Financial Protectionism? First Evidence

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Abstract

During the crisis of 2008-09, many countries engaged in bank nationalizations and other large public interventions in the financial sector. Did such actions lead to nationalistic changes in financial activities? In this paper we provide the first empirical evidence of such "financial protectionism." Manifestations of financial protectionism include a decrease in the quantity and/or an increase in the price of loans that banks from one country make to borrowers resident in another, after a large public intervention like bank nationalization. We provide evidence of financial protectionism from a bank-level panel data set spanning all British and non-British (foreign) banks providing loans within the United Kingdom between 1997Q3 and 2010Q1. During this time, a number of banks were nationalized, received capital injections, or given unusual access to loan or credit guarantees. We use standard panel-data techniques to study the 'loan mix,' British loans of a bank expressed as a fraction of its total loan activity. We examine the loan mix for British and foreign banks, both before and after unusual public interventions such as nationalizations, and find strong evidence of financial protectionism. After nationalization, foreign banks reduced their fraction of British loans by about eleven percentage points and increased their effective interest rates by about 70 basis points. By way of contrast, nationalized British banks did not significantly change either their loan mix or effective interest rates. Nationalized foreign banks also offered significantly smaller mortgage loans to borrowers with similar characteristics. Succinctly, foreign nationalized banks seem to have engaged in financial protectionism, while British nationalized banks did not.

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"We will not retreat into financial protectionism"
- G20 Leaders' Statement from London Summit, April 2009
- G20 Leaders' Statement from Pittsburgh Summit, September 2009

"We reaffirm our commitment to avoid financial protectionism"
- G20 Leaders' Statement from Seoul Summit, November 2010

1. Introduction

The "Great Recession" which engulfed the world in 2008-09 is frequently compared to the Great Depression of the early 1930s. Many economists blame trade protectionism for deepening, spreading, and/or lengthening the Great Depression. This time around, there is only muted evidence of traditional protectionism for real economy goods and services. But the public sector has made substantial interventions in financial markets around the world, particularly in the banking sector, while cross-border bank lending has fallen. In this study we ask if government support for banks has discouraged international economic activity via a new type of protectionism: financial protectionism.

We define financial protectionism as a change in preferences of domestic financial institutions, induced by public policy, which leads them to discriminate against foreign households and/or enterprises. In practice, we search for changes in the lending behavior of individual banks affected by large public interventions; financial protectionism emerges if these domestic banks lend less to foreign borrowers, charge higher interest rates, or both.

While the idea of financial protectionism has been discussed informally for some time, this is, to the best of our knowledge, the first work to test formally for the presence of financial protectionism. The lack of previous empirical work is not surprising to us, as publicly available data are typically aggregated and cannot provide rigorous evidence one way or another. In this study, we take advantage of a panel data set on bank activity collected by the Bank of England. This data set covers all banks, both foreign and domestic, which operated in the UK, a rich country with a large international financial sector. Our data spans 1997Q3 through 2010Q1, a period characterized by the most significant international financial crisis in decades, during which a number of British and foreign banks were nationalized or supported with capital injections and/or unusual liquidity or loan

guarantees (by "British" we mean "of or relating to the UK"). Concurrently, many British and foreign banks did not need to rely on explicit state support for their survival. This variation means that our data set is well suited to testing for financial protectionism.

We use a standard panel data model with period- and bank-specific fixed effects to search for financial protectionism. Our main focus is the fraction of domestic (British) loans that a bank (British or foreign) makes as a fraction of its total loan activity, a ratio we refer to as the 'loan mix.' Our key finding is that after nationalization, foreign banks reduced British lending as a share of their total lending by about eleven percentage points. We corroborate this evidence using two other data sets, and find that foreign nationalized banks also increased interest rates on new loans to UK residents by 70 basis points, and substantially reduced the size of their British mortgage loans. By way of comparison, nationalization does not seem to affect significantly either the lending activity or interest rates of British banks. These results are robust to a variety of perturbations to the underlying empirical model. Succinctly, foreign nationalized banks seem to have engaged in financial protectionism, while British nationalized banks have not.

2. Data and Methodology

2.1 The Data Set

Strategy. Figure 1 plots the growth of aggregate lending to British business over the crisis period. The data lends at least *prima facie* plausibility to the idea that lenders cut back more dramatically on cross-border than on domestic activity. The superficial impression one gets is that during the Great Recession, foreign lenders (i.e., banks with headquarters outside the UK) contracted their activity more dramatically than British lenders (banks with headquarters in the UK). Still, such aggregate evidence does not indicate the presence of financial protectionism. Only if foreign *public* institutions contracted their British loans to similar borrowers more than foreign *private* institutions, would we have evidence of financial protectionism.

We are interested in examining if public interventions, such as bank nationalization, skew either the quantity of loans that banks supply to foreign (as opposed to domestic) borrowers, or their associated prices (interest rates). There is certainly anecdotal evidence of financial protectionism: for example, Commerzbank's November 2008 capital injection of €8.2bn was conditional on the provision of an additional €2.5bn in lending to Germany's Mittelstand.[1] But anecdotes do not constitute rigorous empirical evidence. Unfortunately, publicly available data sets do not provide sufficient information to answer this question. For instance, the BIS provides "locational" and "consolidated" data sets on cross-border bank lending. But these aggregated data do not have a distinction between the external lending of private and publicly-supported banks. Laeven and Valencia (2012) study systemic banking crises and provide data on bank nationalizations during these crises. They also use aggregated data, and do not differentiate the effects of intervention between domestic and foreign financial activity. As aggregation masks the effects of protectionism, it is appropriate to search for this phenomenon using data at the level of individual financial institutions. However, publicly available databases such as *BankScope* do not provide information on individual institutions' external claims. A good test for financial protectionism requires data on both external and domestic lending at the level of individual institutions, some of which were affected by public interventions during the sample period.

Source of Financial Data. Fortunately, for the purposes of this investigation, the Monetary and Financial Statistics Division at the Bank of England have kindly provided us with an appropriate data set. It includes quarterly data with a host of information for all banks doing business in the UK. London's status as a major international financial center means that the banking system of the UK has considerable diversity, enabling us to search for indications of financial protectionism in the behavior of both British and foreign banks. This rich data set is substantially better suited to test for financial protectionism than any publicly available data set. Unfortunately, it has three substantive disadvantages. First, the data set is available to us at the level of individual banks; the bilateral relationship between individual banks and borrowers cannot be studied, nor can one control for borrower characteristics. Second, for foreign banks, the data set includes only data on the UK-resident part of the banking group. Third, the data set is confidential (though we note that

the equivalent data provided by US authorities, also commonly referred to as 'Call Reports' data, are not.).

The data set provides us with a complete set of balance sheet data for every institution in the UK banking sector, as all banks operating in the UK must provide this information to the Bank of England under the present regulatory regime. Internally, the Bank of England uses this confidential data set to help carry out its financial and price stability objectives. Externally, these data are passed on to the Financial Services Authority (FSA) for the purposes of bank regulation and to the Office of National Statistics, where it features as one of the building blocks for the UK's national accounts. The accuracy of this data set is an important priority of the Bank of England: it is compiled in accordance with the Bank's *Statistical Code of Practice*.[2]

There are three types of banks in our sample. *British banks* have their headquarters in the UK and are regulated by the FSA. *Subsidiaries of foreign banks* operate in the UK and participate in the UK's deposit insurance scheme; they are therefore subject to FSA capital requirements. In contrast, *branches of foreign banks* operate in the UK, but are covered by deposit insurance from their home country; these are not subject to FSA capital regulation.

