The Effect of Foreign Lending on Domestic Loans: an Analysis of US Global Banks

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26th Aug 2015

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Abstract

This paper examines the impact of foreign lending activity on the domestic lending for US global banks. We show that greater foreign banking activity complements—rather than detracts—from domestic industrial lending. Exploiting a confidential data (FFIEC 009) on foreign loan exposure of US banks, we use foreign GDP shocks as an instrument for bank foreign office lending. Our estimates show that a 1% increase in foreign office lending growth is associated with a 0.6% increase of domestic industrial lending growth, which suggests potential complementarities across banking products.

Keywords: Foreign Investment, Banking, Global, Multinational, Loans

JEL classifications: F21, F23, F36, G21

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1. Introduction

As of December 2014, dollar denominated bank loans from US reporting banks to the rest of the world totaled $2.7 trillion \(^1\). Given this large volume, foreign lending activities of US global banks could have a significant impact on the financing and growth of the US domestic economy. This paper examines US global banks and asks: does foreign lending come at the expense of domestic lending?

To understand the cross-border lending decision of global banks, it would be natural to apply the framework used for multinational industrial firms and foreign investments. \(^2\) However, the lack of available data on the geographical location of bank investments has posed a significant challenge. To this end, we exploit a confidential dataset (FFIEC 009) of US bank’s foreign country exposure. \(^3\) Following the methodology employed by Desai et al. (2009), we construct a bank-specific country exposure weighted foreign GDP growth or innovations to GDP growth, to instrument for changes in foreign office lending.

Our results demonstrate that US global banks treat foreign and domestic lending more as complements than substitutes, where a 1% increase in foreign lending corresponds to 0.6% increase in domestic loan volume. This finding mirrors the real investment complementarity

\(^1\) Bank of International Settlements Locational Banking Statistics, Table #7A
\(^2\) Papers in the industrial literature include those at the macroeconomic level such as Feldstein (1995) and those at the industry level, such as Arndt et al (2010).
\(^3\) Our construction assumes that banks make lending decisions first, and then based on lending opportunities at home and abroad, funds are raised to service all loans. If funds are raised first or bank funding is fixed, then foreign lending necessarily comes at the expense of domestic lending.
found with multinational industrial firms in Desai et al (2009). For global banks, complementarities between foreign and domestic lending may represent informational and operational efficiencies in underwriting and servicing loans. Moreover, we find that when bank funding conditions tighten, the relationship reverses and increases in foreign lending may come at the cost of lower domestic lending. Our findings contribute to the literature on how global banks allocate loan decisions by demonstrating that outside of extreme stressful funding periods, foreign lending may in fact induce more domestic lending. We leave an exploration of the mechanism for the complementarity for continuing research.

2. Model and Empirical Design

Consider a global bank that lends in the U.S. (“Domestic”) and abroad (“Foreign”). Faced with costs, \( r_D \) and \( r_F \), to operate the loans at home and abroad, respectively, the bank chooses levels of domestic and foreign lending given by \( L_D \) and \( L_F \). The bank solves the following optimization problem, with revenue function \( R(Q(L_D, L_F), y_F) \) and bank specific foreign lending condition, \( y_F \):

\[
\max_{L_D, L_F} R(Q(L_D, L_F), y_F) - r_D L_D - r_F L_F
\]

4 Alternatively, complementarities may also arise as a banking analog to vertical production (Hanson et al 2005), such as loan origination and securitization. We leave analysis of the mechanisms that give rise to this complementarity for further research.

5 Since the global bank raise funding as one entity, funding costs are the same across domestic and foreign lending. Therefore, \( r_D \) and \( r_F \) differ in the cost of operating and monitoring of loans at home and abroad.

