What determines cross-border bank lending and risk taking? The effects of culture, geography, institutions, and information exchange[1]

Preliminary draft

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Abstract: We explore the effects of culture, regulation, and geographical factors on bilateral cross-border bank lending. Using a newly compiled dataset on BIS-reporting banks' activities, we find that geographical factors, information flows and common institutional arrangements are the primary drivers of bilateral bank lending. Trust between individuals in the two countries matters only as a proxy for other cultural similarities. The relationship between bank regulatory differences and lending flows has changed over time. Before the crisis, banks made more cross-border loans in countries with regulations that promoted market discipline and transparency, but took on more risk in countries that had less transparency, perhaps in pursuit of higher returns. This relationship between transparency and banking flows has disappeared in the aftermath of the financial crisis.

Keywords: bank lending; international banking; bank regulations; gravity models; cross-country analysis

JEL classification: G15; G21; G28

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1 Introduction

Cultural and regulatory similarities play an important role in shaping economic exchange between countries because they mitigate informational asymmetries (Guiso et al, 2009, Portes and Rey, 2005). In the case of financial transactions in particular, cultural and regulatory similarities reduce the costs associated with evaluating and monitoring borrowers and investment projects across borders. Geographic proximity may also play a role in reducing monitoring costs. But, in a computerized global financial system with sophisticated means of managing risk, are basic determinants of relationships like culture and geographic distance still relevant? Can regulation substitute for trust? Our research answers both these questions affirmatively, at least to some extent. We find that geographic proximity and indicators of common institutional arrangements are associated with more cross-border lending and risk taking. In contrast, we find only mixed evidence that indicators of common cultural heritage predict bilateral banking relationships. Finally, we find that the role of some measures of regulatory similarity in explaining cross-border flows of loans and risk changed after the financial crisis.

These results are important because recent developments in global financial innovation have the potential to change the nature of global banks' lending and risk management practices. Previously, when banks in one country made loans to borrowers in another country, both the costs of doing business and the costs of monitoring have been concentrated in the borrower's country. Recently, the increasing use of financial derivatives and third-party guarantees have made it so that banks have the ability to transfer a substantial amount of the risk associated with international lending to residents of a third country. The ability to do so enables banks to separate the profit implications of operating in a country with a similar culture or close geographic proximity from risk management concerns, and theoretically, this ability allows higher risk countries to become more integrated into the global financial system. However, in spite of the growing amount of cross-border banking, we find that geography, culture, and common history or institutional arrangements still anchor these transactions.

In developing these results, our primary contribution is that we use a unique and detailed dataset on bilateral cross-border bank lending volumes, risk transfers, and guarantees to refine our understanding

of the roles of culture, geography, and regulation in shaping the patterns of cross-border financial transactions. Our approach enhances the approach of others that have used gravity models to explain these bilateral transactions because we add to the standard gravity model variables that proxy for cultural and regulatory similarities between the source and the host countries. A third contribution allowed by our unique dataset is that we are able to examine the pre- and post-financial crisis periods separately – an important consideration in light of the apparent regime change in bank risk management practices (Temesvary, 2014; Berger and Bouwman 2013; Giannetti and Laeven, 2012).

Our results show that institutional and historical measures, such as common legal origin, geographical distance, communication, and colonial heritage explain the patterns of bilateral lending best, relative to bilateral trust or bank regulatory arbitrage. Specifically, we find that bilateral trust between pairs of countries appears to be a significant determinant of lending activity, but this significance goes away once we include other cultural factors that determine trust. We find limited evidence on the role of bank regulatory differences (arbitrage opportunities) in driving bilateral bank lending. Before the crisis, banks lent more direct loans to host countries whose regulatory framework promoted transparency in bank management practices, but also simultaneously took on more risk in less transparent countries, perhaps in search of higher returns. After the crisis, however, banks lent less and took on less risk in countries that had fewer restrictions on the activities in which banks can engage.

Our use of a gravity model to examine the cultural, historical and geographical drivers of cross-border bank lending flows brings together two strands of the literature. One strand of related literature examines the role of cultural connections and bilateral trust in driving cross-border economic transactions while the second explores gravity models of bilateral bank lending.

Literature on cultural connections, trust, and economic transactions examines a variety of phenomena including trade in goods and services, foreign direct investment, portfolio flows, cross-border mergers, and migration. (Guiso, Sapienza, and Zingales, 2009; Ahern, Daminelli and Fracassi, (forthcoming); and Spring and Grossman, 2013). There are a few papers that, like this one, study the impact of trust and culture on cross-border banking, however, as we explain further below, the previous

research examines a much more concentrated geographic area and only examines cross-border asset flows and not the transfer of risk.

In a seminal paper on the relationship between culture, trust, and economic exchange, Guiso, Sapienza and Zingales (2009) explore trade in goods and services, foreign direct investment, and portfolio flows between European countries. They find that bilateral trust is an important driver of cross-border transactions, even when they use cultural variables such as genetic distance, use of common language, or similar legal origins as instruments for trust between individuals of two countries. In a related finding, Guiso et al (2004) find that social capital plays an important role in the use of and access to financial services and investment. The effect of social capital, hence trust, is particularly important in areas where legal enforcement is weak.

As mentioned above, a few authors have carried this line of investigation into the literature on the determinants of cross-border banking transactions. The most closely related paper to ours is Buch, Driscoll and Ostergaard (2010) who examine the diversification of international asset portfolios for banks in five countries and find that higher bilateral trust is related to a country's assets being over-weighted in banks' portfolios as compared to a benchmark portfolio (with the benchmarks being determined by the CAPM). In another related paper, Heuchemer, Kleimeir, and Sander (2009) study cross-border lending within Europe and find a role for geography and cultural factors. More recently, Hahn (2013) studies cross-border lending from Austria to neighboring Eastern European Union members. He also finds a role for common cultural heritage in explaining cross-border lending dynamics. Although all of these authors are interested in similar issues to the ones we address here, we argue that our work advances knowledge of the determinants of cross-border banking because 1) we use a much larger set of countries in our data set rather than examining a small number of developed countries, and 2) we examine both cross-border lending and cross border transfer of risk.[2]

[2] Giannetti and Yafeh (2012) examine a related phenomenon—the cross border syndication of bank loans. They find that cultural and geographic distance corresponds to higher lending rates, smaller loan amounts and requirements for third-party guarantees.

