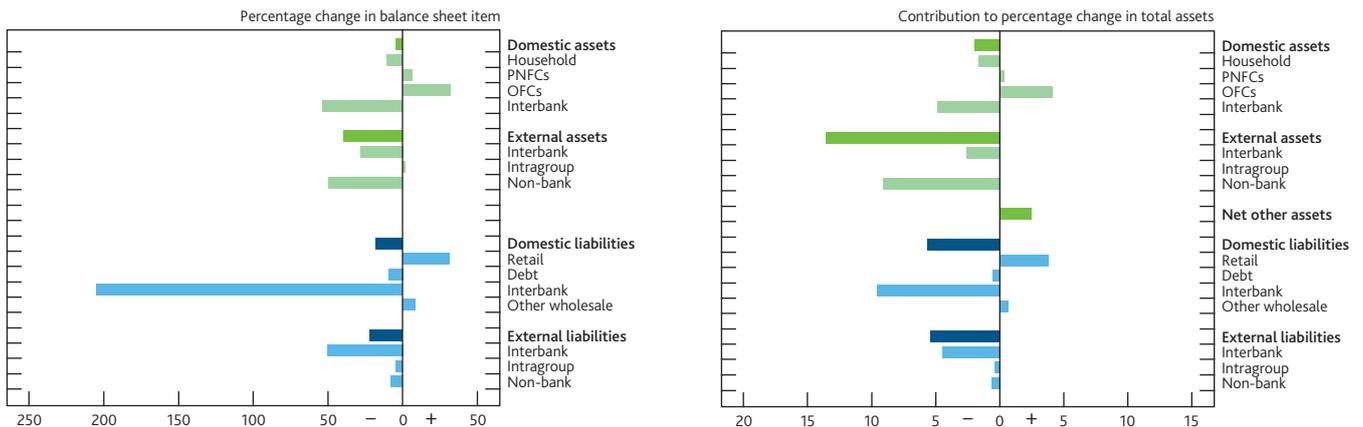
**Foreign branches**



**UK-owned**



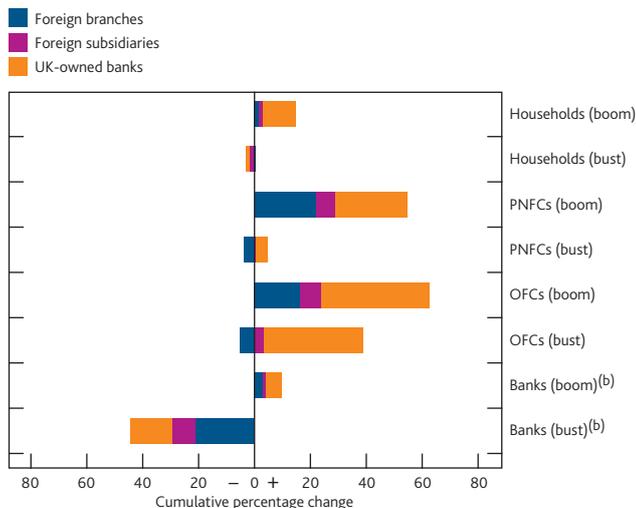
**Foreign subsidiaries**



Notes: Net other assets sums the gross claims less liabilities of the following balance sheet components: domestic intragroup, central monetary institutions, public sector, equity and unclassified (domestic and foreign). Aggregate data are not adjusted for securitisations and loan transfers.

Source: Bank of England.

**Chart 7 Contributions to percentage change in UK credit markets<sup>(a)</sup>**



Source: Bank of England.

(a) Chart shows the change in total stock of credit outstanding in each lending market. The boom period is 2005 Q1–2007 Q3 and the bust 2007 Q3–2009 Q3. Data are not adjusted for securitisations. Excludes intragroup lending and assets held at the Bank of England.

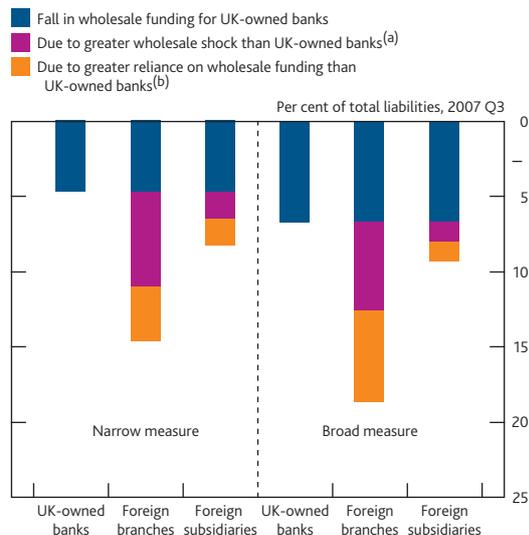
unlike UK-owned banks, they seemed to face a big fall, in per cent terms, in domestic interbank borrowing as well.

The impact of this cross-border wholesale funding shock was also accentuated for foreign branches since cross-border wholesale liabilities accounted for a large share of their total liabilities. For example, on the eve of the slowdown in domestic credit growth (end-2007 Q3), external liabilities (excluding intragroup) accounted for over 40% of the total liabilities of foreign branches, as a whole, but for only 25% of those of UK-owned banks. Including domestic interbank liabilities (excluding intragroup) the respective shares were 50% and 30%. More broadly, taking into account all domestic as well as cross-border liabilities, foreign branches were — and still are — highly reliant on wholesale funding. Domestic retail deposits — which tend to be the most stable form of funding — accounted for less than 1% of the aggregate liabilities of foreign branches on the eve of the crisis, compared to 12% for foreign subsidiaries and 23% for UK-owned banks. Ivashina, Scharfstein and Stein (2012) also found that greater reliance on wholesale funding contributed to bigger declines in bank lending during the recent eurozone sovereign crisis.