6 We assume that global U.S. banks face the same domestic lending conditions so that \( y_F \) can be thought of as a bank’s foreign lending conditions relative to the common domestic one. Note we also do not have a budget constraint, because the bank decides optimal lending amounts and then raises the capital to fund all loans.
At the optimum, both first order conditions (FOC) on $L_D$ and $L_F$ must be satisfied simultaneously:

$$\frac{\partial R}{\partial Q} \frac{\partial Q}{\partial L_D} = G(L_D, L_F, y_F) = r_D \quad (1)$$

$$\frac{\partial R}{\partial Q} \frac{\partial Q}{\partial L_F} = H(L_D, L_F, y_F) = r_F \quad (2)$$

where operating costs, $r_D$ and $r_F$, are parameters in the bank’s decision problem. Equations (1) and (2) demonstrate that a basic OLS estimate that relates foreign and domestic lending, $\beta$ in the below specification, is likely to suffer from simultaneity bias:

$$\% \Delta \text{DomesticLending}_{it} = \alpha + \beta(\% \Delta \text{ForeignLending})_{it} + \gamma \theta_{it-1} + \epsilon_{it} \quad (3)$$

where $\% \Delta \text{DomesticLending}_{it}$ is the change in domestic C&I Loans for bank $i$, $\% \Delta \text{ForeignLending}_{it}$ is the change in foreign office lending$^7$, and $\theta_{it-1}$ are lagged bank specific balance sheet controls.

To address simultaneity, we construct an exogenous variable to instrument for foreign lending and follow a two stage least squares (2SLS) estimation$^8$. We define our instrument, $Z_{it}$, to be the change in foreign GDP, weighted by the bank’s own lagged country exposures:

$$Z_{it} = \sum_{j=1} w_{ij,t-1} z_{jt} \quad (4)$$

$^7$ We choose Foreign Office lending, rather than Cross-Border or Total Foreign lending, because it is most closely resembles foreign direct investment of multinational industrial firms. In addition, establishing foreign office banking is costly to establish and more accurately reflect actual banking services.

$^8$ Our results do not address a related question regarding the self-selection to become global or expand their global operations. We confine our analysis to only global banks to alleviate the bias from choosing to become a global bank. Further, bank balance sheet controls are included to reduce the impact of risk characteristics on the bank’s operational decision. Further analysis is left for future work.
where $z_{jt}$ is the GDP growth for country $j$, $w_{jt-1} = \frac{x_{jt-1}}{\sum_j x_{jt-1}}$, and $X_{ij,t-1}$ is the country exposure of bank $i$ in country $j$. Then, with our instrument, we run a 2SLS, where the regressions in each stage are specified as follows:

\[
\%\Delta \text{ForeignLending}_{it} = a + b \times Z_{it} + c\theta_{it-1} + \omega_{it} \tag{5}
\]

\[
\%\Delta \text{DomesticLending}_{it} = \alpha + \beta \times [\%\Delta \text{ForeignLending}_{it}] + \gamma\theta_{it-1} + u_{it} \tag{6}
\]

3. Data

Our data is based on the confidential regulatory filing FFIEC 009 (CEX)\(^9\) that requires that all US banks with $30$ million or more in foreign claims to report their exposure by country from 1986 to 2011. We aggregate foreign holdings to the bank holding company (BHC) level and match balance sheet variables using the Y9C. Finally, we source GDP data from both World Bank (WB) and the Penn World Tables (PWT)\(^{10}\). We exclude bank-year observations from offshore financial centers and winsorsize around outliers\(^{11}\).

We find that while foreign office loan volumes of US banks are concentrated in OECD countries and Latin America, considerable exposure differences across global banks remain, which can be exploited for empirical identification. In 2012, the top countries by foreign office loan volume were United Kingdom (31%), Japan (17%), Mexico (7%), Australia (5%), Canada (5%), and Germany (5%), South Korea (4%) and Brazil (4%).

\(^9\) For a detailed description of FFIEC 009, see Cetorelli and Goldberg (2012)
\(^{10}\) PWT offers PPP-adjusted GDP. WB provides better coverage of countries in the CEX.
\(^{11}\) We define outliers as observations where domestic lending or foreign office lending changed by -50% or +100%. We define offshore financial centers from IMF report (2006).
4. Results and discussion

Table #1 summarizes the relationship between changes in foreign office lending and changes in domestic C&I lending using various specifications and instruments. Column (1) reports the basic OLS specification in Equation (3) and shows that the change in foreign office lending is positively associated with changes in domestic lending. Since the OLS estimate may be biased, the remainder of Table #1 reports the results for the 2SLS specification, using weighted average foreign GDP growth or innovations to foreign GDP growth, to instrument for foreign office lending.

