Spring 2019

Three Essays on Banking

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Business Administration

Darla Moore School of Business

University of South Carolina

2019

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ACKNOWLEDGEMENTS

I am most grateful to my family, friends, and colleagues who give me unconditional support along the journey. I express the deepest appreciation to my committees, Allen N. Berger, Omrane Guedhami, John Hackney, and Chao Jiang, and Yongqiang Chu for their extremely valuable support and guidance on both my dissertation and academic journey.

ABSTRACT

My dissertation includes three essays related to banking. In the first essay, I identify an important channel through which stronger legal enforcement boosts the real economy – by increasing bank liquidity creation. Results suggest that effective enforceability of contracts increases total, asset-side, liability-side, and off-balance sheet-side liquidity creation, implying favorable causal real economic effects.

In the second essay, we conduct the first broad-based international study on bank-level failures covering 92 countries over 2000-2014 and investigate national culture values as bank failure determinants. We find individualism and masculinity are positively associated with bank failure but operate through different channels.

In the third essay, we identify an important channel through which economic policy uncertainty (EPU) harms the real economy – bank liquidity hoarding. We first build a novel comprehensive measure of bank liquidity hoarding that takes into account hoarding activities of banks on the asset-, liability-, and off-balance sheet-sides and find in response to EPU, banks hoard liquidity overall and through all three components. The identification analyses indicate that bank choices dominate than customer choices, suggesting causal adverse effects of EPU on the real economy through banks.

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1.1 INTRODUCTION

Legal enforcement is fundamental to finance and economics, and form the basis of financial contracting and overall financial development (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 2002, henceforth LLSV; Demirgüç-Kunt and Detragiache, 1998; Beck, Demirgüç-Kunt, Levine, 2003; Esty and Megginson, 2003; Laeven and Majnoni, 2005; Brunt, 2011; El Ghoul, Guedhami, Pittman, and Rizeanu, 2016).[1] In this paper, I focus on the effects of legal enforcement on the supply of liquidity created by banks, which is a broad measure of bank financial services that has been shown to have favorable effects on the real economy.

Investigation of such supply effects is complicated by identification problems because the enforcement also affects the public's demand for liquidity. For example, prior research finds that in countries with more effective enforcement, firms demand more external financing to fund growth (e.g., Demirguc-Kunt and Maksimovic, 1998), and financiers are more willing to supply such funds (e.g., Bae and Goyal, 2009).

In this paper, I provide a clean setting to overcome this challenge by investigating the impact of a bank's home country legal enforcement on their foreign subsidiaries'

[1] Another strand of literature focuses on the effects of creditor rights. Since most of the creditor right variables have little time variation, it is challenging to include country fixed effects to control for time invariant variables within a country (e.g., LLSV, 1998; Djankov, McLiesh, and Shleifer, 2007; Qian and Strahan, 2007). Furthermore, Bae and Goyal (2009) show that it is the enforceability, not merely the existence, of creditor rights that matters to loan size. Therefore, I focus on legal enforcement in this paper, and I also investigate the effects of creditor rights in robustness tests without including the country fixed effects.

activities. Foreign bank subsidiaries are not completely autonomous, as they form a part of a larger organization controlled by the parent bank. Therefore, to a certain extent, their policies are affected by the decisions of their parent banks (e.g., De Haas and Van Lelyveld, 2010). Home country conditions can affect foreign subsidiaries by impacting bank balance sheets of parent banks (e.g., Peek and Rosengren, 1997, 2000; De Haas and Van Lelyveld, 2010; Schnabl, 2012). The demand for credit and other banking services from a foreign subsidiary is mainly driven by factors from its host country, and thus is likely to be uncorrelated with the home country's enforcement. I further include host country × year fixed effects to control for the demand-side factors in the host country that are often impossible from existing studies.[2] Thus, I provide a clean setting to identify the causal effect of legal enforcement on bank liquidity creation by examining the effect of a bank's home country enforcement on liquidity creation by foreign subsidiaries.

I also expand the literature's focus from credit to explore the effects on bank liquidity creation, which incorporates all bank assets, liabilities, and off-balance sheet activities. Liquidity creation is an essential function of banks and is a much broader concept of the output of banks than credit alone.[3] [4] It incorporates liability and off-balance sheet activities, as well as loans and other assets. The components of bank liquidity creation are also theoretically linked to the real economy. Through the asset component, banks provide

[2] Most of this research examines the effects of host country legal conditions on host country credit in an international setting (e.g., LLSV, 1997, 1998; Esty and Megginson, 2003; Laeven and Majnoni, 2005; Qian and Strahan, 2007; Bae and Goyal, 2009; Haselmann, Pistor, and Vig, 2009). Therefore, it is unlikely to include the host country × year fixed effects to control for the local demand-side factors.

[3] Banks create liquidity by transferring liquid deposits to illiquid loans on-balance sheet and by offering loan commitments and other similar guarantees off-balance sheet that provide the nonbank public with liquidity (Bryant, 1980; Diamond and Dybvig, 1983; Holmstrom and Tirole, 1998; Kashyap, Rajan, and Stein, 2002).

[4] Financial intermediation theory suggests that other than the liquidity creation function, banks also provide a risk transformation function by transforming riskless deposits into risky loans. However, these two functions often coincide, and since there is no comprehensive measure of risk transformation and these two concepts are closely related, bank liquidity creation may be the best measure of overall bank output (Berger and Bouwman, 2009; Berger and Sedunov, 2017).

credit to informationally opaque small business borrowers that are often thought to be the primary engines of economic growth and to have limited access to other sources of external financing (Smith, 1776; Levine and Zervos, 1998). On the liability side, banks provide depositors with liquid funds and customers with payment services that keep the economy functioning (Kashyap, Rajan, and Stein, 2002). Through the off-balance sheet component, banks provide loan commitments and standby letters of credit allowing economic agents to plan their investments (Boot, Greenbaum, and Thakor, 1993). In fact, liquidity creation has a stronger positive effect on the real economy than other measures of bank output (Berger and Sedunov, 2017).

The literature on the determinants of bank liquidity creation focuses on the roles of bank capital (Berger and Bouwman, 2009; Lei and Song, 2013; Horvath, Seidler, and Weill, 2014; Berger, Bouwman, Kick, and Schaeck, 2016; Fungáčová, Weill, and Zhou, 2017), competition (Fungáčová and Weill, 2012; Horvath, Seidler, and Weill, 2016; Jiang, Levine, and Lin, 2017), corporate governance (DeYoung and Huang, 2016; Díaz and Huang, 2017), CEO optimism (Huang, Chen, and Chen, 2018), deposit insurance (Berger, Li, and Saheruddin, 2017; Fungáčová, Weill, and Zhou, 2017), mergers and acquisitions (Pana, Park, and Query, 2010), government guarantees (Berger, Li, and Saheruddin, 2017), and trust (e.g., Berger, Guedhami, Li, and Zheng, 2019). The literature, however, has not tackled the effects of legal institutions, and this paper fills this gap.

Data on legal enforcement measures are obtained from the International Country Risk Guide (ICRG). This time-varying index ranges from zero to six and measures the efficiency of the legal system, with higher values indicating more efficient legal development. It captures the strength of the country's legal system and the extent to which

the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. This measure is often used in the finance literature as a proxy for the quality of the legal system and the enforcement of legal contracts (e.g., Demirgüç-Kunt and Detragiache, 1998; Demirgüç-Kuntand and Maksimovic, 1998; Demirgüç-Kunt and Detragiache, 2002; Beck, Demirgüç-Kunt, and Maksimovic, 2005; Laeven and Majnoni, 2005; Bae and Goyal, 2009; El Ghoul, Guedhami, Pittman, and Rizeanu, 2016). The bank's home country is determined by the source country of ownership using Claessens and Van Horen's (2015) bank ownership database. To evaluate the effects of legal enforcement on bank liquidity creation, I modify Berger and Bouwman's (2009) method to create an international bank liquidity creation measure using the Bankscope database.[5] The final sample contains 8,153 bank-year observations in 67 countries from 2000-2013.

I formulate and test the hypotheses about the effects of home country enforcement on the three main components of the foreign subsidiary's host country bank liquidity creation, asset-side, liability-side, and off-balance sheet-side, as well as on its total liquidity creation, which is the sum of these components. On the asset-side, effective home country enforceability of contracts may mitigate market frictions in raising capital for the parent banks, and parent banks with better access to external financing may internally provide support to subsidiaries, thereby increasing the foreign subsidiary's asset-side liquidity creation. The home country enforcement may also decrease the foreign subsidiary's asset-side liquidity creation, as parent banks may allocate less capital to their foreign subsidiaries

[5] The BankScope database provided by Bureau van Dijk and Fitch Ratings includes comprehensive coverage of banks in a large number of countries and accounts for over 85% of all banking assets in each country, which is also used in international banking studies (Brown and Dinç, 2005, 2011; De Haas and Van Lelyveld, 2010; Barth, Lin, Ma, Seade, and Song, 2013; Berger, Li, Morris, and Roman, 2017).

when the home country has favorable economic conditions due to the increasing opportunity costs of limiting home country lending.

On the liability-side, better legal enforcement may increase foreign subsidiary liability-side liquidity creation by attracting more deposits. The home country enforcement may also decrease foreign subsidiary liability-side liquidity creation, as other developed financial markets caused by effective enforceability of contracts may soak up the deposits which would otherwise be available to the banking industry.

The main component of off-balance sheet activities is loan commitment. The home country enforcement may increase foreign subsidiary off-balance sheet liquidity creation by providing more loan commitments, as parent banks with better access to external financing may support more funds to foreign subsidiaries. The home country enforcement may also decrease foreign subsidiary off-balance sheet liquidity creation, as parent banks may allocate less capital to their foreign subsidiaries when the home country has favorable economic conditions due to the increasing opportunity costs of limiting home country lending.

The effect of home country enforcement on total bank liquidity creation is the sum of the effects on asset-, liability-, and off-balance sheet-side bank liquidity creation components. The predicted sign depends upon whether the positive or negative effects for the components discussed above empirically dominate.

I find that foreign subsidiary total liquidity creation increases with the home country legal enforcement index. This effect is also economically significant. If the home country legal enforcement index increases by one, on average a 4.6 percentage points increase in the subsidiaries' liquidity creation will occur. This effect is also robust in

different size categories, subsample tests, alternative enforcement measures, and more home country banking regulation controls. All three components of asset-, liability-, and off-balance sheet-side liquidity creation are positively impacted. However, given that the previous literature on credit focuses mostly on the asset-side, this paper recognizes the significant effects of liability-side and off-balance sheet-side liquidity creation.