**Chart 8** decomposes the bigger fall in cross-border wholesale borrowing by foreign banks compared to UK-owned banks during the crisis into two components: a greater percentage decline in this type of funding versus a greater reliance on it. Both factors — using either a narrow or a broad measure of cross-border wholesale funding — played an important role in explaining the bigger fall in external funding for foreign branches.

In terms of the impact of external wholesale funding, foreign subsidiaries seem to have been a halfway house. Relative to

**Chart 8 Change in cross-border wholesale borrowing by UK-resident banks (2007 Q3–2009 Q3)**



Source: Bank of England.

The chart shows cumulative changes in gross wholesale cross-border borrowing during the crisis as a per cent of pre-crisis total liabilities (excluding equity and intragroup). The narrow measure of cross-border wholesale funding is defined as cross-border borrowing from unrelated banks; the broad measure also includes cross-border borrowing from non-banks. The difference between the changes in cross-border wholesale borrowing by foreign branches (or subsidiaries) than UK-owned banks is separated into two factors:

- The extent to which foreign branches (or subsidiaries) faced a greater wholesale funding shock than UK-owned banks. This is calculated by assuming foreign branches (or subsidiaries) had the same share of wholesale liabilities as UK-owned banks, as of end-2007 Q3.
- The extent to which foreign branches (or subsidiaries) had a greater reliance on wholesale funding than UK-owned banks. This is calculated by assuming foreign branches (or subsidiaries) experienced the same percentage decline in wholesale liabilities as UK-owned banks between 2007 Q3 and 2009 Q3.

UK-owned banks, they faced a larger external funding shock (in per cent terms) and were more reliant on this form of funding but they were less affected by, and less vulnerable to, the external funding shock than foreign branches.

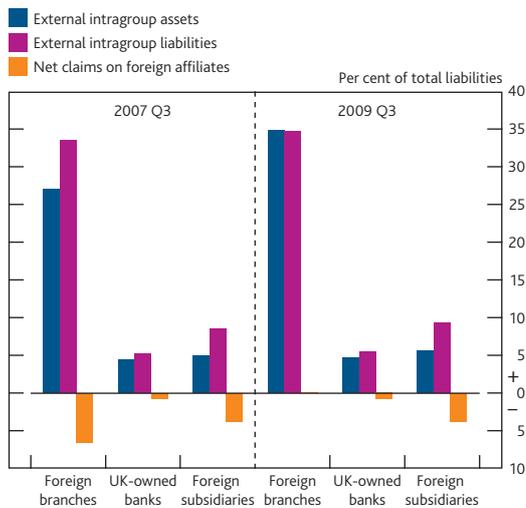
Therefore, since the funding shock had a bigger impact on the balance sheets of branches than on UK-incorporated banks, it may have forced them to delever their asset book by more.

#### 4.1.2 'Home bias' within banking groups

Another possible explanation for why foreign branches cut back their lending to the UK private sector by more than other banks is that it may have reflected the policy choice of the banking group. During the crisis period, foreign branches, in aggregate, up-streamed lending to other parts of their banking group abroad, in both gross and net terms (**Chart 9**). This was particularly the case for the largest, more liquid branches. In contrast, as can be seen from **Chart 9**, there was little change in the net position of UK-owned banks and foreign subsidiaries. More generally, in contrast to UK-incorporated banks, foreign branches also cut back domestic lending by more than external lending.

Why might foreign branches have been more willing to reduce lending to the UK market than domestically incorporated banks? This apparent 'home bias' might have been caused by

**Chart 9** External intragroup gross and net assets of UK-resident banks (2007 Q3 and 2009 Q3)



Source: Bank of England.

banking groups who, in the face of scarce funding and capital, decided to use the balance sheet of the branch in the United Kingdom to support lending in the parent market. Cetorelli and Goldberg (2011), note that in the early stages of the crisis — during the second half of 2007 — US-headquartered banks withdrew funding from their foreign affiliates in all markets. However, they found that the funding withdrawal was greater the more that the affiliate was regarded as a core funder of the group and if the local market of the affiliate was not seen as a core lending market for the group as whole.

Finally, various other governments, as in the United Kingdom, supported their banks with guarantees as well as capital and liquidity injections at the end of 2008 and during 2009 (De Haas *et al* (2012)). Banks, who received such support, may have been asked to focus on domestic lending (Kamil and Rai (2010)). For example, French banks that received state support had to increase domestic lending by 3%–4% annually, while ING announced that it would lend \$32 billion to Dutch borrowers in return for government support (World Bank (2009)). Government interventions potentially could have biased banking groups' decisions in favour of lending in the parent bank's home market.<sup>(1)</sup>

#### 4.1.3 Bank-specific factors affecting lending supply

Bank-specific factors also likely affected the willingness or ability of banks to provide credit during the crisis period. In their large cross-country sample, Claessens and van Horen (2012) find that domestic credit growth fell more during the crisis from bigger local banks and from those with weaker balance sheets, characterised in particular by high leverage, low liquid assets and low domestic deposit to total liability ratios. Relatedly, foreign branches that were part of banking groups with low buffers of liquidity or equity might have been

less able to withstand shocks. Aware of this, wholesale creditors would likely have reduced funding by more than was the case for other banks. Balance sheet weakness at the group level might also have made the parent more likely to withdraw assets and funding from its foreign affiliates to shore up its balance sheet in its home market.

The aggregate data are too broad to know for sure whether foreign branches tended to be weaker than other types of UK-resident banks. That said, going into the crisis, several foreign banking systems which had a significant branch presence in the United Kingdom had lower Tier 1 capital ratios and higher leverage ratios than UK-owned banks.<sup>(2)</sup>

Differences in the riskiness of banks' lending portfolios may also help to explain variation in lending supply. In the run up to the crisis, domestic credit from foreign branches grew much more rapidly than from UK-incorporated banks both to the domestic economy as a whole (Chart 1) and across most sectors and industries. This may have reflected a decision to target riskier borrowers or potentially a misjudgement of the risks they were taking on. And it may have been permissible because supervision was not mainly carried out at the branch level but rather as part of the banking group as a whole. Once the downturn ensued, the higher realised risk of their portfolios may have led foreign branches to cut back lending by more than UK-incorporated banks.