Reporting institutions must provide the data to the Bank of England in several "forms." The "AL" form of the data set provides series on loans and advances granted to UK residents (including monetary and financial institutions). The "CC" form provides a reporting institution's total claims on non-residents. We combine AL and CC series to derive our key regressand, the 'loan mix' ratio. The loan mix measures the ratio of British to total bank lending, and is our dependent variable of choice. The data set on loan mix is available quarterly from 1997Q3 until 2010Q1 for up to 361 banks (not all of which have complete series). As of May 2010, 38 of these banks are British according to the Bank of England, while the rest are foreign. Further details on the construction of our variables are available in the data appendix.

We caution that the loan mix is not a perfect measure of "home bias." For instance, a loan shifted from a British company in the UK to the same company abroad would lead to a

decline in the loan mix. Also, if (say) a French bank contracts lending in the UK and France but expands its activities in Germany, our loan mix measure might again decline even though there may have been no shift in its lending activities towards France. To measure financial protectionism accurately, one would need data on the entire portfolio of a banking group's activities, not just those in one country.

British banks seem naturally to lend more inside the UK, at least compared with foreign banks. This is clear from Figure 2, which provides separate histograms of the loan mix for British and foreign banks. The behavior of the loan mix ratio suggests that British banks tend naturally to lend relatively more at home (the distribution is skewed towards one and the average is .67), while foreign banks lend more abroad (the distribution is skewed towards zero, with a lower average of .27). This does not necessarily indicate financial protectionism, since Figure 2 combines data, over time, from publicly-owned, privately-owned banks, and a number of banks whose ownership switched. The question we ask is whether a bank's behavior – that is, its loan mix – changes following a large public intervention. Regression analysis of the loan mix permits us to explore whether or not a bank's preference for domestic (as opposed to foreign) lending changes, following events like nationalization.

We also take advantage of data provided by the "BT" and "PL" forms, which contain in-depth information of the reporting institution's balance sheet and income/expenditure statement, respectively. The additional data from these forms are used to construct several control variables such as the provisions/assets ratio and measures of capital adequacy, liquidity, and profitability.

Data on loan rates provides us with an alternative, inferior, way to test for financial protectionism. In particular, the "ER" form provides information on effective interest rates on new loans, weighted by loan size. Unfortunately, these data are available over a shorter span of time (only from 2004Q1), and only for the largest institutions (though these collectively make up three-quarters of total lending to any particular sector). Accordingly, we think of loan rates as providing only corroborative evidence, and focus on the loan mix as our key regressand.

Source of Public Intervention Data. Which of the banks in our sample have been affected by public interventions during the sample period? In early August 2010, we conducted bank-by-bank Google searches for ' "bank name" nationalization nationalize privatize' where "bank name" was the precise name of the individual bank in question (according to the Bank of England data set). The clues we discovered from these searches lead us to investigate approximately 150 banks in detail. As we found convincing evidence of public interventions, we constructed suitable binary dummy variables; these take on the value of one at the time of and after public intervention, and zero otherwise. Subsequently we discovered a number of data sets on public bank interventions such as Aït-Sahalia, et al (2012); we have used these to check and corroborate our classifications.

We gathered data on three types of public interventions: 1) nationalizations, 2) injections of public capital, and 3) unusual access to loans, guarantees or liquidity. We focus on bank nationalizations in our empirical work. When a bank receives a public capital injection, it is difficult to measure the government's effective influence on the bank, since private bank capital is difficult to measure during the very times of crisis when capital is injected. Some banks received capital injections that were minor compared with their existing capital; they remained, for the most part, private institutions. Other banks were essentially nationalized when they received capital injections. Thus it seems unwise to assume that all banks react to capital injections similarly. It is also problematic to treat uniformly all banks' access to unusual liquidity facilities or loan guarantees (where banks received larger amounts of liquidity against assets of lower quality than in normal times); such assistance has heterogeneous impacts, and not all banks chose to access such facilities during the crisis. Further, capital injections and other forms of public assistance can occur repeatedly; the effect of such assistance may be heterogeneous if repeated rescues are implicitly guaranteed in advance. Nationalization, by way of contrast, is a clear-cut, discrete, one-time event. For all these reasons, bank nationalization seems like the most obvious measure of public intervention likely to result in detectable financial protectionism.

In our sample, there are a number of notable nationalizations of British banks, including: Northern Rock and National Westminster/Royal Bank of Scotland.

Nationalizations are also in our sample from: Ireland (AIB), the low countries (Fortis), and Iceland (Glitnir, Kaupthing, and Landsbanki). A number of banks received capital injections (British examples include HBOS, Lloyds; non-British examples include BNP Paribas, Citibank, Commerzbank, Dexia, ING, and UBS), and many banks had unusual access to liquidity or loan guarantees.

2.2 Methodology

We explore our data set with a simple panel data model, using

$$\text{Dom}_{i,t}/(\text{Dom}_{i,t}+\text{For}_{i,t}) = \alpha_i + \beta_t + \gamma\text{Nat}_{i,t} + \gamma_{UK}\text{Nat}_{UK,i,t} + \theta\text{LL}_{i,t} + \theta_{UK}\text{LL}_{UK,i,t}$$

$$+ \zeta\text{Cap}_{i,t} + \zeta_{UK}\text{Cap}_{UK,i,t} + \varepsilon_{i,t}, \tag{1}$$

where:
- $\text{Dom}_{i,t}$ is lending to domestic (British) residents by bank i at time t;
- For is lending to foreign residents;
- $\{\alpha_i\}$ is a comprehensive set of bank-specific fixed effects;
- $\{\beta_t\}$ is an analogous set of time fixed effects;
- $\text{Nat}_{i,t}$ is a dummy variable which takes a value of one when a British bank i is nationalized at or before time t, minus one if a foreign bank is nationalized at or before time t, and is otherwise zero;
- $\text{Nat}_{UK,i,t}$ is a dummy variable which takes a value of one when British bank i is nationalized at or before time t, and is otherwise zero;
- LL and Cap are analogues for banks that receive unusual access to liquidity, or loan guarantees (LL), or are the recipients of public capital injections (Cap);
- ε is a well-behaved disturbance term; and
- $\{\gamma\}$, $\{\theta\}$, and $\{\zeta\}$, are coefficients.

The coefficients of greatest interest to us are γ and γ$_{UK}$. They measure the *permanent* effect of bank nationalization on the loan mix. We note in passing that our loan mix regressand is unaffected by proportionate changes in *total* lending.

Financial protectionism is expected to result in British banks *increasing* the share of British loans in their loan portfolios following nationalization; symmetrically, foreign banks are expected to *reduce* the British share of their loan mix. That is, we construct our dummy variable such that financial protectionism, if it exists, appears as a positive and significant γ coefficient. We check whether British and foreign responses to nationalization are similar by estimating γ$_{UK}$. Similarly, we check for equality of responses to capital injections and liquidity/loan guarantees.