I also investigate the channels through which the home country enforcement influences the foreign subsidiary's ability to create liquidity. The asset-side component increase is driven by providing more loans and holding fewer securities. This finding also supports the traditional law and finance literature that stronger legal protection increases the availability of credit. The increase in interbank deposits causes the liability-side to increase. The increase in the off-balance sheet component is driven by supplying more loan commitments. In an additional analysis, I find that the home country enforcement dominates the effects on the foreign subsidiary host country bank total liquidity creation more than home country creditor rights do. The effects of home country legal enforcement also dominate those of host country legal enforcement, which only affect the asset component.

The remainder of this paper is organized as follows. Section 2 briefly discusses the legal enforcement and bank liquidity creation measures. Section 3 develops the hypotheses. Section 4 describes the main empirical methodology. Section 5 presents the empirical results. Section 6 provides robustness results, while Section 7 presents the conclusion.

1.2 LEGAL ENFORCEMENT AND LIQUIDITY CREATION MEASURES

The main explanatory variable is legal enforcement, obtained from the International Country Risk Guide (ICRG), and is an index capturing the strength of a country's legal

system and the extent to which the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. This time-varying index ranges from zero to six, with a higher score indicating stronger civil institutions and court systems, as well as popular observance of the law.

Berger and Bouwman's (2009) U.S bank liquidity creation measure is modified to create the international bank liquidity creation measure. Berger and Bouwman (2009) generate four liquidity creation measures, "cat fat", "cat nonfat", "mat fat", and "mat nonfat." Due to data limitation, they classify loans based on either *category* "cat" or *maturity* "mat." "Fat" and "nonfat" mean the measure including off-balance sheet activities or excluding off-balance sheet activities, respectively. The "cat fat" measure is the preferred measure among the four liquidity creation measures, therefore, it is the focus of this paper. The bank-level financial data are from the Bankscope database from the Bureau van Dijk.[6] First, all bank activities are classified (assets, liabilities, equity, and off-balance sheet activities) as liquid, semi-liquid, or illiquid depending upon the information on the product category. Assets are classified based on the ease, cost, and time for banks to dispose of their obligations to satisfy liquidity demand. Liabilities and equities are classified based on the ease, cost, and time for consumers to achieve liquid funds from the bank. Off-balance sheet activities are classified by using the same rule. However, this approach is slightly different from the methodology in Berger and Bouwman (2009), as it takes into consideration the fact that countries have different levels of development in the capital market. Developed (developing) countries have better (less) developed capital markets, and it is easier (harder)

[6] I only use the banks' unconsolidated financial statements and exclude banks without key financial information to ensure that the banks included in this project have detailed financial information.

to securitize bank assets.[7] Thus, some assets are classified as semi-liquid assets in developed countries and classified as an illiquid asset in developing countries. For example, residential mortgage loans are classified as semi-liquid assets in developed countries but are classified as illiquid assets in developing countries. Berger and Bouwman (2009) focus on the gross fair values of derivatives, which are sometimes positive and sometimes negative, and measure how much liquidity the bank is providing to or absorbing from the public. However, the data on derivatives from Bankscope are not fair value. As such, they are not included when constructing the international bank liquidity creation measure.

Next, weights are assigned to all bank activities classified in the first step. Consistent with the liquidity creation theory, which states that banks create liquidity on the balance sheet when they transform illiquid assets into liquid liabilities, the positive weight +1/2 is assigned to illiquid assets (e.g., corporate and commercial loans) and liquid liabilities (e.g., customer deposits). Negative weight -1/2 is placed on liquid assets (e.g., cash) and illiquid liabilities (e.g., subordinated debt) as banks destroy liquidity by using illiquid assets to finance liquid liability. All semi-liquid assets and liabilities are assigned a weight of 0. The weights of +1/2, 0, -1/2 are used since only half of the total amount of liquidity creation is attributable to the source or use of funds alone. Thus, transforming $1 in liquid deposits into $1 of corporate and commercial loans creates $1 of liquidity for the public. The off-balance sheet activities are weighted similarly to the on-balance sheet activities. For instance, committed credit lines are assigned a weight of +1/2, as they provide customers with access to liquid funds. In the third step, weighted sums are constructed of the individual items into asset-side, liability-side, and off-balance sheet-side

[7] Developed countries are defined as high-income economies according to the World Bank's Atlas Method.

liquidity creation components, *LC(asset)*, *LC(liab)*, and *LC(off)*, respectively, and the sum, *LC(total)*. Following the bank liquidity creation literature, these liquidity creation measures are normalized by the gross total assets (*GTA*), thereby mitigating the effect of these variables being dominated by the largest banks and ensuring that the variables are comparable across banks. In addition to these key variables discussed above, Table 1 describes all of the variables used in the main analysis. The details on the methodology to construct a modified Berger and Bouwman's (2009) "cat fat" liquidity creation measure using the Bankscope database are in Table 1.2.

1.3 HYPOTHESIS DEVELOPMENT

I develop hypotheses concerning the effects of home country legal enforcement on the three main components of bank liquidity creation, asset-, liability-, and off-balance sheet-side, as well as on total bank liquidity creation, which is the sum of these components.

Effects on asset-side bank liquidity creation

Effective home country enforceability of contracts may mitigate market frictions in raising capital for the parent banks, and parent banks with better access to external financing may internally provide support to subsidiaries (Stein, 1997; De Haas and Van Lelyveld, 2010), therefore increasing foreign subsidiary's asset-side liquidity creation, yielding the following hypothesis:

Hypothesis 1a: Home country legal enforcement increase a foreign subsidiary's asset-side bank liquidity creation, ceteris paribus.

Effective enforceability of contracts in the home country may be associated with favorable home country economic outcomes. This may result in home country parent banks allocating less capital to their foreign subsidiaries due to the higher opportunity costs of

doing so (Molyneux and Seth, 1998; Moshirian, 2001), yielding the following hypothesis:

Hypothesis 1b: Home country legal enforcement decrease a foreign subsidiary's asset-side bank liquidity creation, ceteris paribus.

Effects on liability-side bank liquidity creation

Depositors at foreign subsidiaries are also protected by home country. As such, depositors are more willing to deposit money into foreign subsidiaries whose home country has better legal protection, yielding the following hypothesis:

Hypothesis 2a: Home country legal enforcement increase a foreign subsidiary's liability-side bank liquidity creation, ceteris paribus.

Effective enforceability of contracts could also result in better developed financial markets other than the banking industry (e.g., LLSV, 1997), such as a stock market, in home country. These other markets may soak up the deposits which would otherwise be available to the banking industry. Therefore, fewer funds could be used to support foreign subsidiaries, yielding the following hypothesis:

Hypothesis 2b: Home country legal enforcement decrease a foreign subsidiary's liability-side bank liquidity creation, ceteris paribus.

Effects on off-balance sheet-side bank liquidity creation

Most of the off-balance sheet bank liquidity creation is in the form of committed credit lines. The argument above in *Hypothesis 1* also applies to committed credit lines. The home country legal enforcement can increase the foreign subsidiary host country off-balance sheet liquidity creation by providing more committed credit lines, as the parent banks with better access to external financing may support more funds to the foreign subsidiaries. The home country legal enforcement may also decrease the foreign subsidiary

host country off-balance sheet liquidity creation. Parent banks may allocate less capital to their foreign subsidiaries when a home country is with favorable economic conditions due to the increasing opportunity costs of limiting home country lending, yielding the following hypotheses:

Hypothesis 3a: Home country legal enforcement increase a foreign subsidiary's off-balance sheet-side bank liquidity creation, ceteris paribus.

Hypothesis 3b: Home country legal enforcement decrease a foreign subsidiary's off-balance sheet-side bank liquidity creation, ceteris paribus.

Effects on total bank liquidity creation

The effect of home country legal enforcement on a foreign subsidiary's host country bank total liquidity creation is the sum of the effects on asset-, liability-, and off-balance sheet-side bank liquidity creation components. The predicted sign depends upon whether the positive or negative effects for the components discussed above empirically dominate, yielding the following competing hypotheses:

Hypothesis 4a: Home country legal enforcement increase a foreign subsidiary's total bank liquidity creation, ceteris paribus.

Hypothesis 4b: Home country legal enforcement decrease a foreign subsidiary's total bank liquidity creation, ceteris paribus.

1.4 REGRESSION METHODOLOGY AND DESCRIPTIVE STATISTICS

Regression methodology

I estimate regressions of the form:

$$(LC/GTA)_{i,j,t} = \alpha + \beta Enforcement\_home_{k,t-1} + \gamma' Home\_Country\_Controls_{k,t-1} + q' Bank\_Controls_{i,j,t-1} + Time\ fixed\ effects\ +$$

$$Subsidiary\ fixed\ effects + Home\ country\ fixed\ effects +$$
$$Host\ country\ x\ year\ fixed\ effects + \varepsilon_{i,j,t} \quad (1)$$

where *i* indexes a bank, *j* indexes a bank's host country, *k* indexes a bank's home country, and *t* indicates a calendar year. The dependent variable is one of the normalized liquidity creation measures: total bank liquidity creation (*LC(total)/GTA*), the asset component of liquidity creation (*LC(asset)/GTA*), the liability component of liquidity creation (*LC(liab)/GTA*), or the off-balance sheet component of liquidity creation (*LC(off)/GTA*). The key independent variable is home country legal enforcement (*Enforcement_home*). As previously indicated, this measure is from the International Country Risk Guide (ICRG) and captures the strength of the country's legal system and the extent to which the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. It is often used in the finance literature as a proxy for the quality of the legal system and the enforcement of legal contracts (e.g., Demirgüç-Kunt and Detragiache, 1998; Demirgüç-Kuntand and Maksimovic, 1998; Demirgüç-Kunt and Detragiache, 2002; Beck, Demirgüç-Kunt, and Maksimovic, 2005; Laeven and Majnoni, 2005; Bae and Goyal, 2009; El Ghoul, Guedhami, Pittman, and Rizeanu, 2016). The bank's home country is determined using Claessens and Horen's (2014) bank ownership database.[8] A foreign bank is defined as having more than 50% of its shares held by foreigners. The location of the majority shareholder determines the home country of the bank.

A home country's economic conditions matter for foreign bank growth (e.g., De Haas and Van Lelyveld, 2010), therefore I include *Growth_home*, which is the percentage

[8] This database contains full ownership information from 1995-2013 for 5,498 banks active in 139 countries.

change in real GDP at the home country, *Inflation_home*, which is the percentage change in GDP deflator index at the home country, and *Capita_home*, which is the percentage change of GDP per head at the home country, to control for the home country macroeconomic conditions. Prior literature implies a significant relation between the deposit insurance scheme and bank liquidity creation (e.g., Chernykh and Cole, 2011; Fungacova, Will, and Zhou, 2017). Therefore, I include *Deposit_insur_home* as a control, which is a dummy variable equal to 1 if a country has an explicit deposit insurance scheme.