Many of these papers use a gravity model to motivate a basic empirical specification. Looking at small business lending practices, Breevort and Wolken (2009) find that the role of distance in lending varies substantially by bank type and over time. Even though the importance of physical distance has decreased in the past years, it remains an important factor in banking. Breevort and Wolken (2009) survey some of the reasons why geographical and informational distance continues to affect lending relationships. First, geographical distance limits banks' ability to evaluate and monitor their clients, and also makes it costlier for clients to visit their bank. Second, informational distance increases the cost that banks incur in communicating with clients (potentially through third-party intermediaries), as well as the cost of evaluating lending prospects. These informational asymmetries are particularly severe for commercial loans. For clients, informational distance raises the costs of searching for a potential lender. Overall, regulatory changes (such as removal of capital controls) and technological improvements (such as online banking) have reduced the role of geographic distance in banking.

In addition to measures of cultural similarities and distance, Portes and Rey (2005) find that costs from informational asymmetry between borrower and lender (such as transaction costs) and measures of informational flows (such as bilateral telephone traffic) explain bilateral financial transactions well. Using a US-centered dataset, Portes et al (2001) find that these informational variables are particularly important in determining the flow of assets with higher informational content, such as portfolio equities and corporate bonds. In a related finding, Rose (2000) also finds that measures of institutional similarities (such as currency unions) greatly facilitate trade.

Our results are developed in the following three sections. In the next section, we describe the data; in Section 3 we present our main results, explore the potential role of heterogeneity in our results, and present robustness checks. Section 4 summarizes the results and provides a conclusion and potential extensions.

2 Methods and Data

Methods

In order to investigate the determinants of cross-border lending, we estimate the following model

$$Lending_{i,j,t} = \beta_0 + \beta_1 Culture_{i,j,t} + \beta_2 Geography_{i,j,t} + \beta_3 Institutions_{i,j,t} + \beta_4 Regulation_{i,j,t} \; \beta_5 Information_{i,j,t} + \mu_i + \gamma_j + \lambda_t \quad (1)$$

where $Lending_{i,j,t}$ is lending originating in the source country, *i*, to the destination country, *j*, at time, *t*. As we explain in more detail below, we examine two types of lending: immediate borrower lending and ultimate risk lending. The former is actual loans made from the source to the destination country while the latter is the amount of risk that the source country takes in the destination country after adjusting the loan volumes for risk transfer through derivative contracts and loan guarantees.

$Culture_{i,j,t}$ is a vector of variables that measures cultural similarities between the source and destination countries, $Geography_{i,j,t}$ is a vector of variables that captures geographic relationships between the two countries, $Institutions_{i,j,t}$ includes variables that capture institutional similarities, and $Regulation_{i,j,t}$ includes differences in regulatory policies in the two countries. Because lending and risk taking may be more prevalent in countries in which the residents communicate with each other, we also include a proxy for information flows between the two countries. Source country dummies, destination country dummies, and a time dummy are represented by μ_i, γ_j, and λ_t, respectively.

We estimate Equation 1 using panel data. Data availability for regulatory differences and ultimate risk lending restricts our examination to two periods (2005-2006 and 2011-2012). Fortunately, however, these two time periods allow us to examine both pre and post-crisis lending. Although a Chow test does not reject the pooling assumption that all coefficients are jointly equal across time periods, in supplementary estimations we also estimate a SUR model in which we report separate coefficients for the two time periods in order to examine individual coefficients, especially the impact of bank regulation. Finally, because our data does not record any lending volumes less than zero, we also confirm that our results are robust to estimating the relationships in Equation 1 with a Tobit model.

Data

Our two main dependent variables of interest consist of data on cross-border direct lending, and lending adjusted for cross-border risk transfers (as done through derivatives and guarantees). The majority (approximately 52 percent) of the cross-border loans are made to the non-financial private sector in the borrowing country. Roughly one-third of the bilateral loans are made to banks, while the remaining loans are made to the public sector. A little more than half (about 55 percent) of the loans are short term, with maturities of less than one year, while the bulk of the remaining loans (39 percent of the total) have maturities over two years.

All data on bilateral cross-border bank claims come from the Bank for International Settlements (BIS)'s Consolidated Banking Statistics. Each BIS-reporting country reports consolidated foreign banking data by target country, on a bilateral basis.[3] All data are reported on a "consolidated" basis.[4] Data on an "immediate borrower" basis is taken from Item 9B of the statistical release. This dataset captures the volume of foreign claims originating from any BIS-reporting country to any destination country. The BIS also reports data on an "ultimate risk" basis, which is Item 9D of the statistical release. Ultimate risk lending volumes are the actual (immediate borrower) loans made after adjustment for risk transfers. Therefore, ultimate risk lending data captures the amount of claims a BIS-reporting country has in a destination country, but only the amount for the repayment of which the given destination country is responsible.[5] It follows that for any BIS-reporting source country, its "immediate borrower" claims in the

[3] The list of BIS-reporting countries is as follows: Algeria, Argentina, Australia, Austria, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Macedonia (FYR), Malaysia, Mexico, the Netherlands, New Zealand, Norway, Peru, the Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United Arab Emirates, the United Kingdom and the United States, plus the European Central Bank.