We estimate our equation with ordinary least squares, though we provide a number of alternative estimators (and other sensitivity analysis) below to ensure the robustness of our results. Ours is an unbalanced panel with gaps and incomplete coverage, primarily because of mergers and acquisitions. Throughout, we include time fixed effects to take account of common shocks (such as general deleveraging and the credit cycles of Giannetti and Laeven 2012a), and bank fixed effects to control for bank-specific heterogeneity. We present robust standard errors that are clustered by time, though again we also check that our results are not sensitive to this assumption. We cluster by time since public interventions in our sample are temporally concentrated in practice. Table 1 provides some relevant evidence; it tabulates the proportion of different interventions in particular periods of time. Half of all bank nationalizations in the sample took place during the second half of 2008 when the financial crisis was at its peak. Other interventions (such as public capital injections) are even more concentrated.

3. Results

3.1 Lending

Estimates of equation (1) are presented in Table 2. Our interest in this table is mostly in checking for symmetry between the responses of British and foreign banks to public interventions.

The results at the extreme left of Table 2 indicate that there is a statistically negligible difference between British and foreign access to unusual loan or liquidity facilities and/or capital injections; δ_{UK} and ζ_{UK} are statistically insignificant at conventional levels. When we test the null hypothesis H_0: $\delta_{UK}=\zeta_{UK}=0$, the restriction is consistent with the data at better than the .2 confidence level. This is not true of British and foreign responses to bank nationalization; the loan mix of British banks responds significantly less in both economic and statistical terms. Accordingly, we impose the reasonable restrictions (of symmetric responses to British and foreign capital injections and unusual access to loan/liquidity facilities) and re-estimate our equation; these results are tabulated in the second column from the left.

Our main interest is the effect of bank nationalization on the loan mix. Nationalization seems to have a significant effect on the loan mix; foreign banks reduce their proportion of British to total lending by around eleven percentage points. The effect is highly statistically significant; the t-statistic for the hypothesis of no effect is 5.2. Since the average loan mix is around 32 percentage points (lower for foreign banks), this is also a large economic effect; foreign nationalized banks reduce their British loans by over a third. By 2010Q1, the banks that had been nationalized account for slightly over 15% of the total loans made in our sample, further evidence that this is an economically large result. No single foreign nationalization seems to be driving our results, nor do the nationalizations come from one particular foreign country. It is also interesting to note that the coefficient on the British nationalization dummy variable is of almost identical magnitude but opposite sign; that is, British bank nationalization appears to have no economically (or statistically) significant effect on the loan mix. The substantive evidence of financial protectionism after foreign bank nationalization is our most striking finding, especially when combined with the absence of a comparable reaction by British banks.

Other public interventions also have effects on the loan mix. Banks that are granted unusual access to loan or liquidity facilities seem to engage in financial protectionism; British banks raise the proportion of British loans in their portfolios by almost three percentage points (foreign banks lower their British loan mix by the same amount). Capital injections have a smaller effect which is curiously negatively signed, indicating that foreign banks which receive public capital actually *increase* the proportion of British loans in their portfolios, though only by a small amount (just over one percentage point). In the second column from the right, we add a comparably-constructed dummy variable for privatization, which changes results little. The strong and different effects of these public interventions on the loan mix make it *prima facie* implausible that shocks to loan demand (as opposed to supply) explain our results; we check this idea further below.

At the extreme right of Table 2, we restrict the sample to observations that are in the middle 90% of the loan-size distribution for both British and non-British banks, so that banks are comparably sized. Using this smaller sample makes little difference to our key results on nationalization. Unfortunately, some of our smaller results are sensitive to other minor econometric assumptions, as we now show.

3.2 Sensitivity Analysis

Table 3 checks the robustness of our key results in ten different ways; each row in the table represents a separate regression. Since foreign British and foreign bank nationalizations have separate effects, we replace the "symmetric" (+1 British/0/-1 Foreign) dummy variable with conventional (+1/0) dummy variables, taking the value of one following nationalization and zero otherwise

We begin by using three alternative definitions of our dependent variable (further experiments with others have not overturned our results and are available in the online version). First we replace CC15 (Total external claims on non-resident customers) in the denominator with CC1 (Loans and advances to non-residents). Second, we only include real economy (non-financial corporate) domestic and external lending, excluding financial and household lending. The third dependent variable is a variant on the second: it continues to

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exclude financial loans, but only includes foreign loans that are made to the bank's country of residence (so that only British and German loans made by a German bank are included in the dependent variable). That is, it is a bilateral measure of the loan mix, where our default measure is multilateral. This is advantageous insofar as one expects financial protectionism by a nationalized foreign bank to appear as a retrenchment in activity away from the UK and towards the bank's home. However, we only observe the *immediate* destination of a foreign loan, which may not be the *ultimate* destination of the funds. This potential for re-intermediation makes us wary of over-interpreting these results. Our key foreign nationalization result remains large and significant in all cases. However, our other results are sensitive.

We check that our standard error assumptions are not critical by providing robust standard errors that are not clustered. The statistical significance of our nationalization results is unaffected, though different standard errors do affect the significance of other public interventions. Next, we weight our least squares regressions by the natural logarithm of total bank assets; this check does not appear to affect the results much. Since the loan mix is a limited dependent variable, we also estimate our equation with an appropriate censored technique (Tobit), but again this does not affect our results much.

We also divide our sample of data in a number of ways. First, we split the sample into big and small banks, using the median bank loan portfolio (the denominator of our dependent variable) as the dividing point. The results differ by bank size; only bigger banks that are nationalized seem to engage in financial protectionism, as seems intuitive (the responses of smaller banks to public interventions are not statistically significant from zero, and are available online). Next, we check whether our results are sensitive to the inclusion of particular observations. Our results are little affected by dropping the earlier part of our sample. Similarly, we can successively drop: a) foreign branches; b) foreign subsidiaries; and c) all our British banks, all without any serious effect on our results. Our last test in this vein is to drop all observations with a residual which lies more than two standard errors from the mean. However, this does not have a major effect on our key nationalization coefficients, indicating that outliers are not responsible for our results.

We note in passing that our results do not stem from bizarre behavior in either the numerator or denominator of our loan mix regressand, since both behave in a broadly similar fashion. For instance, the average quarterly growth rate of total lending (the denominator) for British banks is 4.3%, similar in both economic and statistical terms to the 5% growth rate of British lending. This similarity characterizes foreign banks, private and nationalized banks, and combinations thereof.

To summarize: the effects of unusual access to loans or liquidity, and public capital injections are not robust to minor perturbations in our econometric methodology. However, foreign bank nationalizations seem consistently to lower the proportion of British loans in the portfolios of foreign banks. This effect is economically large (around eleven percentage points), and statistically significant. British bank nationalizations have had no consistently large effect on the loan mix, from either an economic or statistical perspective.

3.3 Adding Extra Controls

So far we have shown that our default results seem fairly robust to various model specifications. However, omitted variable bias remains a potential concern even though we have included both time- and bank-specific fixed effects. Accordingly, we construct a set of control variables which have been used in microeconometric studies of bank lending (e.g., Ehrman, et al, 2001, and Kashyap and Stein, 2000). The variables we consider are: a) loan growth; b) the capital adequacy ratio; c) leverage; d) bank dependency on the wholesale market; e) the interaction of foreign nationalization and 2008-09 GDP growth from the bank's home country; and f) a measure of loan demand.