At bank level, I control for bank size (*ln(GTA*), which is the natural logarithm of bank gross total assets, and bank capital ratio (*Capital Ratio*), which is a bank's total equity divided by gross total assets. The theories on the effects of capital on bank liquidity creation are not unanimous. One strand of theories implies that bank capital may hamper a bank's role as liquidity creator by the making bank's capital structure less fragile (e.g., Diamond and Rajan, 2000, 2001). The fragile capital structures encourage banks to monitor their borrowers given that depositors can run on the bank if the bank threatens to withhold effort. The shareholders cannot run on the bank, therefore, equity capital discourages less-fragile banks to commit to monitoring, which in turn impedes a bank's ability to create liquidity. Capital may also decrease liquidity creation because it crowds out deposits, which are an important source of bank liquidity creation (e.g., Gorton and Winton, 2017). Another strand of literature implies that higher capital improves a bank's ability to absorb risk and hence their ability to create liquidity (e.g., Allen and Santomero 1998; Allen and Gale 2004). Liquidity creation exposes banks to liquidity risk, and equity capital absorbs risk and expands a bank's risk-bearing capacity (e.g., Bhattacharya and Thakor 1993; Repullo 2004). Thus, higher capital ratios may allow banks to create more liquidity. All independent

variables are lagged one period to mitigate the potential reverse causality concerns. The omitted variable biases are mitigated by including a broad set of fixed effects. Subsidiary fixed effects control for time-invariant factors within a bank. Home country fixed effects control for time-invariant factors within a home country. The demand for credit and other banking services from a foreign subsidiary is mainly from its host country. The *host country x year* fixed effects, which are impossible to control in host country analyses, control for all of the demand and supply factors that may be omitted from conventional studies (e.g., LLSV, 1997, 1998; Esty and Megginson, 2003; Laeven and Majnoni, 2005; Qian and Strahan, 2007; Bae and Goyal, 2009; Haselmann, Pistor, and Vig, 2009). Therefore, I provide a very clean setting to identify the supply effect of legal enforcement on bank liquidity creation by examining the effect of a bank's home country legal enforcement on liquidity creation by foreign subsidiaries. Because the main interest independent variable is at the home country level, standard errors are also clustered there.

Descriptive statistics

Table 1.3, Panel A reports the summary statistics. The mean of total bank liquidity creation (*LC(total)/GTA)* is 0.487 suggesting on average banks create liquidity of 48.7 % of the gross total assets (*GTA*). The standard deviation of *LC(total)/GTA* is 0.317 with the 25th and 75th percentile values at 0.319 and 0.677, respectively. The mean of asset-side liquidity creation (*LC(asset)/GTA*) is 0.145 with the 25th and 75th percentile values at 0.029 and 0.278, respectively. The mean of the liability-side liquidity creation (*LC(liab)/GTA*) is 0.236, which is greater than the asset-side liquidity creation, as most banks hold more liquid deposits than illiquid loans. The mean of the off-balance sheet component liquidity creation (*LC(off)/GTA*) is 0.102 with the 25th and 75th percentile values at 0.005 and 0.118,

respectively. *Enforcement_home* has a mean of 4.645 and a standard deviation of 1.139. The 25th and 75th percentile values are 4.000 and 5.500, respectively.

Turning to controls, the rate of growth in the home country's real GDP (*Growth_home*) is with a mean of 2.562 and with a standard deviation of 3.223. The home country inflation (*Inflation_home*) has a mean of 3.500 and a standard deviation of 4.677. The home country percentage change of GDP per head (*Capita_home*) has a mean of 1.612 and a standard deviation of 3.059. The home country deposit insurance scheme (*Deposit_insur_home*) has a mean of 0.868 and a standard deviation of 0.339. The mean of size is 6.787 (6796.184 million) with a standard deviation of 2.007. The mean of the capital ratio (*Capital Ratio*) is 0.143 with a standard deviation of 0.133.

Table 1.3, Panel B reports the sample distribution by home country with the mean values of the normalized liquidity creation measures: total bank liquidity creation (*LC(total)/GTA*), the asset component of liquidity creation (*LC(asset)/GTA*), the liability-side component of liquidity creation (*LC(liab)/GTA*), the off-balance sheet component of liquidity creation (*LC(off)/GTA*). The mean value of the key independent variable home country legal enforcement (*Enforcement_home*) is also included. The U.S. has the most observations, accounting for about 10% of the sample. European countries account for the majority of the sample, as these countries are more banking oriented. More importantly, due to their small size, European countries need to look outside their borders for business opportunities. Banks homed in Chile, on average, have the highest *LC(total)/GTA* (0.990), almost half of which comes from off-balance sheet components (0.474). Banks homed in Uruguay create the lowest *LC(total)/GTA* (-0.119), most of which is driven by the liability component (-0.188). Both Sweden and Denmark have the highest *Enforcement_home* score

(6.000), while Guatemala has the lowest *Enforcement_home* score (1.549).

Table 1.3, Panel C reports the sample distribution by year. The sample is distributed relatively evenly with the most observations in the year 2011. Overall, the distribution since 2000 shows an expanding trend that indicates banks are engaging more in global markets through foreign subsidiaries.

1.5 MAIN REGRESSION RESULTS

I first present the tests of *Hypotheses 4a* and *4b* regarding the effects of home country legal enforcement on a foreign subsidiary host country bank total liquidity creation (*LC(total)/GTA*), which is followed by tests of *Hypotheses 1-3* concerning the foreign subsidiary host country liquidity creation components (*LC(asset)/GTA*, *LC(liab)/GTA*, *LC(off)/GTA*).

Table 1.4 presents the main regression results of the effect of home country legal enforcement (*Enforcement_home*) on foreign subsidiaries host country total bank liquidity creation *LC(total)/GTA*. In Column (1), I only include the key independent variable home country legal enforcement (*Enforcement_home*) with subsidiary fixed effects controlling for time-invariant determinants of our dependent variables within the foreign subsidiaries, and year fixed effects controlling for time-dependent determinants that are constant across countries. The standard errors are clustered at the home country level. The result shows that home country legal enforcement (*Enforcement_home*) have a positive and statistically significant association with a foreign subsidiary's host country total bank liquidity creation (*LC(total)/GTA*). Based on Column (1), the host country x year fixed effects is added in Column (2) to sweep out all macro and host country supply-and-demand shocks that are common to all subsidiaries in a host country at a moment in time to ensure that the

identification is based on how home country legal enforcement affect a foreign subsidiary's host country total bank liquidity creation. The positive significant results continue to hold. Based on Column (2), home country fixed effects are added in Column (3) to control for time-invariant determinants of our dependent variables within the home country. Further, in Column (4), I control for home country economic conditions, such as GDP growth (*Growth_home*), inflation (*Inflation_home*), change of GDP per head (*Capita_home*), and regulation environment (*Deposit_insur_home*). Bank size (*ln(GTA*) and capital ratio (*Capital Ratio*) are also included. All of the independent variables are lagged one year to avoid potential endogeneity concerns (Duchin, Ozbas, and Sensoy, 2010). Across all regressions, I consistently find that home country legal enforcement (*Enforcement_home*) are positively and statistically significant when associated with a foreign subsidiary's host country total bank liquidity creation (*LC(total)/GTA*). This also indicates a causal effect of legal enforcement (*Enforcement_home*) on host country total bank liquidity creation (*LC(total)/GTA*). As the demand for credit and other banking services from a foreign subsidiary is mainly from its host country, the home country legal enforcementare less likely to directly affect such demand in a foreign subsidiary's host country. The host country × year fixed effects essentially control for all of the demand-side factors in the host country. The effects are also economically significant. If home country legal enforcement (*Enforcement_home*) increase by one, the difference between Cyprus' home country legal enforcementvalue of five to Denmark's value of six, a 4.6 percentage points increase in subsidiary host country liquidity creation will occur. These results favor *Hypothesis 4a* over *Hypothesis 4b*.

Turning to controls, the explicit deposit insurance scheme at home country

(*Deposit_insur_home*) is positively associated with foreign subsidiary host country bank total liquidity creation. This suggests that the implementation of deposit insurance schemes can encourage banks to create more liquidity. Capital ratio (*Capital Ratio*) is negatively associated with foreign subsidiary host country bank total liquidity creation, which is consistent with the Berger and Bouwman's (2009) "financial fragility-crowding out" hypothesis.

Table 1.5 presents the results of the regressions of home country legal enforcement (*Enforcement_home*) on the subcomponents of foreign subsidiary host country bank total liquidity creation. The total bank liquidity creation (*LC(total)/GTA*) is deconstructed into three components: *LC(asset)/GTA, LC(liab)/GTA*, and *LC(off)/GTA*. The dependent variable in Column (1) is *LC(total)/GTA*, which is the same regression in Table 1.4, Column (4). I include it here as a comparison. The dependent variable in Table 1.5, Column (2) is *LC(asset)/GTA*, which measures the foreign subsidiary host country bank liquidity created by asset activities. The dependent variable in Table 1.5, Column (3) is *LC(liab)/GTA*, which measures the foreign subsidiary host country bank liquidity created through liability components. The dependent variable in Table 1.5, Column (4) is *LC(off)/GTA* and measures the foreign subsidiary host country bank liquidity created through off-balance sheet activities. Across all columns, the coefficient estimates on home country legal enforcement (*Enforcement_home*) are all positive and statistically significant at the 1% level suggesting that the main effect in Column (1) works through all three components. It also implies the causal effect of home country legal enforcement (*Enforcement_home*) on asset-side (*LC(asset)/GTA*), liability-side (*LC(liab)/GTA*), and off-balance sheet-side (*LC(off)/GTA*) liquidity creation. The effects are relatively even on these three components given the

similar coefficients from Column (2) to Column (4). The significant effects on liability-side and off-balance sheet-side liquidity creation also suggest that the credit literature misses some important effects. Thus, the results favor *Hypothesis 1a* over *Hypothesis 1b*, *Hypothesis 2a* over *Hypothesis 2b,* and *Hypothesis 3a* over *Hypothesis 3b.*