[4] This means that the lending is irrespective of where the loan is actually booked. With consolidated data, the location of the loan does not matter – only the nationality of the lender and borrower. For instance, if Bank of America makes a loan to Subaru in Germany of $60, then a loan directly to Japan of $40, the total value of American loans to Japan would be reported at $100, without mention of Germany.

[5] For instance, suppose that Bank of America makes a loan to Subaru in Japan of $100 – this is reported as the immediate borrower amount between the US-Japan pair. But now suppose that $30 of this loan is securitized by a British company. Then Britain is ultimately responsible for the repayment of this $30, while Japan remains

destination country (Item 9B) plus the net risk transfer into the destination country makes up the source country's "ultimate risk" amount of claims in the destination country (Item 9D).

There is a strong "common lender" effect in cross-border bilateral lending data – there are few lending (source) countries relative to the number of destination (host) countries. To account for this fact, in addition to the source and destination country dummies mentioned above, we use as dependent variables the *share* of the given source country's loans in that time period that go to each individual host country. Furthermore, in order to smooth through quarterly fluctuations in lending we consider a "time period" to be two years. Thus, the lending data for each time period is the average of eight quarterly observations for each country pair in each time period.

As mentioned above, our independent variables include sets of variables that capture common cultural, institutional, regulatory, information flows, and geographic characteristics between the source and destination countries. More specifically, to proxy for common cultural characteristics, we include a dummy variable if the two countries share a common spoken language. We also incorporate measures that may be more indirect measures of shared culture. These include a variable measuring genetic distance between indigenous populations[6] and a dummy variable indicating if the source country is a former colony of the destination country. These indirect measures may more be determinants of shared culture, and, in fact, Guiso et al. (2009) use these indirect measures of culture as instruments for bilateral trust. We do not follow that same estimation strategy for our entire set of countries because bilateral trust data is not available. However, for a subset of our sample that contains European countries, we are able to use a measure of bilateral trust from Guiso et al. (2009) and in some estimations use these indirect measures of culture as instruments for trust in the European sample.

In addition to shared culture measures, we include several other variables as well. To proxy for common institutional characteristics we include dummy variables indicating if two countries share a

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ultimately responsible for $70. Then the ultimate risk database would report a $30 loan from the US to Britain, and $70 from the US to Japan.

[6] This measure was developed by Cavalli-Sforza, Menozzi, and Piazza (1996), and is based on the existence of genetic or DNA polymorphism (a situation in which a gene or a DNA sequence exist in at least two different forms.

common legal origin and if they use a common currency. Geographic relationships between two countries are captured in a variable measuring the distance between two countries (weighted by population location) and a dummy variable equal to one if the two countries are contiguous.[7] As a proxy for information flows, we also include phone traffic between the two countries as measured by the percent of all incoming calls to the source country made by the destination country.[8]

We also include a set of explanatory variables that capture similarities in bank regulatory frameworks between pairs of countries. Data on bank regulations come from the World Bank's Bank Regulation and Supervision Database. The 2007 and 2012 surveys are used. For each country in the sample, indices of regulatory stringency are constructed based on various dimensions of regulation. These summary indices are taken from an updated version of the dataset constructed in Barth et al (2005). In order to capture *regulatory differences* between countries, for each measure the host country's regulatory indicator is subtracted from the source country's values. Therefore positive values of these regulatory difference measures indicate that the source country is stricter than the destination country. Negative values, on the other hand, indicate a relatively stricter destination country regulator. We examine bank regulatory differences along three dimensions: "supervisory power" is an index of official supervisory power, i.e. whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. Our "activity restrictions" index measures overall restrictions on banking activities – more specifically the extent to which banks may engage in the underwriting and dealing of securities and insurance products, and investment in real estate. Finally, our "private monitoring" variable measures whether there are incentives or ability for the private monitoring of banks. This is a measure of the extent to which the public is made aware of regulatory actions taken against banks, and the extent to which banks are required to disclose their risk management and off balance sheet practices.

[7] We weight the distance by population so that relatively more "important" cities are weighted more heavily in determining how far apart the countries are.

[8] An alternative specification would be to measure the source country's outgoing phone traffic to a given destination country as the share of all calls going out of the source country. However, due to reporting limitations in the Telegeography publication, doing so would result in a substantial loss of available data.

All of our data is summarized in Tables 1 through 3. Table 1 provides a detailed description of the variables and data sources, Table 2 gives summary statistics and Table 3 shows averages by time period. These statistics indicate that, on average, bilateral lending is fairly well diversified across destination countries with the average share of immediate borrowing lending being only 2 percent and ultimate risk lending 1.8 percent of the share of loans from the source country. While it is true that the maximum percentage for each type of lending to one country is much higher (78 percent of total loans for one source country for immediate borrowing lending and 67 percent for ultimate risk lending), this is not typical. In fact, the 95th percentile for immediate borrower lending is 10 percent and for ultimate risk lending it is only 9.8 percent. In other words, for a country pair that is in the 95th percentile, that immediate borrower lending represents only 10 percent of the cross border immediate borrower lending for that source country. The trends in Table 3 show that while the dollar volume of loans increased over the two time periods, the percent of the total loans from the source countries remained essentially unchanged.

3 Results

3.1 Main Specification

We present results of the estimation of Equation 1 in Table 4. Columns 1 through 5 present results for immediate borrower lending and columns 6 through 10 provide results for ultimate risk lending. In the first column for each type of lending, we include our most basic specification which includes measures of culture (common spoken language), institutional arrangements (common legal system and common currency), and information flows (phone calls). In the second column (columns 2 and 6), we add variables that are more indirect measures of common culture (genetic distance, years at war, and colonial ties).