The first stage regression in Column (2) demonstrates the positive and highly significant (tstat = 3.067) relationship between changes in foreign office lending and our foreign GDP instrument. Absent any bank controls, Column (3) reports a positive but statistically insignificant relationship between domestic and foreign lending (0.110, tstat=0.214). When balance sheet controls are added, Column (5) shows that a 1% increase in foreign office lending leads to a statistically significant simultaneous increase of 0.617% in domestic lending (t-stat = 2.494). Using PPP-adjusted PWT GDP to construct our instrument, we find quantitatively similar results in Columns (8) – (11), but with lower statistical significance.

For robustness, we also instrument with the residual from a fitted AR(1) process for each country’s GDP growth12. Column (7) of Table #1 reports the relationship between foreign and

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12 The residual of foreign GDP eliminates potential bank lending decisions based on the expected component of GDP growth.
domestic lending using the residual of WB GDP data to construct the instrument. Comparable
to instrumenting with raw GDP growth, we find a statistically significant estimate of 0.689%
on foreign office lending (tstat = 2.385). Similarly, residuals of PWT GDP reported in Column
(13) are comparable to the direct PWT GDP data.

Table #1 suggests that foreign lending does not come at the expense of domestic lending
and that the two loan decisions may be strategic complements.

4.1 The Financial Crisis of 2008 and 2009

Underlying our framework is the assumption that banks can raise the capital to execute
their lending decisions. However, during the Global Financial Crisis (GFC) of 2008 and 2009,
banks were severely liquidity constrained and capital-raising was extremely limited. Faced
with a binding budget condition, the bank’s lending decision becomes a portfolio allocation
problem and banks will optimally allocate capital within their internal capital markets\(^{13}\), and
foreign lending will necessarily come at the expense of lower domestic lending.

Consistent with the view that the relationships may differ during and outside the GFC,
Table #2 reports the results of our empirical specification applied to the sample period before
and during the GFC. Column (6) shows that indeed during the GFC, a 1% increase in foreign
lending leads to a -0.205% reduction in domestic lending, although statistically insignificant
(t-stat = 0.445). When funding is scarce and banks are unable to raise capital to fund all

\(^{13}\) See recent literature: Correa et al 2014
investments, then one investment necessarily comes at the expense of another\textsuperscript{14}. Moreover, excluding the global financial crisis, Columns (2) and (4) confirms the positive relationship between foreign and domestic lending when funding can be raised to support both types of investments.

5. Summary and conclusions

We present new evidence that foreign and domestic lending decisions made by global banks exhibit a complimentary relationship, similar to real investment decisions made by multinational industrial firms. Exploiting a confidential dataset on individual bank foreign exposure to construct an instrumental variable for foreign lending, our analysis shows that a 1% increase in foreign lending is associated with a 0.6% increase in domestic lending. Moreover, we find that when capital-raising is unavailable, foreign and domestic lending instead act as substitutes. Thus, the evidence suggests that the presence of global banks’ foreign lending improves borrowing conditions for domestic firms outside of financial crises.

\textsuperscript{14} The substitution between foreign and domestic lending during a funding crisis is consistent with the flight home effect found by Giannetti and Laeven (2012).
References
International Monetary Fund, 2006, Offshore Financial Centers: The Assessment Program—A Progress Report, Monetary and Financial Systems Department (February).
Table #1: Foreign Office Lending and Domestic C&I Lending