Table 1.6 presents coefficient estimates from regressions of selected bank balance sheet and off-balance sheet categories on home country legal enforcement (*Enforcement_home*) and controls to help understand the mechanisms behind the main findings. Columns (1)-(3) provide the regressions of three categories of asset-side liquidity creation normalized by *GTA* on home country legal enforcement (*Enforcement_home*) and controls. The effects of home country legal enforcement (*Enforcement_home*) on cash holdings (*Cash/GTA*) and securities (*Securities/GTA*) are both negative, and the latter is statistically significant. These liquid assets on a bank's balance sheet reduce asset-side liquidity creation, so the negative effects of home country legal enforcement (*Enforcement_home*) on these categories help to explain the positive effects of home country legal enforcement (*Enforcement_home*) on asset-side liquidity creation. The effects on total loans (*Loans/GTA*) is positive and statistically significant. These findings further support *Hypothesis 1a* that home country legal enforcement (*Enforcement_home*) increase the supply of banking services, given that banks primarily make their own decisions to hold cash and securities and in making loans. Columns (4) and (5) report the effects on customer deposits (*Customer_Deposits/GTA*) and interbank deposits (*Bank_Deposits/GTA*), which account for most of the liability-side liquidity creation. The impact of home country legal enforcement (*Enforcement_home*) is positive and statistically significant on interbank deposits (*Interbank_Deposits/GTA*). It also partially supports the

argument that the parent banks support funds to foreign subsidiaries through interbank markets, although the interbank deposits are not all from the parent banks. This result further supports *Hypothesis 2a*. Column (6) reports the effects of home country legal enforcement (*Enforcement_home*) on loan commitments (*Loan cmt./GTA*), which accounts for the most off-balance sheet-side liquidity creation. Consistent with the previous finding for off-balance sheet-side liquidity creation, the effects are positive and statistically significant. This evidence supports *Hypothesis 3a*. This item-by-item analysis reinforces the main findings.

1.6 ROBUSTNESS

Table 1.7 illustrates the subsample analysis. Column (1) reports the main results of Column (4) of Table 1.4 for comparison. Columns (2) and (3) of Table 1.7 are for the sample of developing and developed countries, respectively. Both the results from developing and developed countries indicate the positive relation of home country legal enforcement (*Enforcement_home*) to the foreign subsidiary host country bank liquidity creation. Several potential outliers are excluded to ensure that they do not bias the results. The U.S, the country with the most observations, is excluded from Column (4), and Croatia, which is the country with the least observations, is excluded from Column (5). Across all Columns (1)-(5), I continue to find home country legal enforcement to (*Enforcement_home*) have significant positive effects on the foreign subsidiary host country bank total liquidity creation. This suggests that these outliers do not affect the main results.

In an additional untabulated analysis, I also conduct several subsample tests considering the following categories: the median bank capital ratio, the median bank overhead ratio, and different bank sizes. The main results continue to hold.

To mitigate the concerns from home country banking regulations, which may affect a foreign subsidiary's behavior, additional home country banking regulations are added as controls in Table 1.8. To each of the regressions, one home country regulation factor is added, and at the end, these controls are controlled for in the same regression. In Column (1), I control for home country banks' activities restrictions (*Act_restrict_home*), which is the overall restrictions index on banking activities from World Bank surveys on banking regulation. This tool measures the degree to which national regulations restrict banks from engaging in the following: (1) securities activities, which refer to securities underwriting, brokering, dealing, and all aspects of the mutual fund industry; (2) insurance activities, which involve insurance underwriting and selling; and (3) real estate activities, which refer to real estate investment, development, and management.[9] In Column (2), home country index of the stringency of bank capital regulations (*Cap_reg_home*) is included to measure the amount of capital banks must hold and the stringency of regulations on the nature and source of regulatory capital, which is also from the World Bank surveys on bank regulation. *Private_monitor* form the same surveys is included in Regression (3) as an index of home country private monitoring to examine the degree to which regulatory and supervisory policies encourage the private monitoring of banks. In Column (4), I include *Creditor_monitor_home*, which is the home country evaluations by external rating agencies and incentives for creditors of the bank to monitor bank performance from the same surveys. Higher values indicate better credit monitoring. In Column (5), I include *multi_supervisors_home,* which indicates whether there is a single official regulatory of

[9] The index values for securities, insurance, and real estate range from 1 to 4, where larger values indicate more restrictions on banks performing each activity. In particular, 4 signifies prohibited, 3 indicates that there are tight restrictions on the provision of the activity, 2 means that the activity is permitted but with some limits, and 1 signals that the activity is permitted.

banks, or whether in home country multiple supervisors share responsibility for supervising the nation's banks from the same surveys. Across all of the regressions in Table 1.8, home country legal enforcement (*Enforcement_home*) continue to have significant positive effects on the foreign subsidiary host country bank total liquidity creation at the 1% level.

In Table 1.9, I use other home country legal enforcement proxies as robustness checks to mitigate concern on measurement errors. In Column (1), following previous literature (e.g., Bae and Goyal, 2009; El Ghoul, Guedhami, Pittman, and Rizeanu, 2016), I focus on a composite index of home country legal enforcement (*Composite_Enforce_home*) computed as the sum of home country legal enforcement (*Enforcement_home*) in the main regression, home country corruption index (*Corruption_home*), the home country risk of contract repudiation by the government (*Repudiation_home*), and the home country risk of expropriation by the government (*Expropriation_home*). The home country legal enforcement (*Enforcement_home*) in the main regression is from the ICRG's law and order index. The home country corruption index (*Corruption_home*) is from ICRG's corruption index, which is "an assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process." The index ranges between 0 and 6 with higher values indicating stronger protection. The home country risk of contract repudiation by the government (*Repudiation_home*) is from LLSV's (1998) database, which measures the risk of a modification in a contract "taking the form of a repudiation, postponement, or scaling down" caused by "budget cutbacks, indigenization pressure, a

change in government, or a change in government economic and social priorities." The home country risk of expropriation by the government (*Expropriation_home*) is also from LLSV (1998), which captures the risk of property confiscation or forced nationalization. Both indices vary on a scale of 0 to 10 with higher scores signifying lower risks. In Column (2), I include the home country enforcement index (*Enforce_index_home*), which is an index of the effectiveness of home country legal systems in enforcing contracts. The variable is the average of the efficiency of the home country judicial system, the home country rule of law, and the home country risk of expropriation and contract repudiation. They are obtained from both ICRG and LLSV (1998). Higher values indicate better enforcement. In Column (3), I include the home country legal enforcement index from Knack and Keefer (1995). They construct a 50-point "legal enforcement index" by converting home country corruption, the home country rule of law, and home country bureaucratic quality indices to 10-point scales (by multiplying them by 5/3) and then aggregate them with home country contract repudiation and expropriation risk. The individual series used in constructing the Knack and Keefer (1995) legal enforcement index are obtained from LLSV (1998) and ICRG. The main results continue to hold when using all these alternative legal enforcement measures.

Another strand of literature in law and finance focuses on the effects of creditor rights on banks' activities, which may also affect the foreign subsidiary host country bank liquidity creation. Since most of the creditor rights variables have little time variation, it is challenging to include country fixed effects within a country (e.g., LLSV, 1998; Djankov, McLiesh, and Shleifer, 2007; Qian and Strahan, 2007). Therefore, I add the home country creditor rights as control by removing the home country fixed effects. The measure of home

country creditor rights (*Creditor_rights_home*) is from Djankov, McLiesh, and Shleifer (2007). They construct an index of the legal rights of creditors in the event of bankruptcy that closely resembles the one originally developed by LLSV (1998). The index varies yearly over the period 1978–2003 and is the sum of four subcomponents.[10] The first component is *restrictions on entering* (*Restrictions_enter_home*), which reflects whether "there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization." The second component is *no automatic stay* (*No_automatice_stay_home*), which measures whether "secured creditors are able to seize their collateral after the reorganization petition is approved." The third component is *secured creditors paid first* (*Secured_creditors_home*), which identifies whether "secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers." The fourth component is *management does not stay* (*Management_not_stay_home*), which identifies "if management does not retain administration of its property pending the resolution of the reorganization." In Table 1.10, I include the home country creditor rights (*Creditor_rights_home*) index in Column (1), and each of the four components in Column (2) to (4), respectively. Lastly in Column (5), the four components of the home country creditor rights (*Creditor_rights_home*) index are controlled in the same regression. Across all of the regressions in Table 1.10, home country legal enforcement (*Enforcement_home*) continue to have significant positive effects on the foreign subsidiary host country bank total liquidity creation at the 1% level, which also indicates that the home country legal enforcement (*Enforcement_home*) dominate the foreign subsidiary host country bank total liquidity creation more than home

[10] In this paper, I use the aggregated creditor rights score at 2003.

country creditor rights (*Creditor_rights_home*) do.

In Table 3.11, I investigate the effect of home country legal enforcement (*Enforcement_home*) on the foreign subsidiary host country bank total liquidity creation by comparing them to the host country legal enforcement (*Enforcement_host*). By releasing the host country x year fixed effect, I add the host country legal enforcement (*Enforcement_host*) into the same regression with home country legal enforcement (*Enforcement_home*). Across all regressions, I continue to find that home country legal enforcement (*Enforcement_home*) have a positive and significant association with the foreign subsidiary host country bank total liquidity creation and through all three components. The host country legal enforcement (*Enforcement_host*) have a positive and significant association with the foreign subsidiary host country bank total liquidity creation, but only through the asset component. The effects on the foreign subsidiary host country bank total liquidity creation from home country legal enforcement (*Enforcement_home*) also dominate the effects of the host country legal enforcement (*Enforcement_host*). This dominating effect is primarily through liability and off-balance sheet components.

1.7 CONCLUSION

Legal enforcement play a fundamental role in both finance and economics and result in favorable economic effects. Prior research finds that in countries with more effective contract enforcement, firms demand more for external financing to fund growth, and financiers are more willing to supply such funds. Therefore, it is crucial to distinguish between the supply- and the demand-side factors to identify the causal effects of legal enforcement on real economy. In this paper, I provide a very clean setting to overcome this challenge by investigating the impact of a bank's home country legal enforcement on their

foreign subsidiaries' activities. I also make another contribution by expanding the literature's focus beyond credit to explore the effects of bank liquidity creation, which incorporates all bank assets, liabilities, and off-balance sheet activities.

I find that the home country legal enforcement index has significant positive effects on foreign subsidiary host country bank total liquidity creation. This effect is both economically significant and robust in subsample tests, alternative legal enforcement measures, and additional home country banking regulation controls. All three components, asset, liability, and off-balance sheet, are positively impacted.