Most of the variables we add to our base specification are relatively straightforward, and the precise definitions are therefore relegated to the data appendix. The exception is our measure of the demand for a bank's loans. It is important to test if our results are sensitive to demand factors; if British demand for loans from a foreign nationalized bank declines starkly, the omission of a demand variable could result in biased estimates of foreign nationalization on the loan mix. Accordingly, we construct a proxy for the demand for loans from individual banks, following the approach laid out in Aiyar, Calomiris and

Wieladek (2012). This is based on the idea that the demand for a bank's loans is proportional to the rate of growth in real activity in the *sectors* the bank operates in: a bank more exposed to booming sectors is more likely to face high demand for its loans than a bank focusing on shrinking sectors. We implement this idea using bank-specific data on loans to seventeen different sectors. We multiply the sector's weight in the total loan portfolio of each bank by year-on-year output growth in the corresponding sector. The sum of these products is our proxy for bank-specific loan demand.

We add the extra control variables one by one to our default model, and present the results in successive rows of Table 4a. It turns out that our key estimates are robust to the inclusion of each of the six controls; foreign bank nationalization has a statistically significant effect on the domestic share of lending of around eleven percentage points, while the effect of British nationalizations is statistically and economically small. Including the control variables also does not substantially change the effects of the other public interventions. The effect of foreign bank nationalization retains its sign and most of its size, but loses its significance when foreign growth is added interactively. This is simply a reflection of collinearity; the joint effect is significant at better than the .01 confidence level. The coefficient on the interaction is positive, indicating that bigger GDP decline in the foreign country is associated a greater reduction in the loan mix, consistent with financial protectionism.

At the bottom of Table 4a we successively add three different sets of dummy variables to the default specification (as well as a single interaction). The first set isolates the periods after a bank switches its regulatory status. Recall that there are three types of banks in our sample: a) *British-owned* (British headquarters and FSA regulation); b) *foreign subsidiaries* (British deposit insurance and FSA capital requirements); and c) *foreign branches* (no British deposit insurance or FSA capital regulation). Banks sometimes switch from one category to another, as, for example, when Santander Bank purchased Abbey National in 2004. For each of the (seventeen) banks that switched regulatory status in the sample, we add a dummy which is one for the bank during the period after the switch in

regulatory regime, and zero otherwise. As can be seen, adding these dummies has little impact on our results.

The next set of controls is determined by European Commission (EC) policy. Among other things, the EC is in charge of maintaining a competitive single market. As such, it can choose to pursue competition policies when state aid is given to a private entity like a bank. It can also choose to raise objections, and indeed sometimes publicly declares that it will or will not object to state support for a bank (sometimes conditional on restructuring). Alternatively, the EC can investigate a bank, with an accompanying public declaration. We create separate dummy variables that are unity on and after the EC's public declarations of either "no objections" or "initiating investigations" for individual banks (we created separate British and foreign dummies, depending on bank nationality), and zero otherwise. However, when we added these to our default specification they had essentially no effect; the results are tabulated towards the bottom of Table 4a. Alternatively, we add an interaction between foreign bank nationalization and the dummy for an EC investigation; this changes the results little. The coefficient on the interaction is negative, indicating that an investigation in conjunction with nationalization is associated with a greater reduction in the loan mix, consistent with financial protectionism if the EC's suspicions are grounded.

The final controls we add are interactions between a bank's nationality and time-specific fixed effects (we note in passing that 51 banks in the sample switched their nationality). We interact time effects with bank-nationality dummy variables; banks from some fifty countries operate in the UK. These fixed effects allow us to ignore any shocks that are common to the banks from a particular country at any point in time (e.g., national business cycle or foreign exchange rate shocks). This is particularly important given the evidence of "flight home" in the syndicated loans market uncovered by Giannetti and Laeven (2012a, b) and the "great retrenchment" analyzed at a more aggregate level by Milesi-Ferretti and Tille (2011). Adding this (large number of) fixed effects also has little impact on our key results. A more parameterized approach, where we add country-specific measures of either the size of the Great Recession or the country's policy response to the financial crisis, delivers similarly robust results.

If we limit our data sample, we can also add a number of other interesting control variables. The "PL" form allows us to construct three potentially relevant ratios: a) the ratio of provisions (for non-performing loans) to total assets; b) the profit rate (profits as a proportion of assets); and c) the dividend to asset ratio. We add these ratios one by one, and report the results in consecutive rows Table 4b. Since the PL form has only been quarterly available since 2004Q1 and only for roughly 69% of the banks, which together make up 95% of total bank assets in the UK, the number of observations used for these regressions is 3,742, less than 40% of the sample used to generate the estimates of Table 4a. Despite the smaller sample size, our results are robust.

Our results do not change much when we add control variables simultaneously, rather than one at a time. We divide the extra controls into two groups, and present the results in Table 5. The first set contains key controls from Table 4a: loan growth; asset growth; log total assets; capital adequacy; assets/capital (leverage); and wholesale market dependence. The second set includes controls from Table 4b: the provisions ratio; the dividend ratio; and the profit ratio. Our base-line results are confirmed when we include all of the controls in the first group. As expected, when we include the second set of controls (and the number of observations is reduced accordingly), our results are weaker. In the bottom row of the table, we include all the controls simultaneously; at this point, the difference between British and non-British nationalization effects becomes insignificant.

3.4 Interest Rates

If the banking sector is perfectly competitive, banks are price-takers and the effects of financial protectionism would only be observable in the quantity of lending, not in the interest rates charged on new loans. With imperfect competition on the other hand, standard bank lending models predict that banks can, in theory, charge interest rates above their cost of capital (Freixas and Rochet, 2008). Previous empirical work has rejected perfect competition in the UK banking system (Claessens and Laeven, 2004), so it seems worthwhile to examine the interest rates of banks. If banks engage in financial protectionism following nationalization, we expect foreign banks to raise interest rates on

British loans following nationalization and *mutatis mutandis*. Accordingly, we repeat our analysis with interest rates.

Table 6 is an analogue to Table 3, but substitutes the effective interest rate as the dependent variable, in place of the loan mix. We use interest rates on new private non-financial corporation loans of less than one year maturity; this is an important and sensitive sector, and more banks lend to this sector than to any other. Unfortunately, interest rate data are only available since 2004Q1, and only for a relatively small number of the largest banks active in the UK (less than forty). Still, while the estimates of Table 6 are based on a small sample of data, they corroborate the results we obtained with the loan mix. In particular, after foreign banks are nationalized they demand interest rates on loans to British companies that are about seventy basis points higher. This effect is statistically significant and reasonable in economic magnitude. By way of contrast, nationalized British banks do not lend at lower rates to UK resident non-financial private companies. Our interest rate results are consistent with financial protectionism by foreign banks.

This evidence is not definitive. British banks may charge higher interest rates outside the UK following nationalization; foreign banks may begin to charge different rates in their home country after nationalization. Unfortunately we do not have the data to test such propositions. Still, we find it reassuring that the evidence we do have of financial protectionism from quantities (the loan mix) is consistent with that of prices (interest rates).