Albertazzi and Bottero (2013) found that, in the wake of Lehman Brothers' failure, domestic credit in Italy was cut back most from foreign branches of parent banks headquartered in more geographically distant countries. They interpret this as these foreign banks choosing to cut back credit supply because of their limited information on the credit quality of Italian borrowers.

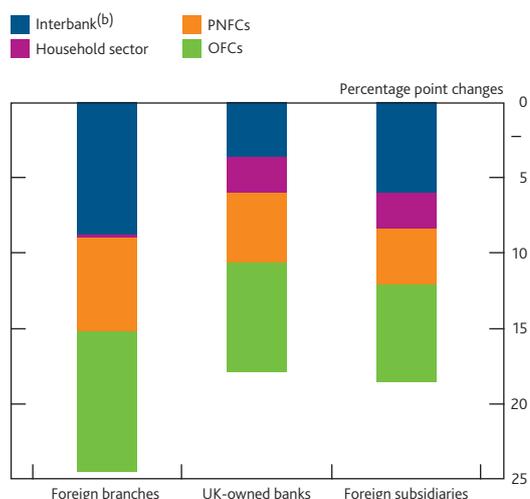
#### 4.1.4 Weak demand for credit from UK borrowers

The above interpretation focuses on a different lending supply response by foreign branches than by UK-owned banks during the crisis. But loan demand likely also played an important role if borrowers from foreign branches were particularly hurt by the economic downturn. Chart 10 lends some support to this possibility since the UK loan portfolio of foreign branches was more skewed towards sectors that faced a bigger downturn — proxied by the change in annual credit growth from all resident banks as a whole. In particular, branches were focused on lending to the very cyclical financial sector

(1) Rose and Wieladek (2011) found that nationalised foreign banks resident in the United Kingdom reduced the share of their lending to the United Kingdom by around 11 percentage points but nationalised UK-owned banks did not change significantly the geographical mix of their loan book.

(2) For example, at end-2007 the UK banking system Tier 1 capital ratio was 8.1% of risk-weighted assets. This was higher than in Germany (7.0%), France (7.7%), Italy (6.5%), Spain (8.0%) and the United States (7.7%). Among the countries with a large foreign bank presence in the United Kingdom, only the Swiss banking system had a higher ratio (9.5%). The UK banking system leverage ratio at end-2007 was 23 times equity. This was lower than Germany (42), France (30) and Switzerland (35).

**Chart 10** Change in credit demand, by bank type (2007 Q3–2009 Q3)<sup>(a)</sup>



Source: Bank of England.

- (a) The demand measure is based on Aiyar (2011). For each bank type, the change in credit growth to each UK-resident sector (households, private non-financial corporations, non-bank financial corporations and unrelated banks) from all banks over the period 2007 Q3–2009 Q3, is weighted by that sector's importance to each bank type in 2007 Q3. The main assumption is that differences in changes in aggregate credit growth across sectors reflect differences in demand movements. Therefore, banks who lent a higher share of credit pre-crisis to sectors that reported a large fall in the growth of aggregate bank borrowing during the crisis are judged to have faced a larger fall in demand than other banks.
- (b) Excludes intragroup lending and assets held at the Bank of England.

rather than the much less cyclical household sector. The reverse was the case for UK-owned banks, at least on an aggregate basis. It is difficult though to distinguish between a credit demand and supply response. Since foreign banks appear to lend to more cyclical sectors, they might have anticipated a bigger increase in credit write-offs and, therefore, cut back lending as a precaution. Also, given the loan book of branches is concentrated more on banks, these loans are likely to be of a shorter maturity, making it easier for them to reduce loan supply.<sup>(1)</sup>

#### 4.1.5 Summary

Therefore, at this high level of aggregation, it seems that foreign branches faced both a larger wholesale funding shock and were more reliant on this form of funding than UK-owned banks. They also likely *decided* to reduce their exposures to the UK market and redirect funds to other parts of the banking group. Differences in credit demand also appear to have played an important role.

#### 4.2 Individual bank level data

The above description of foreign branch behaviour in the United Kingdom before and during the 2007–09 crisis is based on a high level of aggregation of the pattern of banks' balance sheets. But it is important for policymakers to know whether the difference in behaviour suggested by the aggregate data is a feature of branches in general or whether it could be explained by just a few large banks — a possibility given the high concentration of the UK-resident banking sector.

To investigate this, data were collated — on an unconsolidated basis — on the balance sheets of all individual banks resident

in the United Kingdom.<sup>(2)</sup> As part of the United Kingdom's statistical regime, all resident banks must report detailed balance sheet data to the Bank of England on a regular basis. These raw data were adjusted for outliers, breaks in series, exchange rate movements and off balance sheet transfers. Following this process, the constructed database consists of a sample of 106 banks, of which 17 are UK-owned, 25 are foreign subsidiaries, and 64 are foreign branches. Together these banks accounted for about 80% of the total assets of all UK-resident banks in 2007 Q3. A detailed description of the data set is in the data annex.

**Tables C and D** show the summary statistics by bank type based on the individual bank-level data set. The main stylised facts from the aggregate data are confirmed in **Table C**, suggesting that the typical foreign branch exhibited high procyclicality in its lending to the UK private sector during the crisis. The median branch had higher growth in domestic lending pre-crisis — to nearly all sectors — and a sharper contraction in growth during the crisis than both foreign subsidiaries and UK-owned banks. In particular, annual growth in domestic credit fell by around 45 percentage points for the median foreign branch between 2007 Q3 and 2009 Q3, compared to 14 percentage points for UK-owned banks and 12 percentage points for foreign subsidiaries. The median branch also contracted lending growth by more than UK-owned banks to all sectors except to households and utilities (where they have a low presence generally).