I also investigate the channels through which the home country legal enforcement influences the banks' ability to create liquidity. The asset-side component increase is driven by providing more loans and holding fewer securities. The increase in interbank deposits causes the liability-side to increase. The increase in the off-balance sheet component is driven by supplying more loan commitments. In an additional analysis, the home country legal enforcement dominate the effects on the foreign subsidiary host country bank total liquidity creation more than home country creditor rights do or host country legal enforcement do. Therefore, I identify the supply-side effect of legal enforcement on bank liquidity creation by examining the effect of a bank's home country legal enforcement on liquidity creation by foreign subsidiaries.

Table 1.1: Variable Definitions

Variables	Description	Sources
Dependent variables		
LC(total) / GTA	A bank's total bank liquidity creation measure including on- and off- balance sheet activities normalized by the gross total assets of a bank.	Bankscope and author's calculation
LC(asset) / GTA	A bank's liquidity creation measure including only asset-side activities normalized by the gross total assets of a bank.	Same as above
LC(liab) / GTA	A bank's liquidity creation measure including only liability-side activities normalized by the gross total assets of a bank.	Same as above
LC(off) / GTA	A bank's liquidity creation measure including only off-balance sheet activities normalized by the gross total assets size of a bank.	Same as above
Key independent variable		
Enforcement_home	An index capturing the strength of a bank' home country's legal system, and the extent to which the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. This time-varying index ranges from 0 to 6, with a higher score indicating stronger political institutions and court system, as well as popular observance of the law.	International Country Risk Guide
Control variables		
Growth_home	The percentage change in real GDP in the home country.	International Financial Statistics Economist Intelligence Unit
Inflation_home	The percentage change in GDP deflator index at the home country.	Same as above
Capita_home	The percentage change of GDP per head in the home country.	Same as above
Deposit_insur_home	A dummy equal to one if there is an explicit deposit insurance scheme and if depositors were fully compensated the last time a bank failed, and zero otherwise at the home country.	World Bank surveys on bank regulation
Ln(GTA)	The natural log of the gross total assets (GTA) of a bank defined as the total asset + allowance for loan and lease losses + allocated transfer risk reserve (a reserve for certain foreign loans).	Bankscope and author's calculation
Capital ratio	The total equity capital as a proportion of GTA for each bank.	Same as above
Other dependent variables		

Cash/GTA	The ratio of cash and balances due from other depository institutions to gross total asset for each bank.	Bankscope and author's calculation
Securities/GTA	The ratio of securities to gross total asset for each bank.	The same as above
Loans/GTA	The ratio of total loans to gross total asset for each bank.	The same as above
Loan cmt./GTA	The ratio of loan commitments to gross total asset for each bank.	The same as above
Customer_Deposits/ GTA	The ratio of customers' deposits to gross total asset for each bank.	The same as above
Interbank_Deposits/ GTA	The ratio of interbank deposits to gross total asset for each bank.	The same as above
Other independent variables		
Enforcement_host	An index capturing the strength of a bank' host country's legal system, and the extent to which the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. This time-varying index ranges from 0 to 6, with a higher score indicating stronger political institutions and court system, as well as popular observance of the law.	International Country Risk Guide
Composite_Enforce_ home	The sum of home country legal enforcement index, home country corruption index, the home country risk of contract repudiation by the government, and the home country risk of expropriation by the government.	International Country Risk Guide, LLSV (1998)
Enforce_index_home	An index of the effectiveness of home country legal systems in enforcing contracts. The variable is the average of the efficiency of the home country judicial system, the home country rule of law, and the home country risk of expropriation and contract repudiation.	The same as above
Enforce_index_kk_h ome	The home country legal enforcement index from Knack and Keefer (1995). They construct a 50-point "property rights index" by converting corruption, rule of law, and bureaucratic quality indices to 10-point scales (by multiplying them by 5/3) and then aggregate them with home country contract repudiation and expropriation risk.	The same as above
Creditor_rights_hom e	An index aggregating home country creditor rights, following La Porta and others (1998). The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights) and is the sum of four subcomponents below.	Djankov, McLiesh, and Shleifer (2007)
Restrictions_enter_h ome	Whether "there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization."	The same as above

No_automatice_stay_home	Whether "secured creditors are able to seize their collateral after the reorganization petition is approved."	The same as above
Secured_creditors_home	Whether "secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers."	The same as above
Management_not_stay_home	Identifies "if management does not retain administration of its property pending the resolution of the reorganization."	The same as above
Additional Control controls		
Act_restrict_home	Home country overall restrictions on banking in securities, insurance activities, and real estate activities.	World Bank surveys on bank regulation
Cap_reg_home	Home country capital regulation index, which is the sum of overall initial capital stringency index and initial capital stringency index.	The same as above
Private_monitor_home	Measures whether in home country there is incentives/ability for the private monitoring of firms, with higher values indicating more private monitoring.	The same as above
Creditor_monitor_home	The home country evaluations by external rating agencies and incentives for creditors of the bank to monitor bank performance from the same surveys. Higher values indicate better credit monitoring.	The same as above
Multi_supervisors_home	This variable indicates whether in the home country there is a single official regulatory of banks, or whether multiple supervisors share responsibility for supervising the nation's banks.	The same as above

Table 1.2: International Bank Liquidity Creation Construction

This table illustrates the methodology to construct a modified Berger and Bouwman's (2009) "cat fat" liquidity creation measure using the Bankscope database.
Step 1: We classify all bank activities as liquid, semi-liquid, or illiquid.
Step 2: We assign weights to the activities classified in Step 1.

Assets		
Illiquid Assets (weight = +1/2)	**Semiliquid Assets (weight=0)**	**Liquid Assets (weight = -1/2)**
Residential Mortgage Loans (Developing Countries)	Residential Mortgage Loans (Developed Countries)	Reserve Repos and Cash Collateral
Other Consumer/Retail Loans (Developing Countries)	Other Consumer/Retail Loans (Developed Countries)	Trading Securities and at FV through Income
Other Mortgage Loans	Loans and Advances to Banks	Available for Sale Securities
Corporate and Commercial Loans		Held to Maturity Securities
Other Loans		At-equity Investment in Associates
Investment in Property		Other Securities
Other Earning Assets		Cash and Due from other Banks
Foreclosed Real Estate		Insurance Assets
Fixed Assets		
Goodwill		
Other Intangibles		
Current Tax Assets		
Deferred Tax Assets		
Discontinued Operations		
Other Assets		
Liabilities and Equity		
Liquid Liabilities (weight = +1/2)	**Semiliquid Liabilities (weight=0)**	**Illiquid Liability and Equity (weight = -1/2)**
Customer Deposits	Other Deposits and Short-Term Borrowing	Senior Debt Maturing after 1 Year
Deposits from Banks		Subordinated Borrowing
Repos and Cash Collateral		Other Funding
Trading Liabilities		Fair Value Portion of Debt
		Credit Impairment Reserves
		Reserves for Pensions and Other
		Current Tax Liabilities
		Deferred Tax Liabilities
		Other Deferred Liabilities
		Discontinued Operations
		Insurance Liabilities
		Other Liabilities
		Pref. Shares and Hybrid Capital accounted for as Debt
		Pref. Shares and Hybrid Capital accounted for as Equity
		Common Equity
		Non-controlling Interest
		Securities Revaluation Reserves
		Foreign Exchange Revaluation Reserves
		Fixed Assets Revaluation and other Accumulated OCI
	Off-balance Sheet	
Illiquid Guarantees (weight = + 1/2)	**Semi-liquid Guarantees (weight=0)**	**Liquid Guarantees (weight=-1/2)**
Guarantees	Other Off-Balance Sheet Exposure to	

	Securitizations	
Acceptances and Documentary Credits Reported Off-Balance Sheet		
Committed Credit Lines		
Other Contingent Liabilities		

Step 3: We combine banks activities as classified in step 1 and as weighted in step 2 to construct a liquidity creation measure "cat fat."

Cat fat=	+1/2* Illiquid Assets +0* Semiliquid Assets	-1/2* Liquid Assets
	+1/2* Illiquid Liabilities +0* Semiliquid Liabilities	-1/2* Liquid Liabilities
		-1/2*Equity
	+1/2* Illiquid Guarantees +0* Semiliquid Guarantees	-1/2* Liquid Guarantees

Table 1.3: Summary Statistics and Sample Distribution

Panel A. Summary Statistics

	N	Mean	StDev	25th Percentile	50th Percentile	75th Percentile
Dependent Variables						
LC(total)/GTA	8,153	0.487	0.317	0.319	0.512	0.677
LC(asset)/GTA	8,153	0.145	0.183	0.029	0.166	0.278
LC(liab)/GTA	8,153	0.236	0.194	0.176	0.303	0.364
LC(off)/GTA	8,153	0.102	0.162	0.005	0.051	0.118
Key Independent Variables						
Enforcement_home	8,153	4.645	1.139	4.000	5.000	5.500
Controls						
Growth_home	8,153	2.562	3.223	1.000	2.513	4.044
Inflation_home	8,153	3.500	4.677	1.222	2.064	3.783
Capita_home	8,153	1.612	3.059	0.337	1.688	3.263
Deposit_insur_home	8,153	0.868	0.339	1.000	1.000	1.000
Ln(GTA)	8,153	6.787	2.007	5.384	6.634	8.042
Capital ratio	8,153	0.143	0.133	0.073	0.105	0.159