3.5 Mortgage Loans

As another check on our results, we use a completely different data set, focusing on mortgages. The FSA has collected transaction-level data on consumer financial products since April 2005. The FSA collects data on, among other things, new mortgages issued, retail investments, and home purchase plans. All financial institutions (including banks, building societies and non-bank financial companies) are legally required to report the mortgage data to the FSA quarterly. This data set is comprehensive, timely, high-quality, and collected independently of the Bank of England, although it is also, unfortunately,

confidential. We have obtained access to the mortgage data from the database, and use this as an independent check on our financial protectionism hypothesis.

The mortgage database contains over eight and a half million observations on new mortgage loan transactions in the highly politicized housing market, a natural place to look for financial protectionism. The database also provides a wealth of information on individual borrowers and mortgage contracts, which we use as controls in our regressions.[3] Including these characteristics is important because it allows us to account for a number of measurable differences in borrower quality. Our exercise compares mortgage lending by individual banks to borrowers with similar characteristics, before and after nationalization. The granularity of these data makes reverse causality unlikely; this is loan level data with many thousands of borrowers for each bank.

Table 7 presents regressions of government interventions on two dependent variables: the loan to income and loan to value ratios. As in our previous regressions, the data ends in 2010Q1, and we include time- and bank-specific fixed effects throughout (we also add region-specific fixed effects). (We now cluster by bank, rather than time, to ensure that the relationships we uncover are statistically robust to the repetition of bank-level explanatory variables associated with the presence of thousands of loan-level observations per bank.) For each dependent variable, we present four different perturbations of our regression (in rows): a) without extra controls; b) with ten borrower/mortgage characteristics (listed in the notes to the table); c) with borrower characteristics and the five bank characteristics of Set #1 in Table 5; and d) with borrower characteristics and the three bank characteristics of Set #2 in Table 5.

The only public intervention variable that has a consistently significant effect throughout is foreign nationalization. This coefficient is negative; the size of a British mortgage loan falls following the nationalization of a foreign bank. The effect is statistically significant and economically large, amounting to over 100% of borrower income (or just over a third of the average loan/income ratio) or 16% of property value (around a quarter of the average loan/value ratio). The effects of other interventions (such as capital injections) are economically smaller, usually statistically insignificant, and sensitive. We view this as

further cofirmation of the pattern of financial protectionism we found with both the loan mix and interest rates.

3.6 A Note on Endogeneity

Are there reasons to believe that our key regressors – massive public interventions like nationalizations – are simultaneously determined with the bank's choice of loan mix? Alternatively, is there any reason to believe that reverse causality is a problem, with a bank's loan mix driving public interventions? We think it unlikely; it is unclear to us that bank nationalizations and the like are much affected by the domestic/foreign loan ratio, at least in our context. While many British loans did sour during the "Great Recession" of 2008-09, so did many loans abroad; the crisis was a global phenomenon.

Furthermore, bank nationalizations are rare events, and often occur because of inadequate risk management. In rich countries like the UK, it seems unlikely that the loan mix is a significant source of such risk. Nevertheless, we tried a series of instrumental variables, consisting of the controls used in Tables 4 and 5; none produced statistically significant results for the coefficients of interest to us. This is probably because the variables we considered are weak instrumental variables, as they are not significantly correlated with our dummy variables for public interventions (nationalization, and the like).

3.7 Consistency with the Literature

To the best of our knowledge, only two other papers test for financial protectionism. Shortly after this paper began to circulate, we became aware of Giannetti and Laeven (2012b) who use a similar methodology on syndicated bank loan data. Giannetti and Laeven do not distinguish between different types of public interventions; for banks that received *some* sort of intervention, they find (p26) "no evidence that these banks rebalance their portfolio towards domestic borrowers to a larger extent than other banks." We are not surprised by this result, since nationalizations are less common than the other public interventions we examine, and nationalization is the only intervention for which we consistently find strong results. Buch et al (2011) use a confidential data set on German banks but adopt a somewhat different methodology, analyzing the effect of German policy

measures on foreign affiliates through their German "parent" banks. Consistent with our findings, they find (p13) "… the support measures of the German government have induced the banks to increase their foreign assets and liabilities but compared to affiliates of other banks worldwide, the banks have down-sized their foreign activities."

4. Conclusion

In this paper, we have provided the first evidence of financial protectionism. We take advantage of a uniquely suitable confidential bank-level panel data set collected by the Bank of England which includes the activities of all banks operating in the UK from 1997Q3 through 2010Q1. We use a plain-vanilla "difference-in-difference" panel data regression model, which controls for time- and bank-specific fixed effects. We find that foreign banks which have been nationalized reduce their proportion of British to total lending by about eleven percentage points; they also raise loans rates for British companies by about 70 basis points and extend substantially smaller mortgage loans to UK residents. But financial protectionism is not universal. In contrast to their foreign counterparts, there is no evidence that nationalized British banks changed their lending behavior substantively, at least on the basis of British data.

Our main message from this study is that the behavior of foreign banks operating in the UK seems to be consistent with financial protectionism. We have not investigated why these banks chose to act in this way, or whether these actions had any substantive consequences for welfare. We leave those important issues for future research.

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Table 1: Temporal Clustering of Public Interventions

	Nationalization (5 British/15 Foreign)	Capital Injection (17 British/ 59 Foreign)	Unusual Access to Loan Guarantee (30 British/10 Foreign)
2008Q3	20	0	5
2008Q4	30	70	83
2008H2	50	70	88
2008	55	71	88
2009H1	10	15	10
2008H2-2009H1	60	85	98

All figures are percentages.

Table 2: The Effect of Public Interventions on Loan Mix (Mean=32, Std Dev=31)

After:				Similar Size
Nationalization (γ)	10.9**	10.9**	10.9**	11.2**
	(2.1)	(2.1)	(2.1)	(2.1)
British Nationalization (γ_{UK})	-10.5**	-10.4**	-10.4**	-9.2
	(2.2)	(2.2)	(2.2)	(2.4)
Access to Unusual Loans/Liquidity (δ)	1.9	2.8**	2.8**	4.5**
	(1.1)	(.6)	(.6)	(.7)
British Access to Unusual Loans/Liquidity (δ_{UK})	1.8			
	(1.2)			
Capital Injection (ζ)	-1.2*	-1.3**	-1.3**	-.6
	(.5)	(.5)	(.5)	(.6)
British Capital Injection (ζ_{UK})	-1.0			
	(.9)			
Privatization (θ)			10.8**	
			(3.1)	
British Privatization			n/a	
Foreign=British effects (p-value)	.00			
Foreign=British effects except Nationalization (p-value)	.23			
Observations	9,615	9,615	9,615	8,243
R²	.92	.91	.91	.92
RMSE	9.22	9.22	9.21	8.83

Dependent variable: 100(domestic loans/(domestic + foreign loans)). Coefficients for row dummy variables; robust standard errors recorded in parentheses (clustered by time) unless recorded otherwise. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Each column represents a separate LS regression. Observations from quarterly panel, spanning 1997Q3-2010Q1 for 361 banks. Dummies are +1 for time during/after British banks/event, -1 for foreign banks/events. Time- and bank-specific fixed effects included but not recorded. Column with similar size is restricted to sample where British and non-British banks have comparably-sized total loan portfolios.