The median foreign branch also experienced a greater shock to its cross-border wholesale liabilities, both on a broad and narrow definition. In addition, the impact of this shock was exacerbated because foreign branches repatriated funds (in net terms) within their banking group, in contrast to UK-owned banks and subsidiaries. The typical foreign branch lent in net terms 3.7% of its assets back to the rest of its banking group abroad but the extent of repatriation was larger for the biggest foreign branches.

The individual bank-level data also confirm that the business model of the typical foreign branch was much more focused towards lending to UK businesses (financial and non-financial) while branches provided little, if any, credit to households (**Table D**).<sup>(3)</sup>

This data set was combined with public information on the banking groups to which each UK-resident bank belongs. This suggests that, on average, the groups of which UK-resident foreign branches were part had, on the eve of the crisis, weaker balance sheets than UK-incorporated banks, with lower levels

(1) Lending mainly at short term may be a signal that foreign branches had less commitment to the UK market.

(2) Individual authorised banks irrespective of whether they are part of a larger banking group operating in the United Kingdom.

(3) This was also the case for foreign banking groups which operate in the United Kingdom through both a branch and a subsidiary structure.

**Table C** Changes in balance sheets, by bank type (based on a sample of individual banks)<sup>(a)</sup>

		UK-owned	Branch	Subsidiary	All banks
<b>A. Annual growth in lending to the UK private sector<sup>(b)</sup></b>					
Pre-crisis average (2005 Q1–2007 Q3)	Percentage change on a year earlier	16.2	26.3	14.7	20.1
End-crisis (2009 Q3)	Percentage change on a year earlier	3.2	-15.7	-2.3	-8.3
Change during crisis (2007 Q3–2009 Q3)	Percentage points	-14.4	-45.0	-12.0	-26.7
<b>B. Shocks during crisis period (2007 Q3–2009 Q3)</b>					
<b>Cross-border wholesale funding</b>					
Narrow measure <sup>(c)(d)</sup>	Percentage change	-24.4	-43.7	-10.3	-36.7
Broad measure <sup>(d)(e)</sup>	Percentage change	-11.8	-15.3	-14.8	-13.9
<b>Cross-border intragroup funding</b>					
Net claims on foreign affiliates <sup>(d)(f)</sup>	Percentage point change	-0.3	3.7	0.0	0.2
<b>Change in demand (2007 Q3–2009 Q3)<sup>(g)</sup></b>	Percentage points	-16.6	-20.4	-17.6	-19.0

Source: Bank of England.

(a) Figures shown are medians. In most cases, however, the mean and median are very close, indicating the sample is not distorted by outliers.

(b) Lending in all currencies, including to the financial sector and intragroup.

(c) External interbank funding.

(d) All external funding (other than intragroup and from foreign central banks).

(e) Crisis period defined as 2007 Q4–2009 Q3 due to limited availability of intragroup liability positions prior to 2007 Q4.

(f) Per cent of total assets.

(g) Proxy based on Aiyar (2011). For each bank *i*, the change in credit growth to each sector *j* by all banks, is weighted by sector *j*'s importance to bank *i*.**Table D** Individual bank characteristics, by bank type (end-2007)<sup>(a)</sup>

		UK-owned	Branch	Subsidiary	All banks
<b>A. UK-resident entity (eg HSBC Bank plc)</b>					
<b>Domestic lending activity:<sup>(b)</sup> share of total</b>					
Household sector		34.2	1.8	23.1	13.4
Non-financial private sector		15.1	40.5	15.1	29.4
Financial sector		50.7	57.7	61.8	57.2
<b>Cross-border funding: share of total liabilities</b>					
Total cross-border liabilities		11.7	71.2	15.0	50.0
Cross-border wholesale liabilities (narrow measure) <sup>(c)(d)</sup>	4.8	14.0	2.3	9.9	
Total wholesale liabilities (broad measure) <sup>(d)(e)</sup>		37.2	38.7	22.5	32.0
Gross borrowing from foreign affiliates		0.0	28.2	10.2	16.9
<b>B. Banking group (eg HSBC Holdings plc)</b>					
Core Tier 1 capital	Per cent of risk-weighted assets	8.2	7.3	8.4	7.6
Return on equity	Per cent of equity	15.7	13.5	15.7	14.3
Liquid assets	Per cent of short-term funding	41.7	38.8	31.0	38.8
Non-performing loans	Per cent of gross loans	1.2	1.3	0.8	1.2

Sources: Bank of England, De Haas *et al* (2012) and Bank calculations.

Footnotes: see Table C

of capital, profitability and liquid assets, and a higher share of non-performing loans (Table D). In summary, therefore, a detailed examination of the population of individual banks resident in the United Kingdom confirms the main findings from the aggregate data: the strong procyclicality in foreign branch domestic lending during the crisis was a feature of branches in general and not driven by one or two large banks.

## 5 An empirical investigation into the drivers of UK bank lending during the crisis

In this section a simple econometric approach is used to investigate which factors may help to understand the heterogeneity of lending behaviour by bank type outlined above.

### 5.1 Methodology

The approach is set out in equation (1). It aims to explain the change in annual growth of domestic lending during the 2007 Q3–2009 Q3 period for each bank in the sample. The set of explanatory variables includes several *ex-ante* variables which proxy for differences in banks' business models at both the individual and group level.<sup>(1)</sup> The use of *ex-ante* variables is important from two perspectives. First, potential problems of endogeneity between the dependent and explanatory variables are mitigated by including variables measured before the crisis period.<sup>(2)</sup> Second, policymakers will find it useful to know

(1) *Ex-ante* variables are measured as at 2007 Q3, ie before the start of the crisis period.

(2) The demand proxy used in the equation is also likely to be exogenous to the bank since it is based on the change in credit from all banks as a whole (weighted by the individual bank's pre-crisis loan portfolio).