Panel B. Distribution by Home Country

County Name	**N**	***LC(total)/GTA***	***LC(asset)/GTA***	***LC(liab)/GTA***	***LC(off)/GTA***	***Enforcement_home***
Argentina	70	0.253	0.075	0.064	0.093	3.191
Australia	62	0.620	0.234	0.244	0.141	5.685
Austria	242	0.496	0.211	0.238	0.047	5.988
Bahrain	39	0.377	0.125	0.138	0.114	4.985
Belgium	139	0.488	0.148	0.220	0.113	5.000
Brazil	117	0.256	0.100	0.101	0.051	2.059
Canada	194	0.499	0.166	0.234	0.096	5.841
Chile	24	0.990	0.380	0.155	0.474	4.802
China	93	0.447	0.066	0.262	0.109	4.083
Colombia	90	0.417	0.066	0.318	0.035	2.002
Costa Rica	22	0.690	0.384	0.304	0.002	3.848
Croatia	9	0.465	-0.002	0.382	0.083	5.000
Cyprus	12	0.467	0.301	0.153	0.014	5.000
Denmark	36	0.725	0.280	0.331	0.113	6.000
Ecuador	24	0.741	0.241	0.323	0.195	2.839
Egypt	29	0.200	-0.098	0.252	0.046	3.693
El Salvador	15	0.599	0.244	0.248	0.120	2.783
France	767	0.599	0.205	0.243	0.139	4.940
Germany	572	0.390	0.059	0.241	0.088	5.105
Greece	137	0.627	0.205	0.339	0.080	4.016
Guatemala	17	0.550	0.198	0.326	0.026	1.549
Hong Kong	55	0.582	0.199	0.293	0.090	4.907
Hungary	25	0.546	0.259	0.230	0.056	4.093
India	111	0.415	0.088	0.254	0.073	4.000
Ireland	30	0.572	0.248	0.258	0.066	5.907
Israel	64	0.530	0.192	0.253	0.092	5.000
Italy	419	0.496	0.177	0.236	0.079	4.238
Japan	180	0.494	0.193	0.187	0.109	5.073
Jordan	39	0.461	0.107	0.243	0.111	4.000
Kazakhstan	36	0.374	0.264	0.086	0.023	3.896
Kenya	49	0.550	0.171	0.337	0.042	2.081
Kuwait	47	0.404	0.025	0.270	0.109	4.989
Latvia	22	0.497	0.180	0.277	0.041	5.000
Lebanon	40	0.606	0.108	0.310	0.196	4.000
Luxembourg	25	0.337	-0.024	0.323	0.038	5.960
Malaysia	74	0.475	0.176	0.257	0.040	3.743
Mali	107	0.656	0.189	0.352	0.115	3.037
Mexico	26	0.385	0.229	0.111	0.037	2.207
Morocco	27	0.720	0.259	0.358	0.103	4.907
Netherlands	288	0.353	0.081	0.132	0.120	5.990
Nicaragua	70	0.737	0.252	0.309	0.198	3.879
Nigeria	58	0.463	0.039	0.328	0.096	2.007
Norway	49	0.655	0.299	0.314	0.040	5.959
Pakistan	27	0.296	-0.119	0.363	0.053	3.123
Panama	99	0.665	0.256	0.306	0.123	3.030
Peru	21	0.662	0.260	0.349	0.046	3.111
Philippines	14	0.330	0.230	0.058	0.042	2.304
Portugal	94	0.371	0.109	0.196	0.052	5.000
Qatar	11	0.390	0.004	0.293	0.092	5.000
Russian	131	0.484	0.165	0.256	0.063	3.898
Saudi Arabia	22	0.217	0.044	0.111	0.063	5.000
Singapore	93	0.585	0.202	0.270	0.111	5.167
Slovenia	32	0.499	0.284	0.168	0.047	4.500
South Africa	265	0.469	0.125	0.284	0.060	2.353

South Korea	131	0.287	0.126	0.108	0.055	4.733
Spain	298	0.643	0.195	0.266	0.188	4.669
Sweden	211	0.573	0.175	0.273	0.121	6.000
Switzerland	219	0.398	0.003	0.314	0.076	5.139
Thailand	27	0.403	0.124	0.254	0.024	2.812
Togo	159	0.695	0.246	0.353	0.097	3.000
Turkey	194	0.405	0.085	0.248	0.071	4.096
Ukraine	27	0.476	0.162	0.301	0.013	4.000
UAE	29	0.508	0.197	0.212	0.096	4.000
UK	626	0.485	0.099	0.256	0.119	5.565
US	822	0.424	0.129	0.152	0.137	5.228
Uruguay	28	-0.119	0.026	-0.188	0.019	2.658
Venezuela	22	0.302	0.054	0.236	0.012	2.148
Total	8,153	0.487	0.145	0.236	0.102	4.645

Panel C. Distribution by Year

Year	N	Percent
2000	416	5.1
2001	478	5.86
2002	498	6.11
2003	499	6.12
2004	497	6.1
2005	502	6.16
2006	558	6.84
2007	610	7.48
2008	663	8.13
2009	684	8.39
2010	690	8.46
2011	705	8.65
2012	692	8.49
2013	661	8.11
Total	8,153	

Table 1.4: Home Country Legal Enforcement on Total Liquidity Creation

This table reports estimates from the regressions analyzing the effect of legal enforcement on bank total liquidity creation. The dependent variable across all columns is *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variables	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*
Enforcement_home	0.032***	0.035***	0.048***	0.046***
	(2.993)	(5.297)	(5.729)	(5.752)
Growth_home				0.007
				(1.449)
Inflation_home				-0.001
				(-0.563)
Capita_home				-0.005
				(-1.135)
Deposit_insur_home				0.068*
				(1.735)
Ln(GTA)				0.042
				(1.002)
Sqr. Ln(GTA)				-0.004
				(-1.374)
Capital Ratio				-0.434***
				(-7.222)
Subsidiary Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Host Country x Year Fixed Effects	NO	YES	YES	YES
Home Country Fixed Effects	NO	NO	YES	YES
Cluster at Home Country	YES	YES	YES	YES
Observations	8,153	8,153	8,153	8,153
Adjusted R-squared	0.695	0.744	0.748	0.757

Table 1.5: Home Country Legal Enforcement on Components of Liquidity Creation

This table reports estimates from the regressions analyzing the effects of legal enforcement on components of bank total liquidity creation. The dependent variable in Column (1) is *LC(total)/GTA*, which is bank total liquidity creation normalized by gross total assets. The dependent variable in Column (2) is *LC(asset)/GTA*, which is asset-side bank liquidity creation normalized by gross total assets. The dependent variable in Column (3) is *LC(liab)/GTA*, which is liability-side bank liquidity creation normalized by gross total assets, while the dependent variable in Column (4) is *LC(off)/GTA*, which is off-balance sheet-side bank liquidity creation normalized by gross total assets. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variables	*LC(total)/GTA*	*LC(asset)/GTA*	*LC(liab)/GTA*	*LC(off)/GTA*
Enforcement_home	0.046***	0.013*	0.016***	0.014***
	(5.752)	(1.89)	(3.196)	(3.59)
Controls	YES	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Host Country x Year Fixed Effects	YES	YES	YES	YES
Home Country Fixed Effects	YES	YES	YES	YES
Cluster at Home Country	YES	YES	YES	YES
Adjusted R-squared	0.756	0.773	0.809	0.694
Observations	8,153	8,153	8,153	8,153

Table 1.6: Selected Bank Balance Sheet and Off-balance Sheet Categories

This table reports estimates from the regressions analyzing the effects of legal enforcement on selected bank balance sheet and off-balance sheet categories. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Asset-side			***Liability-side***		***Off-side***
Dependent Variables	*Cash/ GTA*	*Securities/ GTA*	*Loans/ GTA*	*Customer Deposits/ GTA*	*Interbank Deposits/ GTA*	*Loan cmt./ GTA*
Enforcement_home	-0.001	-0.014**	0.017**	0.006	0.013**	0.010***
	(-0.551)	(-2.363)	(2.631)	(0.708)	(2.385)	(3.147)
Controls	YES	YES	YES	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Host Country x Year Fixed Effects	YES	YES	YES	YES	YES	YES
Home Country Fixed Effects	YES	YES	YES	YES	YES	YES
Cluster at Home Country	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.699	0.747	0.832	0.862	0.785	0.653
Observations	8,153	8,153	8,153	8,153	8,153	8,153

Table 1.7: Subsample Tests

This table reports estimates from the regressions analyzing the effects of legal enforcement on bank total liquidity creation for the subsample tests. The dependent variables across all columns are *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Main	***Developing***	***Developed***	***Without US - the Most Obs.***	***Without Croatia - the Least Obs.***
Dependent Variables	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*
Enforcement_home	0.045***	0.052***	0.049***	0.046***	0.045***
	(6.215)	(4.484)	(4.273)	(5.319)	(6.029)
Controls	YES	YES	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Host Country x Year Fixed Effects	YES	YES	YES	YES	YES
Home Country Fixed Effects	YES	YES	YES	YES	YES
Cluster at Home Country	YES	YES	YES	YES	YES
Observations	8,153	2,174	5,979	7,331	8,144
Adjusted R-squared	0.756	0.813	0.743	0.757	0.756

Table 1.8: Home Country Banking Regulations

This table reports estimates from the regressions analyzing the effect of legal enforcement on bank total liquidity creation by controlling for home country banking regulations. The dependent variable across all columns is *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables	*LC(total)/ GTA*	*LC(total)/ GTA*	*LC(total)/ GTA*	*LC(total)/ GTA*	*LC(total)/ GTA*	*LC(total)/ GTA*
Enforcement_home	0.046***	0.066***	0.045***	0.043***	0.046***	0.040***
	(5.874)	(4.271)	(5.807)	(5.002)	(6.090)	(2.732)
Act_restrict_home	0.006**					-0.014
	(2.339)					(-0.698)
Cap_reg_home		0.001				0.004
		(0.299)				(1.295)
Private_monitor_home			-0.007			-0.009
			(-1.435)			(-0.729)
Creditor_monitor_home				0.009		0.001
				(0.987)		(0.044)
Multi_supervisors_home					0.017	0.077**
					(0.781)	(2.452)
Controls	YES	YES	YES	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Host Country x Year Fixed effect	YES	YES	YES	YES	YES	YES
Home Country Fixed Effect	YES	YES	YES	YES	YES	YES
Cluster at Home Country	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.759	0.769	0.757	0.766	0.760	0.785
Observations	7,670	4,564	7,595	5,390	7,984	3,123

Table 1.9: Alternative Legal Enforcement Measures

This table reports estimates from the regressions analyzing the effect of home country alternative legal enforcement measures on bank total liquidity creation. The dependent variable across all columns is *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable is *Composite_Enforce_home*, which is the sum of home country legal enforcement, home country corruption index, the home country risk of contract repudiation by the government, and the home country risk of expropriation by the government in Column (1), *Enforce_index_home*, which is an index of the effectiveness of home country legal systems in enforcing contracts in Column (2) by averaging the efficiency of the home country judicial system, the home country rule of law, and the home country risk of expropriation and contract repudiation, *Enforce_index_kk_home*, which is the home country legal enforcement index from Knack and Keefer (1995) by converting corruption, rule of law, and bureaucratic quality indices to 10-point scales (by multiplying them by 5/3) and then aggregating them with home country contract repudiation and expropriation risk. Controls include *Growth_home, Inflation_home, Capita_home*, *Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent Variables	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*
Composite_Enforce_home	0.012***		
	(4.115)		
Enforce_index_home		0.012***	
		(4.115)	
Enforce_index_kk_home			0.012***
			(3.880)
Controls	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES
Year Fixed Effect	YES	YES	YES
Host Country x Year Fixed effect	YES	YES	YES
Home Country Fixed Effect	YES	YES	YES
Cluster at Home Country	YES	YES	YES
Adjusted R-squared	0.751	0.751	0.750
Observations	7,037	7,037	7,037