We find several interesting results that are generally similar for both types of lending. Our first result of note is that geography matters. Both contiguous and distance enter in the ultimate risk (UR) and immediate borrower (IB) regressions in expected ways. More specifically, source countries lend a

significantly greater share of both types of loans to contiguous host countries. Furthermore, the farther the host country is from the source country, the smaller is the share of both types of lending that it can receive. These variables remain significant, even after controlling for cultural and institutional factors. The magnitudes of these effects are reasonable, but also notable. For example, the results in Column 1 of Table 4 suggest that a lender will increase the share of immediate borrower loans to a contiguous borrower by .69 percentage points. Given that the average share for any one country pair is two percent, this is a meaningful increase. While these results are in line with the "gravity" literature on trade flows, we contribute by showing that such gravity effects prevail in the case of banking flows across a large range of countries as well. In this context, these results are consistent with the theory that geographic proximity reduces monitoring costs.

Second, we find evidence that common institutional arrangements matter in expected ways. Specifically, source countries allocate a significantly greater share of their *UR* and *IB* lending to countries that share the same legal system (French vs. Anglo-Saxon, etc.). The magnitude of the coefficient in Column 1 indicates that the economic significance of this effect is similar to the country pairs sharing a border. To the extent that contracts are easier to write and enforce, and litigation is easier to manage in familiar legal environments, this result is easier to interpret in the case of financial flows than in the trade literature. Interestingly, we do not find any evidence that sharing a common currency affects loan shares. This suggests that the financial markets have provided sufficient tools to mitigate currency risk and any transaction costs associated with foreign exchange. One reason that we find this result for bilateral bank loans but Rose (2000) does not find it for trade in goods and services is that the lending banks may already be active participants in currency markets and have fairly low transaction costs in hedging currency risk. An alternative explanation is that sharing a common currency does not matter if the majority of cross-border loans are denominated in one of the global reserve currencies (US dollars or Euros).[9]

[9] Unfortunately, our data does not include information about the currency denomination of the loans. The BIS converts all loans to $US for reporting purposes.

In contrast to the result that foreign exchange does not matter, information exchange clearly does. Information exchange and communication as measured by phone traffic is strongly positively correlated with bank lending flows. Using phone traffic data from the 1990s, previous papers have shown that this relationship exists for bilateral trade and FDI & FPI flows (Portes and Rey, 2005). Our analysis uses an updated phone traffic database to show that bilateral phone traffic prevails as a driver of bank lending as well. And, the effect is quite large: The results in Column 1 of Table 4 indicate that a one standard deviation increase in Phone Calls (4.5 percent) is associated with a 3.1 percentage point increase in the share of immediate borrower loans.

We find mixed results for shared culture. Our only direct measure of shared culture (common spoken language) is insignificant in all the estimations. However, when we add indirect measures of shared culture we obtain some significant results. The one (indirect) measure of shared culture that enters significantly and in the expected way is the shared colonial history. If the source country is a former colony of the destination country, then both types of lending are significantly higher. Results in Column 2 and 6 of Table 4 indicate that this type of colonial relationship increases the share of immediate borrower lending by 4.2 percentage points and the share of ultimate risk lending by 7.9 percentage points. Again, given that the average shares for these two types of lending are around 2 percent, these effects are quite large. It is notable that this variable retains significance even after controlling for common legal origin, suggesting that the effect is a result of more than just institutional similarities. The second indirect measure of shared culture is genetic distance. This variable enters the regressions inconsistently, prohibiting us from drawing any conclusions about the relationship between genetic distance and cross-border lending.

Finally, none of the measures of differences in regulatory practices enter our regressions significantly. However, as we explain below, we explore this relationship in greater detail by examining pre and post-crisis results to allow for the possibility that the effect of regulations on bank lending has changed over time.

3.2 Alternative specifications and robustness checks

In this section, we explore some alternative specifications to qualify and add to our main results. We start by exploring the additional role that bilateral trust plays beyond cultural and historical ties, using a subsample of our data for which such a measure is available. We move on to examine the issue of time dependence in the role of bank regulatory similarities in driving bank lending flows. In addition to conducting some robustness checks, we also explore the extent to which our results may depend on the target sector of bank lending.

Incorporating bilateral trust

As mentioned previously, several authors have explored the role of bilateral trust in influencing economic exchange. However, in our full sample bilateral trust data is not available and we must confine ourselves to including as independent variables country characteristics that have been used as determinants of bilateral trust. However, direct measures of bilateral trust from survey data are available for a subsample of European countries from Guiso et al (2009).[10] We replace the variables that were indirect measures of trust between two countries (genetic distance and colonial relationship) with the bilateral trust data in estimations that are reported in Table 5. In columns 1 through 5 of Table 5, we present results from OLS estimation of immediate borrower lending. In column 6, we instrument for trust with variables from Guiso et al. (2009) that they show are determinants of trust (genetic distance, number of years at war between 1000 and 1970, and differences in GDP). Similarly, in columns 7 through 11, results for ultimate risk lending appear and, in column 12, we again instrument for trust in the estimation of ultimate risk lending.

The results in Table 5 indicate that when no other control variables are used (columns 1 and 7), bilateral trust has a significant positive effect both on immediate borrower and ultimate risk lending. However, as control variables for geography, common institutional arrangements, information exchange, and regulatory similarities are added, bilateral trust loses significance in explaining both types of lending.

[10] The underlying data is from the Eurobarometer survey sponsored by the European Commission. The data is from a question that asked individuals to rate how much they trusted citizens from a number of other European countries, on a four-point scale.

These conclusions also hold when we instrument for trust (columns 6 and 12). Thus, the lack of evidence for a strong link between shared culture and bank lending in the broader sample is duplicated in the European sample.