Table 3: Sensitivity Analysis

After:	Foreign Nationalization	British Nationalization	Unusual Access to Loans or Liquidity	Public Capital Injection
Default (Table 2)	-10.9**	.5	2.8**	-1.3**
	(2.1)	(.5)	(.6)	(.5)
Denominator Variant	-10.6**	1.5*	1.5*	-.9
	(2.1)	(.6)	(.6)	(.5)
No Financial Lending	-11.9**	-2.5*	-3.4**	.8
	(5.4)	(1.1)	(.8)	(.5)
No Financial Lending, bilateral	-19.3**	n/a	21.2**	-.5
	(5.0)		(2.7)	(1.2)
Robust SEs, not clustered	-10.9**	.5	2.8	-1.3
	(2.7)	(1.9)	(1.5)	(1.0)
Weight by Log Assets	-10.8**	.2	2.7**	-1.4**
	(2.0)	(.5)	(.6)	(.4)
Tobit	-11.0**	.6	2.8*	-1.6
	(2.0)	(2.0)	(13)	(.8)
Big Banks	-8.6**	-1.6**	1.1*	.0
	(2.4)	(.4)	(.5)	(.4)
Drop pre-2000	-11.9**	-.6	2.7**	-1.3**
	(2.2)	(.5)	(.6)	(.5)
No Foreign Branches	-11.5*	.4	3.9**	-3.0**
	(5.1)	(.6)	(.7)	(1.0)
No Foreign Subsidiaries	-8.0**	.3	2.3**	.3
	(2.1)	(.5)	(.5)	(.4)
No British Banks	-9.9**	n/a	6.7**	-.8
	(2.2)		(1.3)	(.5)
Drop >|2σ| outliers	-9.9**	2.8**	-.1	-.0
	(1.2)	(.8)	(.5)	(.3)

Dependent variable: domestic loans/(domestic + foreign loans), expressed as a percentage. Non-financial lending excludes any financial sector and household lending. The latter is excluded because direct cross-border lending to households directly in another country is unlikely; to thus ensure non-financial 'foreign' and 'domestic' lending are comparable, we focus on lending to non-financial private corporates only. Coefficients for column dummy variables; robust standard errors recorded in parentheses (clustered by time) unless recorded otherwise. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Each row represents a separate LS regression. Dummies are +1 for British banks/event, -1 for foreign banks/events except for nationalizations. Default regression has 9,615 observations from quarterly panel spanning 1997Q3-2010Q1 for 361 banks. Time- and bank-specific fixed effects included but not recorded (Tobit has fixed time effects, random bank effects).

Table 4a: Adding Extra Controls, One by One

Extra Control(s):	Foreign Nat'n	British Nat'n	Unusual Loan/Liq'y Access	Public Capital Injection	Extra Control(s)
Default (Table 2)	-10.9**	.5	2.8**	-1.3**	
	(2.1)	(.5)	(.6)	(.5)	
Loan Growth	-10.8**	.5	3.0**	-1.4**	-.9**
	(1.9)	(.5)	(.6)	(.5)	(.3)
Capital Adequacy	-11.1**	.0	3.1**	-1.3**	4.4**
	(2.1)	(.5)	(.6)	(.5)	(.8)
Assets/Capital (Leverage)	-10.8**	-1.5**	2.8**	-1.5**	-3. e-7
	(2.1)	(.4)	(.6)	(.5)	(4. e-7)
Wholesale Market Dependence	-10.9**	.5	2.8**	-1.3**	1.2
	(2.1)	(.6)	(.6)	(.5)	(3.0)
Interact Foreign Growth, Nationalization	-6.9	.5	2.9**	-1.3**	.6
	(3.6)	(.5)	(.6)	(.5)	(.5)
Demand Proxy	-11.4**	-0.2	2.9**	-1.4**	0.5**
	(2.2)	(0.5)	(0.6)	(0.5)	(0.2)
Status-Switching Banks	-9.5**	1.2*	1.6**	-1.0*	F()=36**
	(2.2)	(.6)	(.5)	(.4)	
EC Objection or Investigation	-10.7*	.3	.2	2.3	F()=1.0
	(4.2)	(.6)	(1.1)	(4.7)	
Interact EC Investigation, Nationalization	-9.6**	.5	2.8**	-1.3**	-4.2
	(2.7)	(.5)	(.6)	(.5)	(3.1)
Nationality x Time FE	-16.1**	1.8	4.0**	-.9	F()=1.2**
	(3.2)	(2.1)	(1.4)	(1.0)	

Dependent variable: 100(domestic loans/(domestic + foreign loans)). Coefficients for column dummy variables; robust standard errors recorded in parentheses (clustered by time), conventional for bottom row. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Default regression has 9,615 observations from quarterly panel spanning 1997Q3-2010Q1 for 361 banks. Time- and bank-specific fixed effects included but not recorded.

Table 4b: Adding Extra Controls, One by One; (Data only available from 2004 onwards)

	Foreign Nat'n	British Nat'n	Unusual Loan/Liq'y Access	Public Capital Injection	Extra Control(s)
Provisions/ Assets	-7.8* (2.9)	.8 (.5)	1.9** (.5)	-.8 (.5)	-137.** (41.)
Profits/ Assets	-8.2** (2.7)	.5 (.5)	1.8** (.5)	-.7 (.4)	34. (20.)
Dividends/ Assets	-8.5** (2.7)	.5 (.5)	1.7** (.5)	-.6 (.5)	-16. (207.)

Dependent variable: 100(domestic loans/(domestic + foreign loans)). Coefficients for column dummy variables; robust standard errors recorded in parentheses (clustered by time) unless recorded otherwise. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Default regression has 3,742 observations spanning 2004Q1-2010Q1. Time- and bank-specific fixed effects included but not recorded.

Table 5: Adding Extra Controls Simultaneously

Extra Controls:	Foreign Nat'n	British Nat'n	Unusual Loan/Liq'y Access	Public Capital Injection	No. Obs.
Default (Table 2)	-10.9** (2.1)	.5 (.5)	2.8** (.6)	-1.3** (.5)	9,615
Set #1	-9.7** (1.8)	-2.9** (.4)	4.0** (.6)	-1.2* (.6)	9,141
Set #2	-7.9* (2.8)	.8 (.5)	2.0** (.5)	-.8 (.5)	3,692
Both Sets #1 and #2	-8.9** (2.5)	-3.1* (1.3)	3.6** (.7)	-.2 (.5)	3,606

Dependent variable: domestic loans/(domestic + foreign loans), expressed as a percentage. Coefficients for column dummy variables; robust standard errors recorded in parentheses (clustered by time) unless recorded otherwise. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Each row represents a separate LS regression. Dummies are +1 for British banks/event, -1 for foreign banks/events except for nationalizations. Default regression has 9,615 observations from quarterly panel spanning 1997Q3-2010Q1 for 361 banks. Time- and bank-specific fixed effects included but not recorded. Set #1 of controls includes: loan growth; asset growth; log total assets; capital adequacy; assets/capital (leverage); and wholesale market dependence. Set #2 of controls includes: provisions/assets ratio; dividend ratio; profit ratio.