**Equation 1:**

$$\Delta L_i = \alpha_i + \beta_1 BRA_i + \beta_2 F_i + \beta_3 \Delta D_i + \beta_4 X_{ij} + \varepsilon_i$$

Where:

- $\Delta L_i$  is the percentage point change in annual growth of bank  $i$ 's lending to the UK private sector over the 2007 Q3–2009 Q3 period.
- $\alpha_i$  is an intercept term and  $\beta_i$  are coefficients.
- $BRA_i$  is a dummy variable equal to 1 if bank  $i$  is a foreign branch and 0 otherwise.
- $F_i$  is an *ex-ante* measure of reliance on wholesale funding.
- $\Delta D_i$  is a variable which proxies for the change in demand facing bank  $i$  over the 2007 Q3–2009 Q3 period.
- $X_{ij}$  is a set of country and bank-specific controls.
- $\varepsilon_i$  is an idiosyncratic error term  $\varepsilon_i \sim \text{IID}(0, \sigma_\varepsilon^2)$ .

which individual bank characteristics may have predictive power for future cycles in bank lending.

The choice of explanatory variables is based on the analysis in Section 3. On the supply side, both the narrow and broad measures of cross-border wholesale liabilities shown in **Chart 8** are used as indicators of reliance on vulnerable funding sources. Banks' lending growth pre-crisis (2005 Q1–2007 Q3) is used to proxy for the riskiness of banks' supply of lending and, therefore, desire to cut back lending during the crisis.<sup>(1)</sup> For changes in demand, the proxy outlined in Aiyar (2011) and shown in **Chart 10** is used. For each bank type, the change in credit growth to each UK-resident sector from *all banks* over the period 2007 Q3–2009 Q3, is weighted by that sector's importance to each bank type on the eve of the crisis (2007 Q3). The main assumption is that differences in changes in aggregate banking system credit growth across sectors reflect differences in demand movements. Therefore, banks which lent a higher share of credit pre-crisis to sectors that reported a large fall in the growth of aggregate bank borrowing during the crisis are judged to have faced a larger fall in demand than other banks. Core capital and liquidity ratios, non-performing loans, return on equity and leverage are included as banking group specific control variables. A number of characteristics relating to the business model and performance of the UK-resident entity are also examined, such as size, write-offs and income structure.<sup>(2)</sup>

## 5.2 Empirical results

**Table E** reports OLS estimates based on equation (1) across the sample of 106 UK-resident banks. All estimates include robust standard errors.<sup>(3)</sup>

In the first column in **Table E**, the decline in annual domestic lending growth during the crisis period is regressed on a set of variables which proxy for both demand and supply determinants. Both factors are found to be statistically significant in explaining the fall in domestic credit growth. On

the supply side, banks contracted lending by more, the greater their reliance on cross-border wholesale funding — measured on a narrow basis — and the greater their lending growth pre-crisis. But the proxy for changes in demand during the crisis also suggests that exposure to more cyclical sectors was an important factor driving lending growth during the crisis. A previous Bank of England study which used different techniques (Bell and Young (2010)) also found that both demand and supply factors help to explain the weakness in UK bank lending from 2007.

As discussed above, foreign branches were particularly susceptible to these demand and supply factors (**Table D**). The median foreign branch had a bigger reliance on cross-border wholesale finance, higher pre-crisis lending growth and greater exposure to cyclical sectors. Therefore, it is not surprising that their lending growth contracted by more than other banks during the crisis.

In the second column, a branch dummy is added to show explicitly the differential behaviour of branches and UK-incorporated banks during the crisis. As expected, the coefficient on the branch dummy is negative and significant, showing that even controlling for known demand and supply factors, the average branch reduced domestic lending growth by 28 percentage points more than UK-incorporated banks during the crisis.

In the third and fourth columns, other variables are added to capture some of the individual bank characteristics that may help to explain the differences in lending growth across banks during the crisis. The results suggest an important role for balance sheet strength. UK-resident banks that belonged to banking groups that were more profitable on the eve of the crisis — proxied by return on equity — seemed to reduce their growth in lending to the UK private sector by less. Banks with higher returns pre-crisis may have been better able to absorb shocks (Allen (2011)). At the same time, lending contracted by more, the weaker the balance sheet of the UK entity (proxied by write-off rates pre-crisis). Weaker pre-crisis balance sheets may, therefore, have been an indication of riskier lending practices.

Similar to Claessens and van Horen (2012) there is evidence that the growth in domestic lending by larger banks (proxied by total assets) was more cyclical than by smaller banks. The reasons for this are not entirely clear but may reflect that they could borrow more cheaply than smaller banks due to the perception of an implicit government guarantee in case of failure.

(1) This variable though may instead, or as well, proxy for demand if demand for credit from riskier borrowers fell by relatively more during the crisis.

(2) Further details on the construction of these variables are reported in the data annex.

(3) As a sensitivity check we also estimated equation (1) using different time periods, based on the per cent change in levels rather than the change in annual growth rates of domestic credit and excluding securities lending from the dependent variable. Our main results were, in general, robust to these changes.

**Table E** Baseline specification

Dependent variable: percentage point change in annual growth in lending to the UK private sector (2007 Q3–2009 Q3)

	(1)	(2)	(3)	(4)	(5)
<b>Branch dummy</b>		-28.059*** (0.004)	-26.790*** (0.005)	-21.498** (0.024)	-23.165** (0.019)
<b>Supply and demand proxies</b>					
Cross-border wholesale liabilities (narrow measure)	-0.467*** (0.007)	-0.284 (0.111)	-0.171 (0.301)	-0.229 (0.188)	-0.319 (0.105)
Pre-crisis average lending growth	-0.469*** (0.009)	-0.443** (0.010)	-0.500*** (0.003)	-0.630*** (0.001)	-0.487*** (0.007)
Demand	3.247** (0.033)	0.757 (0.624)	2.484 (0.158)	3.620** (0.050)	3.918** (0.016)
<b>Bank-specific controls (UK-resident entity)</b>					
Bank size			-7.466*** (0.001)	-4.866** (0.025)	-3.386 (0.153)
Write-offs			-15.924 (0.211)	-43.882** (0.017)	-53.909*** (0.007)
<b>Bank-specific controls (banking group)</b>					
Return on equity				1.573*** (0.006)	2.207*** (0.001)
<b>Country specific controls</b>	N	N	N	N	Y
Observations	106	106	106	97	97
R-squared	0.148	0.209	0.265	0.339	0.408