In addition, most of our larger sample conclusions are supported with the results of the European sample. Specifically, we find a strong positive effect for shared institutional arrangements via the effect of a common legal system and a strong positive effect for information exchange as proxied by the effect of phone calls. The effect of distance is also confirmed, with countries that are farther from each other experiencing less bilateral lending. An interesting difference, however, is that in the European subsample, sharing a common border with a destination country is not significantly correlated with increased lending flows there. Because of the extent of the integration of European Union economies, sharing a border in this region may not have as much economic significance as in a broader sample of countries.

Separating time periods

Although our main results are from a specification in which we pool observations across time periods and control for differential effects of the two time periods with a time fixed-effect, we also check to see if our results are robust to estimating separate coefficients for each time period using SUR analysis. Because one of our time periods is pre-crisis and one is post-crisis, this method has the advantage of removing the restriction that the coefficients on all of the explanatory variables are constant both before and after the financial crisis. [11] A disadvantage, however, is that the sample used to estimate each coefficient is significantly reduced because we can only use observations in which we have data for both time periods. We present the SUR results for immediate borrower lending in Table 6A and for ultimate risk lending in Table 6B.

The results in Table 6A and 6B confirm several of our earlier results: the importance of information exchange, geography, and colonial relationships are all borne out in SUR estimations.

[11] As we reported earlier, a Chow test does not allow us to reject this restriction when jointly imposed on all the coefficients. In the SUR analysis, however, we test the restriction on specific coefficients individually.

Interestingly, however, the evidence for the effect of common legal systems is weaker, but the evidence for the effect of different regulatory practices is stronger. While loss of significance of the common legal system variable may in part be due to a smaller sample size, the pre and post-crisis impact of differing regulatory practices are consistent with bank behavior being affected by the crisis.

Examination of the effects of bank regulatory considerations by time period reveals some interesting patterns. First, the negative coefficient on private monitoring in Column 3 in Table 6A and the positive coefficient in Column 3 in Table 6B indicate that relatively stricter private monitoring in the destination country leads to significantly more immediate borrower lending, but significantly less ultimate risk lending, to the destination country in the pre-crisis period.[12] The interpretation is that banks lend more direct loans to host countries that have strict and well-enforced transparency laws in place, such as requirements for banks to reveal risk management practices and off-balance sheet activities. At the same time, banks were also willing to take on more risk in countries that had relatively weaker transparency laws during the pre-crisis period. There is no evidence of these effects in the post-crisis period. Why would less transparent banking practices be associated with banks being willing to take on more risk? One possibility is that rates of return were higher in countries with less transparent practices, enticing banks to take on more risk. Although our data does not contain information on rates of return to loans to specific countries, we can use stock market returns as a proxy for rate of return to bank loans to investigate this channel (Buch et al, 2010). We find that, in fact, lower levels of private monitoring are associated with higher stock market returns.[13] Post-crisis, we find a similar correlation between transparency regulation and stock market returns, however, we find no evidence of the effect of transparency regulation on banks' willingness to take on risk in a specific country during the later time

[12] Recall that the regulation variables are the differences in a regulatory index calculated by taking the source country value minus the destination country value. Thus, a positive difference indicates that the source country has stricter regulation.

[13] Specifically, in the pre-crisis period, an increase in the private monitoring index of one is associated with a decrease in the annual stock market returns of 2.9 percentage points. This effect is significant at the one percent level.

period. Perhaps the financial crisis sensitized banks to taking on risk when there is less transparency and the risk could not be as well understood.

Differences in regulatory restrictions on banking activities also appear to have a differential effect on cross-border bank lending pre and post-crisis. In the earlier time period, we find no effect of differences in regulatory restrictions on banking activities for either immediate borrower or ultimate risk lending (Column 5 of Tables 6A and 6B). However, post-crisis, there is a fairly strong negative effect, with banks being less likely to lend on either an immediate borrower or an ultimate risk basis to countries which allow banks to engage in a greater variety of activities. This result is consistent with banks being more sensitized to risk as a result of the financial crisis and being less willing to lend in countries in which the banking sector might be associated with greater risk.

Tobit estimation

In addition to the SUR estimation, we also explore if our results are robust to an additional specification that might be suggested by the nature of the data. One important issue to explore is that there is a small number of observations in our larger dataset that have zero entries for bilateral bank flows. This fact raises concerns about the effect of left-censoring of the data. To determine if this affects our conclusions, we estimate a Tobit model with our pooled dataset used to generate our main results. The Tobit specification yields results that are very close to the pooled specification presented in Table 4 and we do not present them in detail here.

Target sector-specific estimation

The considerations that go into banks' choices of how much to lend to a given country may also depend on the target sector of lending. For instance, there may be substantial differences in the intensity of monitoring that is necessary for a loan going to another large bank across borders, versus a private individual abroad. Furthermore, loans to governments might be motivated by political considerations as well. In light of these differences, it is important to explore the extent to which our results might vary by the target sector of lending in a host country. While such sector-specific breakdown is not available in our main data, we are able to investigate this issue using a different dataset on U.S. banks' foreign lending.

This supplemental dataset, compiled from regulatory sources, provides information on U.S. banks' immediate borrower and ultimate risk bilateral lending to three sectors in each host country: the banking sector, the non-financial private sector and the public sector. While this dataset is valuable in that it provides sector-specific lending data, it is important to keep in mind that such data is only available for one source country: the United States. Because of this, there are many limitations on our ability to investigate all of the independent variables that we use in our main specifications. Specifically, none of the destination countries for U.S. bank loans share a common currency, only two destination countries are contiguous, and there are only three destination countries from which the U.S. was colonized. Therefore, we exclude these variables from our estimation due to their limited variation. In addition, because we only have one source country and, at most, two observations for each destination country, we are unable to estimate coefficients for dummy variables for the destination and source country. Instead, we estimate a country specific random effect for destination countries of U.S. cross-border bank loans.