Table 1.10: Home Country Creditor Rights

This table reports estimates from the regressions analyzing the effect of legal enforcement on bank total liquidity creation by comparing home country legal enforcement to home country creditor rights. The dependent variable across all columns is *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable is *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home*, *Inflation_home*, *Capita_home*, *Deposit_insur_home*, *Ln(GTA)*, *Sqr. Ln(GTA)*, and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses and standard errors are clustered at the home country level. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*	*LC(total)/GTA*
Enforcement_home	0.035***	0.033***	0.035***	0.041***	0.034***	0.040***
	(4.877)	(4.764)	(4.888)	(5.692)	(4.777)	(5.808)
Creditor_rights_home	-0.024					
	(-1.377)					
Restrictions_enter_home		-0.040				-0.046
		(-0.737)				(-0.942)
No_automatice_stay_home			-0.020			0.024
			(-0.543)			(0.885)
Secured_creditors_home				-0.104***		-0.115***
				(-4.567)		(-5.065)
Management_not stay_home					0.004	0.022
					(0.105)	(0.749)
Controls	YES	YES	YES	YES	YES	YES
Subsidiary Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Host Country x Year Fixed Effects	YES	YES	YES	YES	YES	YES
Home Country Fixed Effects	NO	NO	NO	NO	NO	NO
Cluster at Home Country	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.753	0.753	0.753	0.754	0.753	0.754
Observations	8,066	8,066	8,066	8,066	8,066	8,066

Table 1.11: Host Country Legal Enforcement

This table reports estimates from the regressions analyzing the effect of legal enforcement on bank total liquidity creation by comparing home country legal enforcement to host country legal enforcement. The dependent variable across all columns is *LC(total)/GTA*, which is bank total liquidity creation normalized by the gross total assets. The key explanatory variable are *Enforcement_home*, which is an index capturing the strength of the legal system in a bank's home country and the extent to which the citizens of a home country are willing to rely on the established institutions to make and implement laws and adjudicate disputes, and *Enforcement_host*, which is an index capturing the strength of the legal system in a bank's host country and the extent to which the citizens of a host country are willing to rely on the established institutions to make and implement laws and adjudicate disputes. Controls include *Growth_home, Inflation_home, Capita_home, Deposit_insur_home, Ln(GTA), Sqr. Ln(GTA),* and *Capital Ratio*. All of the independent variables are lagged one year. Coefficients on constant terms are omitted. All of the variables are defined in Table 1.1. *t*-statistics are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variables	*LC(total)/GTA*	*LC(asset)/GTA*	*LC(liab)/GTA*	*LC(off)/GTA*
Enforcement_home	0.040***	0.014***	0.012***	0.010**
	(6.187)	(3.984)	(3.709)	(2.533)
Enforcement_host	0.021***	0.017***	-0.003	0.004
	(3.026)	(4.607)	(-0.976)	(0.900)
Controls	YES	YES	YES	YES
Subsidiary Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Host Country x Year Fixed Effects	NO	NO	NO	NO
Home Country Fixed Effects	YES	YES	YES	YES
Cluster at Home Country	NO	NO	NO	NO
Adjusted R-squared	0.717	0.743	0.805	0.587
Observations	7,554	7,554	7,554	7,554

CHAPTER 2: CULTURAL VALUES ON BANK FAILURES AROUND THE WORLD[11]

2.1 INTRODUCTION

This paper analyzes bank failures around the world using unique bank-level failure data covering 92 nations over 2000-2014 and investigates whether national culture characteristics about how different nations deal with fundamental problems may help understand bank failures. We find strong evidence that national culture matters for bank failures in various countries. The cultural dimensions of individualism and masculinity are significantly and economically positively associated with bank failure, even after accounting for a broad set of other economic, financial, regulatory, political, and legal determinants of bank failure, while other culture dimensions do not yield consistent results. Effects for individualism and masculinity operate through very different channels. Results are robust to numerous tests, including accounting for endogeneity. Our results have implications for prudential policy best practices, informing the decisions of policymakers, regulators, and supervisors.

Bank failures can have widespread economic costs, resulting in significant negative externalities for 1) other financial institutions that suffer losses through interconnections and contagion; 2) governments that often get involved in costly bailouts; and 3) borrowers, creditors, and other counterparties in the real economy that depend on the failed institutions and other parties that are harmed by these failures (e.g., Barth, Bartholomew, and Bradley,

[11] Berger, A.N., Li, X, Morris, C., Roman, R.A.. To be submitted.

1990; James, 1991; Lang and Stulz, 1992; Ashcraft, 2005; Reinhart and Rogoff, 2009; Acharya, Cooley, Richardson, and Walter, 2011; Kupiec and Ramirez, 2013; Kang, Lowery, and Wardlaw, 2014). Individual bank failure is not necessarily bad for society, but widespread bank failures often result in financial crises, deep recessions, and long-lasting economic growth problems (e.g., Reinhart and Rogoff, 2009; Laeven and Valencia, 2012). It is therefore crucial that prudential policymakers, regulators, and supervisors be aware of the major causes of bank failures to tailor their policies, regulations, and supervision, respectively, to target the sources of potential banking problems. Even when some failure causes cannot be directly countered or eliminated – such as may be the case with long-lasting national cultural characteristics – information about these causes is key to designing resistant financial architectures.

There are many studies of bank failure. These studies generally focus on a single developed nation, usually the U.S., and identify a number of determinants of bank failure including the influence of financial accounting variables, such as capital ratios, loan performance problems, and earnings; the proportion of certain risky investments, such as commercial real estate; and corporate governance factors, such as foreign and government ownership (e.g., Lane, Looney, and Wansley, 1986; Espahbodi, 1991; Cole and Gunther, 1995, 1998; Helwege, 1996; Wheelock and Wilson, 1995, 2000; Calomiris and Mason, 1997, 2003; Molina, 2002; Schaeck, 2008; Aubuchon and Wheelock, 2010; Cole and White, 2012; Berger and Bouwman, 2013; DeYoung and Torna, 2013; Ng and Roychowdhury, 2014; Berger and Imbierowicz and Rauch, 2016). There are very few multi-country bank-level failure studies, all of which focus on emerging economies only (e.g., Bongini, Claessens, and Ferri, 2001; Brown and Dinc, 2005, 2011).

In this paper, we directly address two substantive and related omissions in the bank failure literature. The first is that, to our knowledge, there are no empirical studies of bank failure using bank-level data from many developed and developing nations together.[12] It is difficult to draw general conclusions about the causes of bank failures and develop prudential best practices to predict, prevent, and deal with these failures and their systemic consequences using results drawn mostly from failures in a single developed nation or from a few developing nations only. The lack of broad international evidence means that important differences across countries, including differences in culture, are not well understood.

Second, the effects of national culture have been neglected in the bank failure literature. National culture is defined as the set of values, beliefs, and norms learned early in life and differentiate one group of people from another (e.g., Beck and Moore, 1985; Hofstede, Hofstede, and Minkov, 1991, 2010), and is shown to be a relatively stable component of countries (e.g., Newman and Nollen, 1996; Adler, 1997; Hofstede, 1983, 1984, 2001; Williamson, 2000; Hofstede, Hofstede, and Minkov, 2010). National culture is deeply embedded in everyday life and resistant to change, and invades everything in a society, including the corporate culture of banks (e.g., Guiso, Sapienza, and Zingales, 2015a).

Because of its pervasive nature, it would be surprising if national culture did *not* have strong effects on the probability of bank failure, but these effects have not been investigated, likely for two reasons. First, according to Zingales (2015), most financial

[12] Some studies (e.g., Caprio and Klingebiel, 1996; Barth, Caprio, and Levine, 2004) discuss some of the causes of international bank fragility and insolvencies, but they do not use bank-level data on individual failures and a bank-level, multi-country approach to study determinants of these failures like we do.

economists ignore the role of culture because it is difficult to observe, define, and measure. Second, national culture is inherent to a nation and does not vary significantly over time, so its effects cannot be determined from the many single-nation studies or the few multinational studies of emerging nations that do not focus on the effects of national culture. This paper addresses these issues and is the first, to our knowledge, to study bank failure in a large number of developed and developing economies with a very broad distribution of cultures, and the first to focus on national cultural elements as key drivers of bank failure. The results add to the research knowledge about the causes of bank failure and may assist in the formulation of prudential best practices.

Specifically, we formulate and test hypotheses about how several dimensions of national culture may affect the likelihood of bank failure using unique bank-level data on failures for 92 countries over 2000-2014. Data permitting, we collect failure and financial information on the 25 largest banking organizations in each of the countries (as defined by total assets at the end of 2000) using BankScope, Zephyr M&A, and LexisNexis. On average, our sample accounts for over 78% of total banking system assets in these nations. Focusing on the largest banks increases comparability because these tend to comply with international accounting and regulatory standards. We combine the bank data with Hofstede's measures of four main national culture dimensions – individualism, masculinity, power distance, and uncertainty avoidance.[13] Our final dataset has 15,693 bank-year observations covering 1,541 banks and bank holding companies (BHCs). Out of these, 473 are failure observations (for 206 unique banks) We estimate failure probability models which include a comprehensive set of bank, country, and time variables in the

[13] Since most of the culture literature focus on these four dimensions, we use four dimensions in our main model. We also include the other two culture dimensions - long term orientation and indulgence in later empirical tests.

models to control for other potential causes of bank failure found in the literature. We also investigate the channels through which the various dimensions of culture influence the probability of bank failure and find plausible results.

By way of preview, we find that individualism – which stresses independence, personal achievement, and is linked with overconfidence and overoptimism – increases the probability of bank failure. The channel through which this appears to occur is that bank managers in individualistic societies put themselves in the position to fail by taking on relatively large portfolio risks. This is consistent with research on nonfinancial firms, which suggests that individualism can be associated with higher risk-taking incentives (e.g., Kanagaretnam, Lim, and Lobo, 2011; Griffin, Yue, and Zhao, 2013; Mihet, 2013; Shao, Kwok, and Zhang, 2013). Second, we find that masculinity – which stresses competitiveness and achievements, material success, and little sympathy for the weak – also increases the probability of bank failure. The channel through which this appears to occur is that government authorities in masculine countries allow banks to operate with less tangible capital and liquidity, and less often bail out troubled institutions, allowing them to fail. Other national culture dimensions, power distance and uncertainty avoidance, do not have consistent effects on the likelihood of bank failure. Our results suggest that prudential policies, regulation, and supervision may be most effective if tailored to individual countries' cultures. For more individualist countries, managerial risk taking might be curbed through prudential actions such as tighter supervision, increased transparency of bank conditions, and/or bail-in mechanisms to induce more capital market monitoring. For more masculine nations, enforcement of capital and/or liquidity guidelines, or their bailout policies might be rebalanced.