Table 6: Interest Rates

After:	Foreign Nationalization	British Nationalization	Unusual Access to Loans or Liquidity	Public Capital Injection
Default	.71**	.19	.15*	.04
	(.07)	(.17)	(.06)	(.05)
Interest Rate Variant	.86**	-.83**	.08	.29
	(.25)	(.16)	(.14)	(.16)
Weight by Log Assets	.71**	.18	.17**	.04
	(.07)	(.16)	(.06)	(.05)
Control for Total Loans	.71**	.18	.17*	.04
	(.07)	(.16)	(.07)	(.06)
Drop >|2σ| outliers	.70**	.08	.10*	.05
	(.07)	(.06)	(.04)	(.04)

Dependent variable: Interest rate for private non-financial corporation loans of less than one year maturity. Variant is interest rate for households and individual trust loans of less than one year maturity. Coefficients for column dummy variables; robust standard errors recorded in parentheses (clustered by time) unless recorded otherwise. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Each row represents a separate LS regression. Dummies are +1 for British banks/event, -1 for foreign banks/events except for nationalizations. Default regression has 679 observations from quarterly panel spanning 2004Q1-2010Q1 for 35 large banks active in the UK. Time- and bank-specific fixed effects included but not recorded.

Table 7: Effect of Public Intervention on Mortgage Size

	Foreign Nationalization	British Nationalization	Foreign Capital Injection	British Capital Injection	British Access to Unusual Loans/ Liquidity

Dependent Variable: Loan/Income (Mean=280, Standard Deviation=11)

	Foreign Nationalization	British Nationalization	Foreign Capital Injection	British Capital Injection	British Access to Unusual Loans/ Liquidity
Default	-116** (42)	11 (12)	44 (42)	17 (9)	5 (10)
With borrower characteristics	-99** (32)	12** (4)	39 (33)	4 (5)	2 (9)
With borrower characteristics + Set of Controls #1	-118** (39)	8* (4)	46 (39)	8 (8)	-7 (5)
With borrower characteristics + Set of Controls #2	-108** (41)	12** (4)	46 (41)	4 (6)	-2 (7)
With borrower characteristics + Set of Controls #1 & #2	-116** (41)	8 (4)	46 (42)	9 (8)	-6 (5)

Dependent Variable: Loan/ Value (Mean=64, Standard Deviation=23)

	Foreign Nationalization	British Nationalization	Foreign Capital Injection	British Capital Injection	British Access to Unusual Loans/ Liquidity
Default	-16* (7)	2 (5)	-1 (7)	3 (3)	-0 (1)
With borrower characteristics	-15* (7)	1 (2)	-0 (7)	-1 (1)	-1 (1)
With borrower characteristics + Set of Controls #1	-19.* (7)	-0 (2)	2 (7)	1 (2)	-3** (1)
With borrower characteristics + Set of Controls #2	-17* (7)	1 (1)	3 (7)	-0 (1)	-2* (1)
With borrower characteristics + Set of Controls #1 + #2	-16* (7)	-0 (2)	1 (7)	2 (2)	-3** (1)

Coefficients tabulated for dummy variables (columns); standards errors (recorded in parentheses) are clustered by bank. One (two) asterisk(s) mark coefficients significantly different from zero at .05 (.01) significance level. Each row represents a separate LS regression from quarterly panel spanning 2005Q2-2010Q1. Time-, bank-, and region-specific fixed effects included but not recorded. Dummies =1 for during/after intervention =0 otherwise. Default Loan/Income (Loan/Value) regression has 8,570,530 (8,747,817) observations. Borrower/mortgage characteristics include: 1) borrower age; 2) dummies for interest rate type [a) fixed, b) discounted variable, c) tracker, d) capped, e) standard variable or f) other]; 3) dummy for flexibility of repayment (allowing over/under payments); 4) dummy for offset mortgages; 5) term of mortgage in years; 6) dummies for method of repayment [a) capital and interest, b) interest only (endowment), c) interest only (ISA), d) interest only (pension), e) interest only (type unknown), f) mix of capital and interest and interest only, g) unknown]; 7) dummies for purpose of remortgage [a) no extra money raised, b) extra money for home improvements, c) extra money for debt consolidation, d) extra money for home improvements and debt consolidation]; 8) dummy for mortgage protection payment insurance; 9) dummy for income verification; 10) dummies for type of employment [a) employed, b) self-employed, c) retired, d) other, e) unknown]. Log income (log property value) included as explanatory variable, when the dependent variable is the Loan/Value (Loan/Income) ratio. Control sets #1 & #2 are defined in Table 5.
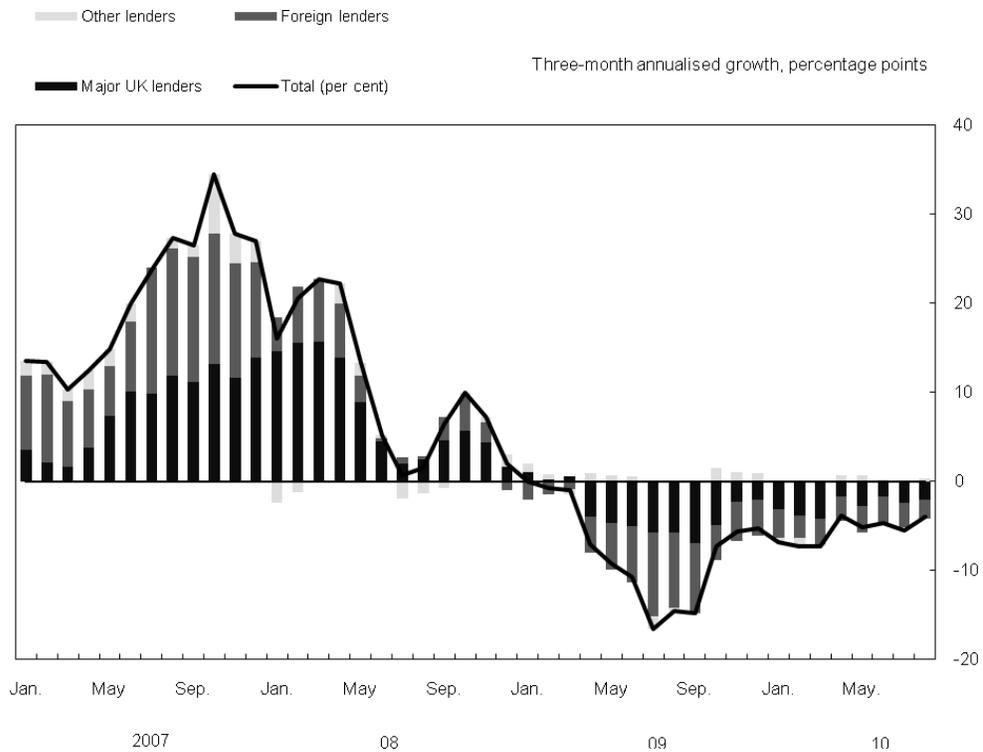
Figure 1: Contributions to Growth in Lending to UK Businesses
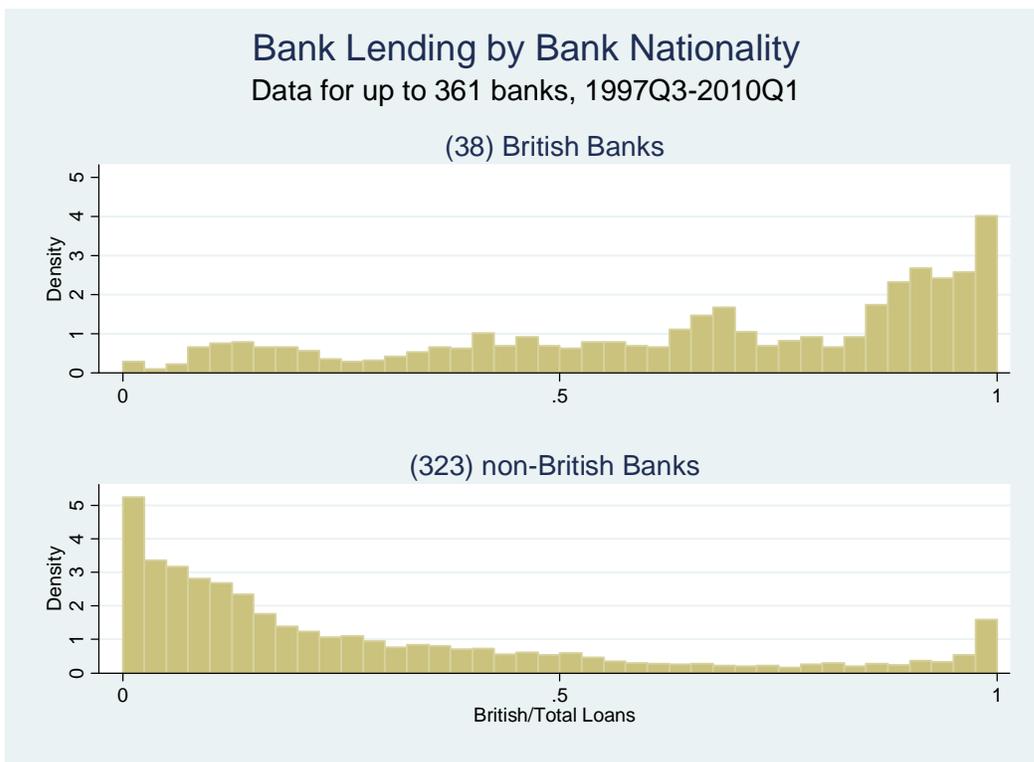(Lending to private non-financial corporations; three-month annualized growth rates in the stock of lending.)