We obtain similar results for both immediate borrower lending and ultimate risk lending so only report in detail the results of the ultimate risk lending in Tables 7A (banking sector), 7B (public sector), and 7C (non-financial private sector).[14] There are a few broad conclusions that can be drawn from these results. First, information exchange, as measured by cross-border phone calls remains positively and significantly associated with all types of lending. Second, there are some differences in the variables that are associated with lending to different sectors. Lending to the banking sector seems to be positively influenced by sharing a common language. Sharing a common language is not a statistically significant determinant of lending to the public sector and is significant in only one of the specifications explaining lending to the private sector. In addition, sharing a common legal origin is negatively related to loans to the public sector. This result is in contrast to the results we obtained with our broader data set and may be an artifact of examining only data from U.S. banks. Many of the other countries in the data set that share a common legal origin with the U.S. are also former British colonies, many of them with less stable governments.

[14] Detailed results for immediate borrower lending are available from the authors upon request.

In sum, although the results in Table 7 suggest that cross-border lending to different sectors may be influenced by different factors, data limitations prohibit strong conclusions. Because this data is available for only one source country, the sample size is significantly reduced and idiosyncratic features of the source country may influence the results.

4 Summary and Conclusion

In this paper, we explore the effects of culture, institutional arrangements, information exchange, regulations and geographical factors on bilateral cross-border bank lending. Using a newly compiled dataset on BIS-reporting banks' activities, we find that geography, institutional arrangements and communication are the primary drivers of bilateral lending flows. We find very little evidence that cultural similarities play a role.

Our results are consistent with the idea that the role of bank regulatory differences has changed over time. Before the crisis, banks lent more to countries with regulations promoting and enabling market discipline, but took on more ultimate risk exposure in countries with less transparent banking laws. There is evidence to suggest that banks were willing to do so in search of higher returns on their claims. In the aftermath of the crisis, this pattern disappears. Instead, in the post-crisis period we find that banks lend less in countries with fewer restrictions on banking activities. This suggests that banks are not engaging in regulatory arbitrage to avoid the consequences of tighter restrictions on banking activity. There is evidence that the drivers of cross-border bank lending depend on the target sector as well: loans to other banks and the private sector are chosen similarly, while public sector lending is different.

An important consideration, which we are not able to tackle due to data limitations, is the difference between cross-border vs. foreign affiliate-based lending. Much of the trust-based sorting may already happen along the lines of local (subsidiary)-based vs. cross-border based lending. Local lending allows closer monitoring of the borrowers and loans. However, setting up an office is a major commitment that might be risky if the political and economic climate is very different. Therefore, an interesting extension would be to examine the extent to which these same factors influence whether lending occurs via cross-border loans vs. local affiliates.

Table 1: Variable definitions

Variable	Definition	Source
IB percent	Percent of source country's IB lending to destination country	Bank for International for Settlements (BIS)
UR percent	Percent of source country's ultimate risk lending to destination country	BIS
Common language	=1 if common spoken language	Mayer and Ries (2010)
Contiguous	=1 if share a border	Mayer and Ries (2010)
Distance	Distance weighted by population	Mayer and Ries (2010)
Common legal	=1 if have common legal origins	Mayer and Ries (2010)
Common currency	=1 if have common currency	Mayer and Ries (2010)
Phone calls	incoming phone calls from destination to source country as a percent of total incoming phone calls to source country	Telegeography's Global Telecommunications Traffic Statistics, 2006
Genetic distance	Fst genetic distance	Spolaore and Wacziarg (2009)
Destination Colony	=1 if source country a former colony of destination country	Mayer and Ries (2010)
Supervisory Power	Supervisory Power index of source country minus supervisory power index of destination country	Barth, Caprio, and Levine (2005), updated
Private Monitoring	Private monitoring index of source country minus private monitoring index of destination	Barth, Caprio, and Levine (2005), updated
Banking Restriction	restrictions on banking activities of source country minus restrictions in destination country	Barth, Caprio, and Levine (2005), updated
Bilateral trust	Trust from source to destination country residents	Guiso, Sapienza and Gonzales (2009)

Table 2: Summary Statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
IB percent	1375	2.0213	5.6048	0	0.776931
UR percent	1249	1.8679	5.1178	0	0.673221
Common language	1375	0.348864	0.327721	0	1
Contiguous	1375	0.088727	0.284453	0	1
Distance	1375	5006.319	4202.942	160.9283	19781.39
Common legal	1375	0.353455	0.478216	0	1
Common currency	1375	0.110546	0.313683	0	1
Phone calls	1375	01.7352	4.5399	2.37E-06	0.45298
Genetic distance	1343	525.4535	622.9934	0	2292
Destination Colony	1375	0.010182	0.100427	0	1
Supervisory Power	1113	0.091644	0.82489	-2	2
Private Monitoring	988	-0.91903	2.800261	-9	7
Banking Restriction	944	-0.56144	2.201522	-9	7
Bilateral trust	153	2.786144	0.282547	2.13	3.65

Table 3: Averages by time period

Variable		Mean	
		2006-2007	2011-2012
IB lending as a percent of total		1.9608	2.083
UR lending as a percent of total		1.8075	1.9298
IB lending in dollars		22262.67	27007.97
UR lending in dollars		24093.4	29194.09
Supervisory Power (source - destination)		-0.00515	0.198113
Private monitoring (source - destination)		-1.38202	-0.37445
Banking restrictions (source - destination)		-0.67424	-0.41827