Notes: Lending to the UK private sector is in all currencies, including lending to banks. This includes intragroup lending since separate data on this are not available on an individual bank basis prior to 2007 Q4. Cross-border wholesale liabilities (narrow measure) is defined as external interbank liabilities as a percentage of total liabilities (excluding equity and intragroup). Demand is defined as in Aiyar (2011). For each bank  $i$ , the change in credit growth to each sector  $j$  by all banks is weighted by sector  $j$ 's importance to bank  $i$ . All regressors are based on 2007 Q3 values, except Demand. The model is estimated using OLS and the standard errors are robust. Robust  $p$  values appear in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5% and 10% level of significance, respectively. A constant is included but not shown.

Sources: See Table A1 in the data annex.

In the last column of **Table E** country and regional dummies are added to control for heterogeneity among the countries in which foreign banks are headquartered. Distance of the parent bank from the United Kingdom is not found to affect the size of the cutback in domestic credit growth. Rather, banks from countries that have subsequently become most affected by the euro-area crisis appear to have contracted lending growth by the most. For example, banks from the European periphery economies and Belgium contracted lending growth by more than banks from other European countries, while domestic credit growth fell the least from banks headquartered in resource-rich countries such as Norway and the United Arab Emirates (UAE). There is also mixed evidence on the impact of government recapitalisations. Among those countries that supported their banking systems with public rescue measures, banks from Belgium, Denmark, France and Switzerland reduced lending growth in the United Kingdom by the most.<sup>(1)</sup>

Overall, when the full set of statistically significant explanatory variables are used, including the branch dummy, around 40% of the variation in the change in lending growth is explained.

What may the significance of the branch dummy imply about what is not being explained explicitly in the equations for the bigger fall in domestic lending growth of branches during the crisis? One major factor that affected branches, in particular, which is likely not fully captured by the explanatory variables in the equations is that they faced a bigger per cent fall in wholesale funding. One possible explanation for this is that they took on riskier portfolios

during the boom period, reflecting the fact that foreign branches are less subject to local regulatory and supervisory oversight than domestically owned banks and foreign subsidiaries. Another possibility is that the balance sheets of branches are more opaque which made it more difficult for the home supervisor and private sector investors to assess counterparty risk during the crisis (Fiechter *et al* (2011)).

Also, it is unlikely that the bank-specific regressors fully capture why foreign branches, particularly the largest ones, up-streamed net lending to other parts of their banking group abroad during the crisis. This likely constrained the ability of foreign branches to lend to UK borrowers. This apparent 'home bias' may have been a policy choice of the banking group, who given scarce capital and funding, decided to use the balance sheet of the UK branch to support lending in the parent market.

## 6 Conclusions and lessons for policy

Foreign branches, in aggregate, have a large presence in the United Kingdom. They account for over one third of total banking system assets, more than in any other major advanced economy. They play an important role in the global financial system as conduits — borrowing from abroad and lending back out again. But despite their business model being both primarily externally oriented and with a large share of securities and interbank lending, they also play a key role in

(1) For details of government support measures taken during the crisis see Brei and Gadanez (2012).

lending to some sectors of the UK economy, especially to non-financial companies and indirectly via other banks and other financial companies.

Foreign branches — and subsidiaries — contribute potentially large benefits to the UK economy. In particular, they provide an alternative source of credit for the UK private sector and can increase competition in the domestic financial market. But in the recent past, lending to the UK economy by foreign branches has been more volatile than by UK-incorporated banks — UK-owned banks and foreign subsidiaries. In part, this seems to have reflected demand factors; lending by foreign branches was more concentrated in sectors that were more sensitive to the recent domestic economic cycle. But during the previous boom, lending by foreign branches to most sectors also grew more rapidly than was the case for UK-incorporated banks — and conversely during the bust it fell more rapidly — suggesting they may have built up excessive credit risk in the United Kingdom.

Foreign branches also appeared to rely more on flighty sources of financing than UK-incorporated banks. During the boom, branches financed much of their expansion in UK lending through cross-border borrowing from the rest of their banking group abroad. And during the crisis, in contrast to both UK-owned banks and subsidiaries, foreign branches, in aggregate, up-streamed (net) lending significantly to other parts of their banking groups abroad. Foreign branches were also heavily reliant on interbank funding, especially from abroad, that turned out to be fickle. There is also some evidence that their banking groups were, on average, less resilient than UK-owned banks to any adverse shocks to the balance sheet.

Given the magnitude and past volatility of their lending to the UK economy, going forward it is important that there is close monitoring of the risks that foreign branches, particularly large ones, may pose to UK financial stability and the broader economy. The same applies to foreign banks that lend to the UK economy directly cross-border. In particular, these results reinforce the body of previous evidence showing that periods of unusually rapid credit growth are often a harbinger of a subsequent sharp reversal associated with large bank losses and, in some cases, bank failure. It suggests the need for the Bank of England's Financial Policy Committee (FPC) to monitor closely the growth in domestic lending not only in aggregate but also by different types of banks and to different sectors of the economy.