Figure 2: Loan Mixture varies by Nationality

Data Appendix 1 (Tables 1-6)

We collect the raw data from the AL, BT, CC, CE, ER, IS, PL and QD forms. A detailed description of these forms (along with the forms themselves) is available at http://www.bankofengland.co.uk/statistics/reporters/defs/defs.htm. The variables actually used in our regressions are transformed from the raw data as described below.

Variable	Item in form
Share of Domestic in Total Lending, "Loan Mix"	AL 19 [Total Lending to UK residents] / (AL 19 [Total Lending to UK residents] +CC15 [Total external claims on non-resident customers])
Share of Domestic in Total Lending (Denominator Variant)	AL 19 [Total Lending to UK residents]/ (AL 19 [Total Lending to UK residents] +CC1 [Total loans and advances to non-residents])
British Bank	Institutional Nationality is identified by the Bank of England (over time) in http://www.bankofengland.co.uk/statistics/reporters/institutions/index.htm#UK
Size	BT 40 [Total Assets]
Asset Growth	Growth rate of BT 40 [Total Assets]
Loan Growth	Growth rate of AL 19 [Total Lending to UK residents]
Capital adequacy ((Capital + Reserves)/Total Assets)	BT 19 [Capital and Other funds]/ BT 40 [Total Assets]
Leverage (Assets/Owners Equity)	BT 40 [Total Assets]/ BT 19CD [Capital and other internal accounts]
Wholesale Market Dependence	BT 6 [Liabilities under Sale and Repurchase Agreements] / BT 20 [Total Liabilities]
Provisions Ratio	PL 20B [Financial Level of Provisions for Bad and Doubtful Debts] / BT 40 [Total Assets]
Profitability	PL 21 [Retained Profit after Provisions for Bad and Doubtful Debts] / BT 40 [Total Assets]
Dividends/ Assets	PL 17 [Dividends paid] / BT 40 [Total Assets]
Effective interest Rates on loans to Private non-financial corporations	ERC102 [Private non-financial corporations Time – fixed original maturity <= 1 year (maturity)]

Data Appendix 2 (Table 7)

   We collect transaction level mortgage data from the Financial Service Authority's Product Sales Database. All financial institutions operating in the UK are legally required to report all of their first-charge mortgages, meaning loans where the originating lender has the first claim on the property in case of default, to the FSA. Second charge and buy-to-let mortgages are not reported in this dataset. All of the borrower and mortgage characteristics we use in our analysis of those data are described in detail below.

Variable	Definition/Notes
LTV	Value of Loan / Value of Property
LTI	Value of Loan / Gross Income
Offset Mortgage	Takes value of 1 if mortgage is of the offset type, 0 otherwise. An offset mortgage is a UK-specific financial product, which allows interest accrued on a savings account within the same financial institution to 'offset' the mortgage interest balance.
Flexible features	Takes value of 1 if mortgage allows over/under payments and zero otherwise.
Borrower Age	The age of the borrower.
Income verified	Takes value of 1 if income verified, 0 otherwise.
Mortgage Term	Remaining mortgage maturity
Mortgage Payment Protection	Takes value of 1 if payment insurance taken out, 0 otherwise
Employment Status	Takes distinct numerical value for each status: 1) Employed, 2) Self-employed, 3) Retired or 4) Other.
Borrower type	Takes distinct numerical values for each type: 1) First Time Buyer, 2) Home Mover, 3) Remortgager, 4) Social tenant, 5) Other, 6)Unknown
Repayment type	Takes distinct numerical value for each type: 1) Capital and Interest 2) Interest only (endowment), 3) Interest only (pension), 4) Interest only (Unknown), 5) Mix of 'capital and interest' and 'interest only' 6) Unknown
Remortgage reason	Takes distinct numerical value for each reason: 1) No extra money raised, 2) Extra money for home improvement, 3) Extra money for debt consolidation, 4) Extra money for home improvement and debt consolidation, 5) other
Rate Type	Takes distinct numerical value for each rate type: 1) Fixed, 2) Discount, 3) Trackers, 4) Capped, 5) other.

Endnotes

[1] https://www.commerzbank.de/en/hauptnavigation/aktionaere/service/archive/ir-nachrichten_1/2008_5/ir_nachrichten_detail_08_2203.html. See also "Part-Nationalised Banks Agree Extra Lending" from *The Independent* on March 24, 2010: http://www.independent.co.uk/news/uk/politics/partnationalised-banks-agree-extra-lending-1926540.html#, the February 2009 plans by nationalized Northern Rock to revive mortgage lending http://news.bbc.co.uk/2/hi/business/7904748.stm, or recent discussions of financial protectionism and the effects on global finance http://www.ft.com/cms/s/0/a476d3f0-420e-11e2-979e-00144feabdc0.html#axzz2EdRbdAWC.

[2] Available at http://www.bankofengland.co.uk/statistics/about/code.htm

[3] Details are available in an appendix and at http://www.fsa.gov.uk/doing/regulated/returns/irr/gabriel/faqs/psd and http://www.fsa.gov.uk/static/pages/doing/regulated/returns/irr/psd-data-ref-v4.5.pdf.