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>World Bank (WB) GDP</th>
<th>WB GDP Residual</th>
<th>Penn World Table (PWT) GDP</th>
<th>PWT GDP Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chg US C&amp;I Loans</td>
<td>0.113</td>
<td>(1.926)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wgt Foreign GDP Shock</td>
<td>2.309</td>
<td>(3.067)**</td>
<td>2.424</td>
<td>(3.267)**</td>
<td>2.887</td>
</tr>
<tr>
<td>IV (Chg Foreign Office Loans)</td>
<td>0.110</td>
<td>(0.214)</td>
<td>0.617</td>
<td>(2.494)**</td>
<td>0.698</td>
</tr>
<tr>
<td>Lag Log Assets</td>
<td>0.357</td>
<td>(0.319)</td>
<td>2.042</td>
<td>(2.146)**</td>
<td>-0.286</td>
</tr>
<tr>
<td>Lag Leverage Ratio</td>
<td>1.078</td>
<td>1.68</td>
<td>1.007</td>
<td>1.010</td>
<td>0.944</td>
</tr>
<tr>
<td>Lag Chg US C&amp;I Loans</td>
<td>6.565</td>
<td>(1.664)*</td>
<td>12.61</td>
<td>(1.434)</td>
<td>6.769</td>
</tr>
<tr>
<td></td>
<td>(1.251)</td>
<td>(1.29)</td>
<td>(2.371)**</td>
<td>(2.124)**</td>
<td>(1.29)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.965</td>
<td>(1.947)*</td>
<td>10.97</td>
<td>(1.856)*</td>
<td>-6.775</td>
</tr>
<tr>
<td></td>
<td>(1.947)</td>
<td>(2.137)**</td>
<td>15.69</td>
<td>(-2.620)</td>
<td>(-0.289)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-14.87</td>
<td>(-1.620)</td>
<td>(-1.766)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-39.43</td>
<td></td>
<td>(-0.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-0.050)</td>
</tr>
<tr>
<td>Observations</td>
<td>452</td>
<td>452</td>
<td>452</td>
<td>406</td>
<td>406</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.206</td>
<td>0.133</td>
<td>0.139</td>
<td>0.136</td>
<td>0.128</td>
</tr>
</tbody>
</table>

This table reports regressions of bank-country-year percentage changes of foreign lending activity on the GDP per capita growth. The Column (1) reports an OLS regression of percent change of domestic C&I on weighted average percentage change in foreign office loans. Columns (2)-(5) under World Bank GDP report first (2, 4) and second (3, 5) stage regressions with and without control variables and use a World Bank derived GDP instrument for foreign office loans. Columns (8)-(11) under Penn World Table GDP growth do similarly, using a PWT derived GDP instrument. Columns (6)-(7) under WB GDP Residual and Columns (12)-(13) under PWT GDP Residual use innovations to country specific AR(1) GDP processes to derive the instrument (using their respective data sources) and report first and second stage results from this process with controls. All regressions include Year fixed effects and standard errors are clustered by bank, significance levels are *p<0.10; ** p<0.05; *** p<0.01
Table #2: Crisis vs No-Crisis

<table>
<thead>
<tr>
<th></th>
<th>WB GDP - No Crisis</th>
<th>PWT GDP - No Crisis</th>
<th>WB GDP - Crisis</th>
<th>PWT GDP - Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Chg Foreign Office Loans</td>
<td>-0.114 (0.085)</td>
<td>1.329 (2.071)**</td>
<td>-0.205 (0.387)</td>
<td>-0.054 (0.258)</td>
</tr>
<tr>
<td>Chg US C&amp;I Loans</td>
<td>7.066 (1.188)**</td>
<td>7.148 (1.241)</td>
<td>0.387 (0.023)</td>
<td>-102.3 (-0.258)</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.278 (-40.54)</td>
<td>1.208 (-33.79)</td>
<td>-102.3 (-1.211)</td>
<td>-1.291 (-1.447)</td>
</tr>
<tr>
<td>Observations</td>
<td>373</td>
<td>373</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.146</td>
<td>0.145</td>
<td>0.103</td>
<td>0.036</td>
</tr>
</tbody>
</table>

This table reports regressions of bank-year percentage changes of foreign office lending activity on measures of GDP growth for the Pre US Financial Crisis years of 1985–2007 versus the Crisis years of 2008 and 2009. First and second stage results are presented pre-crisis using World Bank GDP data in the Columns (1) and (2). Columns (3) and (4) under PWT GDP-No crisis similarly present the first and second stage results using PWT GDP data. Columns (5)-(8) replicate the first four, respectively, using data only from 2008 and 2009. All balance sheet variables are lagged. All regressions include Year fixed effects and standard errors are clustered by bank, significance levels are * p<0.10; ** p<0.05; *** p<0.01.