But with respect to domestic lending by foreign banks — either from local branches or directly cross-border — there is an issue, both at the macroeconomic and microeconomic level, whether the surveillance job could fall between the cracks of national prudential policy making. The issues highlighted in this paper emphasise the importance for the FPC and the Prudential Regulation Authority (PRA) to monitor the risks that can be

posed by foreign branches. However, as host authorities they have more limited information on the strength of the banking group as a whole, of which UK branches are part, and even more limited policy tools to supervise — as well as to resolve — foreign branches, since they largely fall outside the UK regulatory perimeter. For monitoring purposes, this reinforces the need for (the host) UK authorities to have access to timely and comprehensive information on the parent bank as well as on its UK branch. It also reinforces the need for close collaboration over policy actions with the foreign banking group's home authorities. This is essential in planning for potential resolutions, as well as for ongoing supervision.<sup>(1)</sup>

More formally, reciprocity agreements with other supervisors may be a way forward to make national macroprudential policies more effective. The PRA is alert to the risks posed by foreign branches and this is reflected in its new supervisory approach. This emphasises the importance of close collaboration with home supervisors and engagement in supervisory colleges.<sup>(2)</sup>

The large procyclical swing in cross-border net intragroup borrowing by the big foreign branches in the recent cycle also raises the issue of whether there should be tighter restrictions on foreign branch activity. Since the crisis, some national authorities have tightened regulations on the entry of new foreign branches from abroad. There also seems to have been a policy shift in some countries in favour of tighter limits on intragroup borrowing and lending by existing branches, and more generally, of banks financing domestic credit from domestic deposits rather than from funding cross-border.<sup>(3)</sup> But ring-fencing of funding at the intragroup level would need to be weighed against the benefits that borrowing and lending between the branch and other parts of the group provide in terms of improving the efficiency and stability of the banking group as a whole.

These issues need to be seen in the broader context of the economic and financial stability advantages and disadvantages of foreign-owned banks operating locally on a branch versus a subsidiary basis. More research is needed on the behaviour of foreign banks. Such analysis has in the past been hindered by cross-country data limitations. This constraint should be eased going forward since one of the planned improvements in the BIS international banking data is to distinguish between the balance sheets of resident foreign branches, foreign subsidiaries and domestically owned banks.<sup>(4)</sup>

(1) For example, see FSA (2009) on the potential benefits from enhanced international supervisory co-operation and Bank of England/Federal Deposit Insurance Corporation (2012) for an outline of UK-US co-operation on resolution planning.

(2) See Box 5 of Bank of England/FSA (2012) for the intended approach of the United Kingdom's Prudential Regulation Authority to supervising foreign banks operating in the United Kingdom.

(3) For example, in 2011, the Austrian central bank and financial regulator announced a series of prudential guidelines designed to limit Austrian banks' cross-border funding of their subsidiaries and branches in Central and Eastern Europe.

(4) CGFS (2012).

## Data annex

The data used in this paper are based on the statistical returns submitted to the Bank of England by UK-resident banks.<sup>(1)</sup> All data are unconsolidated — they refer to individual authorised banks irrespective of whether they are part of a larger banking group operating in the United Kingdom. The Bank of England does not as a matter of course publish disaggregated balance sheet data for the resident banking system split into types of banks. There is a methodical data interrogation process, which is designed to identify misreporting or errors which materially affect the data. Despite this, some minor data issues remain on a bank-by-bank basis. The raw reporting data, therefore, was adjusted by the authors on a best endeavours basis. The next section describes the data used and the adjustment procedures followed.

### A.1 Aggregate data

The data presented in Sections 2 and 3 are based on a high level of aggregation and were prepared by the Bank of England Statistics and Regulatory Data Division (SRDD). They cover the entire population of UK-resident deposit-takers, including building societies. The data are in all currencies and cover all parts of the balance sheet except equity capital and off balance sheet liabilities. Debt liabilities, which are sizable, are not classified by residency of the holder. This implies, in turn, that the net external asset position of UK-resident banks will likely be overstated in the data.

A bank's nationality is determined by where its ultimate parent (eg holding company) is located and not by the nationality of the largest shareholder. For example, a 'UK-owned' bank simply means its ultimate parent is incorporated in the United Kingdom.

Changes in the raw balance sheet have been adjusted for valuation changes due to exchange rate movements, significant changes in the reported population, off balance sheet items coming back onto banks' books and for known structural breaks and reporting errors.<sup>(2)</sup> The crisis period is defined from the end of 2007 Q3 through to the end of 2009 Q3.

The main variable of focus, domestic lending to the UK private sector, is defined as lending by UK-resident banks to both the financial and non-financial sectors, excluding lending to other banks within the same banking group (intragroup). Lending is in all currencies and comprises loans and advances, certificates of deposit, commercial paper and bills, reverse repos and securities. Domestic intragroup positions are reported from 2007 Q4; prior to this date, intragroup lending is assumed to grow in line with lending to unrelated banks.

## A.2 Individual bank level data

### A.2.1 Data description

The panel data set of individual bank balance sheets used in Sections 3 and 4 was prepared by the authors. Raw data from the Bank's regulatory reporting forms were collected at a quarterly frequency, covering the balance sheets of 360 UK-resident banks (excluding building societies) over the period 2005 Q1–2009 Q4.

The definitions of individual balance sheet items in the data set are broadly the same as in the aggregate data. A full description of the variables used, together with the relevant reporting forms is provided in **Table A1**.<sup>(3)</sup>

### A.2.2 Data adjustment procedures

The raw data were adjusted to account for the following:

- i) exclusion of banks with limited foreign funding activity,
- ii) breaks in time series associated with the changes in reporting standards, iii) loan securitisations, iv) mergers and acquisitions, v) exchange rate movements, and vi) outliers.

#### *Exclusion of externally inactive banks*

Because the interest is primarily in the transmission of the shock in global funding markets to UK domestic credit, only those banks that report both domestic lending and external liabilities were included. Banks excluded were those which did not meet the reporting threshold for private sector credit in excess of £1 billion and/or for external liabilities above £300 million.<sup>(4)</sup>

#### *Changes in reporting standards*

The Bank continuously improves the standards of information it collects and publishes, responding to users' needs.<sup>(5)</sup> This results in occasional amendments to the reporting forms, some of which lead to breaks in individual series. This was adjusted for by using information from previous reporting forms and merging the codes of the old and new series, where relevant.