Table 4: Full Sample Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Immediate Borrower Lending					Ultimate Risk Lending				
Common Langauge	-0.6908	-0.4949	-0.4753	-0.196	-0.1437	-0.3871	-0.372	-0.3267	0.0168	0.1329
	(0.51)	(0.51)	(0.56)	(0.61)	(0.66)	(0.57)	(0.57)	(0.61)	(0.67)	(0.70)
Contiguous	0.6879*	0.7600*	1.0425**	1.0492**	1.0865**	0.9798**	0.8153*	1.0917**	1.2165**	1.2132**
	(0.40)	(0.39)	(0.41)	(0.48)	(0.50)	(0.43)	(0.42)	(0.44)	(0.52)	(0.53)
Distance	-0.0002***	-0.0002***	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	0.6498**	0.6918***	0.6688**	0.7164**	0.7826**	0.5867**	0.5696**	0.4746	0.5358	0.5909*
	(0.27)	(0.27)	(0.29)	(0.32)	(0.34)	(0.27)	(0.27)	(0.29)	(0.33)	(0.34)
Common Currency	0.0911	0.382	-0.2671	-0.3218	-0.4109	-0.2348	0.1212	-0.5675	-0.4361	-0.4889
	(0.49)	(0.49)	(0.52)	(0.58)	(0.59)	(0.47)	(0.47)	(0.49)	(0.55)	(0.56)
Phone Calls	0.6960***	0.6943***	0.6286***	0.6364***	0.6382***	0.6797***	0.7154***	0.6390***	0.6311***	0.6269***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Genetic Distance		0.0007**	0.0007*	0.0006	0.0006		0.0007	0.0004	0.0004	0.0004
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
Destination Colony		4.1762***	4.6960***	3.5482***	3.5334***		7.9172***	7.0944***	5.6081***	5.5750***
		(0.97)	(1.01)	(1.09)	(1.12)		(1.10)	(1.10)	(1.21)	(1.24)
Supervisory Power			-0.0187					-0.0267		
			(0.21)					(0.21)		
Banking Restrictions					-0.0559					-0.082
					(0.10)					(0.11)
Private Monitoring				-0.0508					-0.0756	
				(0.09)					(0.09)	
Observations	1375	1343	1091	962	918	1281	1250	1010	887	848
R-squared	0.69	0.7	0.74	0.74	0.75	0.65	0.67	0.7	0.71	0.71

Standard errors in parentheses. ***significant at 1%, **significant at 5%, *significant at 10; all estimations include dummy variables for time, source country nd destination country.

Table 5: European subsample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Immediate Borrower Lending						Ultimate Risk Lending					
Bilateral Trust	9.302***	3.895*	3.477	3.883*	3.457	-17.585	8.492**	3.248	2.893	3.226	2.852	-19.348
	(3.43)	(2.16)	(2.32)	(2.17)	(2.33)	(24.38)	(3.27)	(2.07)	(2.21)	(2.08)	(2.21)	(24.52)
Common Language		-1.099	-1.682	-1.08	-1.699	-0.69		-1.117	-1.643	-1.081	-1.673	-0.687
		(1.07)	(1.21)	(1.08)	(1.21)	(1.58)		(1.03)	(1.15)	(1.03)	(1.15)	(1.59)
Distance		-0.004***	-0.004***	-0.004***	-0.004***	-0.006**		-0.004***	-0.004***	-0.004***	-0.004***	-0.006**
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Contiguous		0.615	1.5	0.615	1.517	0.365		0.692	1.618	0.693	1.62	0.429
		(0.94)	(1.10)	(0.94)	(1.10)	(1.35)		(0.90)	(1.05)	(0.90)	(1.05)	(1.36)
Phone Calls		0.168**	0.163**	0.167**	0.163**	0.277*		0.191***	0.184***	0.189***	0.185***	0.305*
		(0.07)	(0.07)	(0.07)	(0.07)	(0.15)		(0.06)	(0.07)	(0.06)	(0.07)	(0.16)
Common Legal		1.674***	1.713**	1.661***	1.704**	2.048**		1.797***	1.777***	1.773***	1.785***	2.191**
		(0.63)	(0.67)	(0.63)	(0.67)	(0.98)		(0.60)	(0.64)	(0.60)	(0.64)	(0.99)
Private Monitoring			0.025						-0.057			
			(0.19)						(0.18)			
Banking Restrictions					-0.067						-0.096	
					(0.37)						(0.35)	
Supervisory Power				-0.098						-0.185		
				(0.33)						(0.31)		
Observations	153	127	118	127	118	127	153	127	118	127	118	127
R-squared	0.49	0.83	0.84	0.83	0.84	0.67	0.48	0.84	0.85	0.84	0.85	0.66

Standard errors in parentheses. ***significant at 1%, **significant at 5%, *significant at 10; all estimations include dummy variables for time, source country and destination country. Columns 6 and 12 estimated via IV estimation. Instruments for trust are from Guiso et al (2009): genetic distance, fraction of years at war and difference in GDP.

Table 6A: SUR specification – Immediate borrower basis

	(1)	(2)	(3)	(4)	(5)	(6)
	2006-2007	2011-2012	2006-2007	2011-2012	2006-2007	2011-2012
Common Language	-0.788	-0.425	0.108	0.228	0.472	0.571
	(0.79)	(0.89)	(0.96)	(1.11)	(1.04)	(1.20)
Contiguous	0.793	1.347**	0.974	1.535*	0.942	1.503
	(0.57)	(0.64)	(0.79)	(0.92)	(0.82)	(0.95)
Distance	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	0.38	0.875*	0.39	1.141*	0.54	1.431**
	(0.42)	(0.47)	(0.51)	(0.59)	(0.55)	(0.64)
Common Currency	-0.136	-0.157	-0.249	-0.493	-0.395	-0.709
	(0.73)	(0.82)	(0.90)	(1.04)	(0.94)	(1.08)
Phone Calls	0.640***	0.595***	0.612***	0.617***	0.611***	0.617***
	(0.05)	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)
Genetic Distance	0.001	0.001	0.001	0.001	0	0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Destination Colony	6.019***	6.466***	2.908*	4.867**	2.83	4.829**
	(1.42)	(1.60)	(1.69)	(1.96)	(1.74)	(2.02)
Supervisory Power	-0.898	-0.382				
	(1.38)	(1.51)				
Private Monitoring			-0.917***	-0.32		
			(0.35)	(0.32)		
Banking Restrictions					-0.15	-3.087***
					(0.47)	(0.50)
p-value for null hypothesis that the coefficients on regulation variables are equal across time periods		0.69		0.16		0.000
Observations	488	488	372	372	347	347

Standard errors in parentheses. ***significant at 1%, **significant at 5%, *significant at 10; all estimations include dummy variables for time, source country and destination country

Table 6B: SUR specification – Ultimate Risk basis

	(1)	(2)	(3)	(4)	(5)	(6)
	2006-2007	2011-2012	2006-2007	2011-2012	2006-2007	2011-2012
Common Language	-0.102	-0.014	1.062	1.006	1.332	1.32
	(0.87)	(0.94)	(1.04)	(1.16)	(1.08)	(1.22)
Contiguous	0.749	1.491**	1.045	1.702*	0.923	1.589
	(0.61)	(0.66)	(0.89)	(0.99)	(0.91)	(1.03)
Distance	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	0.201	0.499	0.147	0.61	0.32	0.775
	(0.42)	(0.45)	(0.52)	(0.58)	(0.55)	(0.63)
Common Currency	-0.645	-0.422	-0.22	-0.217	-0.362	-0.344
	(0.69)	(0.74)	(0.84)	(0.94)	(0.88)	(0.99)
Phone Calls	0.646***	0.569***	0.599***	0.589***	0.585***	0.574***
	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)	(0.09)
Genetic Distance	0	0.001	-0.001	0	-0.001	0
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Destination Colony	6.981***	8.480***	2.814	6.018***	2.737	6.000***
	(1.50)	(1.61)	(1.81)	(2.03)	(1.87)	(2.11)
Supervisory Power	0.004	-1.323				
	(0.51)	(1.67)				
Private Monitoring			2.379***	0.061		
			(0.43)	(0.45)		
Banking Restrictions					-0.096	-2.170***
					(0.26)	(0.54)
p-value for null hypothesis that the coefficients on regulation variables are equal across time periods		0.44		0.000		0.001
Observations	461	461	348	348	326	326

Standard errors in parentheses. ***significant at 1%, **significant at 5%, *significant at 10; all estimations include dummy variables for time, source country and destination country.

Table 7A: US Bank Lending to Banking Sector (as a percent of all lending to banking sector)

	(1)	(2)	(3)	(4)	(5)
	UR lending to banking sector				
Common Language	3.1731**	3.0036*	3.0281*	2.9843*	2.9510*
	(1.52)	(1.62)	(1.58)	(1.77)	(1.77)
Distance	0.0002	0.0002	0.0001	0.0001	0.0001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	-1.6019	-1.3695	-1.0054	-1.2563	-1.1117
	(1.13)	(1.24)	(1.21)	(1.34)	(1.35)
Phone Calls	0.5638***	0.5414***	0.5062**	0.5172**	0.5240**
	(0.20)	(0.21)	(0.20)	(0.22)	(0.22)
Genetic Distance		-0.0004	-0.0006	-0.0006	-0.0007
		(0.00)	(0.00)	(0.00)	(0.00)
Supervisory Power			0.2798		
			(0.26)		
Banking Restrictions					0.1196
					(0.10)
Private Monitoring				0.0497	
				(0.07)	
Observations	128	126	117	113	108
Number of destination	64	63	62	62	61

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
Includes dummy for time period and destination country random effects.

Table 7B: : US Bank Lending to Public Sector (as a percent of all lending to public sector)

	(6)	(7)	(8)	(9)	(10)
	UR lending to public sector				
Common Language	0.6346	0.866	0.8428	0.0685	0.3062
	(1.09)	(1.15)	(1.09)	(1.02)	(1.04)
Distance	0.0002	0.0002	0.0002	0.0001	0.0002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	-1.5067*	-1.7593**	-1.7266**	-1.4131*	-1.3719*
	(0.81)	(0.89)	(0.83)	(0.77)	(0.79)
Phone Calls	0.6039***	0.6264***	0.6029***	0.5815***	0.6045***
	(0.14)	(0.15)	(0.14)	(0.13)	(0.13)
Genetic Distance		0.0005	0.0004	0.0004	0.0004
		(0.00)	(0.00)	(0.00)	(0.00)
Supervisory Power			-0.2615		
			(0.21)		
Banking Restrictions					0.1531
					(0.09)
Private Monitoring				0.1587***	
				(0.06)	
Observations	128	126	117	113	108
Number of destination	64	63	62	62	61

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
Includes dummy for time period and destination country random effects.

Table 7C: : US Bank Lending to Private Sector (as a percent of all lending to private sector)

	(11)	(12)	(13)	(14)	(15)
	UR lending to private sector				
Common Language	2.5044*	2.1027	2.1265	1.939	1.7912
	(1.28)	(1.33)	(1.34)	(1.36)	(1.36)
Distance	0	0.0001	0.0001	0.0001	0.0001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Legal	0.4405	0.0159	0.0796	0.0919	0.246
	(0.96)	(1.02)	(1.03)	(1.02)	(1.03)
Phone Calls	0.6751***	0.7451***	0.7273***	0.7323***	0.7472***
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Genetic Distance		-0.0002	-0.0003	-0.0003	-0.0003
		(0.00)	(0.00)	(0.00)	(0.00)
Supervisory Power			-0.1265		
			(0.21)		
Banking Restrictions					0.1735
					(0.11)
Private Monitoring				0.0574	
				(0.07)	
Observations	128	126	117	113	108
Number of destination	64	63	62	62	61

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
Includes dummy for time period and destination country random effects.

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