#### *Securitisations and classification changes*

Securitisation of loans increased significantly prior to the crisis. Some monetary financial institutions (MFIs) have reported securitised assets off balance sheet, while others have reported them on balance sheet. On balance sheet reporting

(1) A full description of these forms can be found at [www.bankofengland.co.uk/statistics/Pages/reporters/default.aspx](http://www.bankofengland.co.uk/statistics/Pages/reporters/default.aspx).

(2) For more information on aggregate flows adjustments see [www.bankofengland.co.uk/statistics/Pages/iadb/notesiadb/Changes\\_flows\\_growth\\_rates.aspx](http://www.bankofengland.co.uk/statistics/Pages/iadb/notesiadb/Changes_flows_growth_rates.aspx).

(3) These data were supplemented with time-varying information on the nationality of the banking group to which the UK-resident entity belongs, the bank's relation with its parent (branch or subsidiary), and whether the bank belongs to a particular group (group identifier) or is a standalone entity. Balance sheet information of these consolidated banking groups was then added using annual data from BankScope.

(4) Banks omitted from the sample tended to be small or domestically focused (eg building societies).

(5) In compliance with the Bank's *Statistical Code of Practice*, a review of existing forms continues on a rolling five-year schedule. The implementation of the form changes — resulting from completed reviews — took place in October 2007 (and December 2007 for quarterly forms) for BT, BE, AL, CC, CL forms.

**Table A1** Variable definitions of individual bank level data

Variable	Definition	Source	Notes
Branch dummy	Dummy variable takes the value one if the UK-resident bank is a foreign branch, and zero otherwise.	Bank of England.	
Domestic credit	Lending to the UK private sector.	Bank of England reporting form BT.	Includes securities as well as loans, and domestic intragroup lending.
Cross-border wholesale funding: narrow definition	External interbank liabilities as a percentage of total liabilities (excluding equity and intragroup).	Bank of England reporting forms CL, BT.	Does not include marketable debt liabilities.
Cross-border wholesale funding: broad definition	Total external liabilities as a percentage of total liabilities (excluding equity and intragroup).	Bank of England reporting forms CL, BT.	Does not include marketable debt liabilities.
Net lending to foreign affiliates	Gross external intragroup assets minus gross external intragroup liabilities as a percentage of total assets of the UK-resident entity.	Bank of England reporting forms CC, CL, BT.	Includes deposits and reverse repos only.
Total cross-border liabilities	Total external liabilities as a percentage of total liabilities (excluding equity and intragroup).	Bank of England reporting forms CL, BT.	
Demand	Demand is defined as in Aiyar (2011). We have used both sectoral and industrial compositions of lending to create two different measures of domestic demand for loans.	Bank of England reporting forms AL, BT, BE.	
Bank size	Total assets of the UK-resident entity.	Bank of England reporting form BT.	
Write-offs	Write-offs in all currencies, as a percentage of domestic credit of the UK-resident entity.	Bank of England reporting forms PL, BT.	
Core Tier 1 capital	Shareholder funds plus perpetual non-cumulative preference shares as a percentage of risk-weighted assets with off balance sheet risks measured under the Basel rules.	De Haas <i>et al</i> (2012).	
Liquid assets	Liquid assets as a percentage of customer deposits and short-term funding.	De Haas <i>et al</i> (2012).	
Return on average equity	Net income as a percentage of average equity at time $t$ and $t-1$ .	De Haas <i>et al</i> (2012).	
Non-performing loans to gross loans	Fitch definition of impaired loans, as a percentage of loans plus loan loss reserve.	De Haas <i>et al</i> (2012).	

has become more prevalent as more institutions adopt International Financial Reporting Standards. However, this means that data on securitisation operations of UK-resident banks may distort the time series. For example, when

securitised loans are transferred to a UK-resident Special Purpose Vehicle (SPV), the securitised loans move off the balance sheet of the MFI and onto the balance sheet of the SPV, causing a reduction in the amount outstanding of UK-resident bank credit.

Because these transfers do not represent genuine changes in private sector credit they were removed from the data by subtracting amounts of the securitised asset from the credit stock prior to calculating growth rates.<sup>(1)</sup>

### *Treatment of mergers and acquisitions*

Over the period analysed, a number of the banks in the sample were involved in mergers or acquisition activity. Bank mergers were dealt with by creating a synthetic merged series of the merging banks' balance sheets over the entire period. The acquired bank was then removed from the data set.

### *Foreign currency adjustment*

Information on the currency composition of the main variables of interest was used to adjust the flows data for exchange rate movements. Amounts outstanding are reported in sterling which were first converted into the 'original' foreign currency using the appropriate end-quarter exchange rates. Changes in these amounts outstanding, expressed in their 'original currency', were then converted back into sterling using the average exchange rate for the quarter. Non-sterling data were converted into sterling since this is the currency in which the majority of borrowing by UK private sector is denominated.

### *Outliers*

As the reporting population of banks varies over time a number of banks have gaps and/or outliers in the time series.<sup>(2)</sup> These data do not have a material impact on the aggregate stock or flows data and were most probably related to misreporting by the individual bank.

For example, examination of the sample suggested that a number of the very large positive or negative growth rates were associated with banks with very small household or corporate loan portfolios or very small external liabilities. Since these banks may behave very differently from most banks in our sample due to their negligible presence in the relevant credit market, we chose to drop these banks from the estimation sample. A similar procedure was used for other variables included in the regression analysis.

(1) From January 2010 onwards, the Bank has changed the way banks and building societies report securitisations in their statistical returns. Extra data are collected on the amount of loans that have been securitised, and on liabilities to and deposits from securitisation SPVs. Off balance sheet liabilities are excluded.

(2) There are a number of banks in the sample that were newly authorised or became inactive during the period. Another reason is the change in bank coverage due to banks falling below and within the thresholds limits over time.

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