Our evidence is robust to a variety of tests. First, to address endogeneity concerns related to culture, we conduct an instrumental variable (IV) analysis in which we use prevalence of diseases, demography, gender inequality, pronoun politeness distinctins, and religious beliefs as instruments for different national cultural dimensions. Second, we check the sensitivity of our results to different estimation techniques, including using proportional hazard weighted logit models where weight is proportional to the the number of banks in the country. Third, to address the concern that potentially omitted bank-level or country-level variables may bias our main findings, we also include a variety of additional bank characteristics such as proxies for too-big-to-fail (*TBTF*) or too-many-to-fail (*TMTF*) considerations, and additional country characteristics. Fourth, we re-run our analyses using an alternative proxy for bank failure which includes non-government related acquisitions, and alternative measures for individualism and masculinity culture dimensions (Tang and Koveos, Schwartz, and Globe). Finally, we conduct tests in which we exclude several potential outliers to ensure that these are not responsible for our results: the U.S., the G-10 countries[14], countries that have less than three or less than five banks in the sample, or include only the 40 countries in the Hofstede's original list.[15] We also conduct tests in which we exclude the global financial crisis (2007-2009) or country systemic crises. We also consider a country-level analysis of averages using one observation per country. Across all these checks, we continue to find evidence in support of our main findings that individualism and masculinity are positively associated with bank failure.

[14] G-10 countries include France, Germany, Belgium, Italy, Japan, the Netherlands, Sweden, the United Kingdom, the United States, Canada, and Switzerland.

[15] In addition, in unreported tests, we also controlled for outliers by excluding each country one at a time to test whether the banks from any single country determine our results, and we find that our results hold in all cases.

The remainder of the paper is organized as follows. Section 2.2 reviews the bank failure, national culture, and culture and finance literature. Section 2.3 develops the empirical hypotheses. Section 2.4 explains our empirical approach. Section 2.5 describes the data and key variables used in the analysis. Section 2.6 discusses the main results. Section 2.7 reports the robustness tests, and Section 2.8 concludes.

2.2 LITERATURE REVIEW

Bank Failures

Bank failures occur under all economic conditions, but they often accelerate during financial crises, which give rise to many studies of the determinants of bank failure during these time periods. To illustrate, a large number of studies investigate the causes of bank failures during the recent global financial crisis (e.g., Aubuchon and Wheelock, 2010; Cole and White, 2012; Berger and Bouwman, 2013; DeYoung and Torna, 2013; Ng and Roychowdhury, 2014; Berger, Imbierowicz and Rauch, 2016). These studies build on earlier bank failure studies (e.g., Martin, 1977; Lane, Looney, and Wansley, 1986; Espahbodi, 1991; Cole and Gunther 1995, 1998; Helwege, 1996; Schaeck, 2008).

The studies in both categories generally focus on a single developed nation, usually the U.S., and generally find that banks fail due to weak fundamentals, as proxied by financial accounting variables such as capital, performance, loan quality (e.g., Lane, Looney, and Wansley, 1986; Espahbodi, 1991; Cole and Gunther, 1995, 1998; Helwege, 1996; Wheelock and Wilson, 1995, 2000; Calomiris and Mason, 1997, 2003; Molina, 2002; Schaeck, 2008; Cole and White, 2012; Berger and Bouwman, 2013; Berger, Imbierowicz, and Rauch, 2016), risky bank activities (investment banking, private equity) and lack of experience with new financial products (e.g., DeYoung and Torna, 2013), ownership and

corporate governance issues (e.g., Berger and Bouwman, 2013; Berger, Imbierowicz, and Rauch, 2016; Calomiris and Carlson, forthcoming), regional economic conditions (e.g., Aubuchon and Wheelock, 2010), political factors (e.g., Liu and Ngo, 2014), and/or fraud (e.g., Benston and Kaufman, 1986; Akerlof and Romer. 1995; Barker and Holdsworth, 1994).

Very few studies analyze empirically bank-level failure in a multi-country context, and almost all of these focus on developing economies only. Brown and Dinc (2005, 2011) analyze bank failures in 21 developing countries. Brown and Dinc (2005) find that failing banks are less likely to be taken over by the government or lose their licenses before elections. Brown and Dinc (2011) find evidence of regulatory forbearance in relation to bank failures: a government is less likely to take over or close a failing bank if the banking system is weak. Bongini, Claessens, and Ferri (2001) study failures in 5 East Asian countries and find that traditional financial data predict bank distress and closure, and also find evidence of "too-big-to-fail" policies. Caprio and Klingebiel (1996) and Barth, Caprio, and Levine (2004) discuss some of the causes of international bank fragility and insolvencies and mention real GDP growth, volatility in output and prices, and regulation as important factors, but they do not conduct a bank-level study of international failures. Our paper is the first, to our knowledge, to study bank failures using bank-level failure data and a comprehensive number of both developing and developed countries. We also examine national culture elements as determinants of bank failures in these countries, about which there is no evidence in the literature.[16]

[16] There are also studies in an international context at the country level which generally document that country economic, institutional, and regulatory framework can make crises more likely (e.g., Barth, Caprio, and Levine, 2004, 2006; Beck, Demirguc-Kunt, and Levine, 2006; Caprio and Klingebiel, 1996, 2002; Claessens, Klingebiel, and Laeven, 2005; Demirguc-Kunt and Detragiache, 1997, 2002).

National Culture

Hofstede and Bond (1988) define culture as being "the collective programming of the mind which distinguishes the members of one group or category of people from another." National culture reflects essential country characteristics that help explain international differences in beliefs, learned values, and norms. Researchers find that national culture affects the way corporations do business and have important implications for business managers as work-related values are not universal, and national values persist over multinationals' efforts to create corporate culture (e.g., Hofstede, 1983; Trompenaars, 1993; House, Hanges, Javidan, Dorfman, and Gupta, 2004).

The national culture dimensions employed in this study are derived from the survey of national culture conducted by Geert Hofstede. Hofstede's culture dimensions describe the fundamental problems of mankind with which each society has to deal, problems to which different societies have found different answers (Hofstede, 1983, 1984, 2001; Hofstede, Hofstede, and Minkov, 2010): (1) the degree of group integration, (2) division of roles between genders, (3) immobility between social classes, and (4) tolerance of uncertainty. These problems and possible answers are described in detail in Appendix B, however we also provide a brief overview of them below.

Individualism (*IDV*) – arguably the most significant driver of cultural differences across societies (Markus and Kitayama, 1991) –measures the degree to which a society stresses the role of the individual versus that of the group. Individualism is associated with independence, personal achievement, overconfidence, and overoptimism.

Masculinity (*MAS*) focuses on the duality of genders and captures the extent to which "male assertiveness" (preference for the competitiveness, achievement, heroism,

assertiveness, and material rewards for success) is promoted as a dominant value in a society.

Power Distance (*PDI*) measures the extent to which the less powerful expect and accept that power is distributed unequally. In a high power distance country, the population holds relatively authoritarian views, and that authority is based on tradition rather than on secular arguments. It also characterizes a highly stratified society that values conformity more than independence.

Uncertainty Avoidance (*UAI*) deals with a society's tolerance for uncertain, unknown, or unstructured situations. Uncertainty avoidance is defined as "feeling uncomfortable with uncertainty and ambiguity, and therefore valuing beliefs and institutions that provide certainty and conformity." (Hofstede, 2001). People in uncertainty avoidant cultures have a "fear of failure" and thus favor an orderly structure in their organizations, institutions, and personal relations, prefer well anticipated events, and tend to take only known risks.

Following prior research on culture and finance, we use these four cultural value dimensions in our analysis. Although these measures are widely used and have arguably the greatest influence among various cultural classifications in cross-cultural research (e.g., Kirkman, Lowe, and Gibson 2006; Schwartz 1994; Sivakumar and Nakata 2001), we also test whether our results are sensitive to using alternative proxies for cultural values.

Culture and Finance

The last decades have experienced a "cultural revolution in finance" (Zingales, 2015) and a growing research literature finds that culture matters for finance and economics (Karolyi, 2016). Barth, Caprio, and Levine (2006) point out that banks and bank regulation

are "surrounded by the entire apparatus of political, legal, cultural and technological forces influencing the operation of banks." Culture may arguably influence individuals' attitudes and perceptions towards decision-making (Vitell, Nwachukwu, and Barnes, 1993; Husted and Allen, 2008). Aggarwal and Goodell (2009) contend that the relative efficiency of enforcing incomplete contracts differs significantly across countries, depending on legal, political, economic, and cultural environments, while North (1990) explains that the informal constraints that stem from culture provide a more pervasive influence than formal rules and property rights on shaping choices in daily interactions and ordering economy. Aggarwal, Faccio, Guedhami, and Kwok (2016) discuss that ignoring the role of culture jeopardies omitting an important variable from the analysis of financial decision-making.

First, a number of studies focus on how culture matters for the real economy and various broad country economic and financial phenomena such as economic development and national savings and income redistribution (e.g., Greif, 1994; Stulz and Williamson, 2003; Guiso, Sapienza, and Zingales, 2003,2004, 2006, 2009, 2015a,b).[17,18] Second, other studies document effects of national culture on investor perceptions and stock performance (e.g., Grinblatt and Keloharju, 2001; Chui, Titman, and Wei, 2010; Pevzner, Xie, and Xin, 2013; Hillert, Jacobs, and Müller, 2014; Eun, Wang, and Xiao, 2015). Third, other research finds that national culture is an important determinant of capital structure, affects dividend

[17] Closely related to this strand of research, there are also studies focusing on corporate culture and their influence on firm financial outcomes (e.g., Braguinsky and Mityakov, 2013; Davidson, Dey, and Smith, 2013; Hoenig and Morris, 2013; Biggerstaff, Cicero, and Puckett, 2015; DeBacker, Heim, and Tran, 2015; Guiso, Sapienza, and Zingales, 2015b; Mironov, 2015). Hofstede, Neuijen, Ohayv, and Sanders (1990) recommend integrating both types of culture in order to best impact the organizational performance. Guiso, Sapienza, and Zingales (2015a) observe that national cultural changes are rare and slow and find that corporate culture can be used as a laboratory to study the role of national culture and the way it can be changed.

[18] In studies focusing on other aspects of culture, Guiso, Sapienza, and Zingales (2003) find that religious beliefs are associated with good' economic attitudes, where good' is defined as conducive to higher per capita income and growth. Guiso, Sapienza, and Zingales (2004) find that in high-social-capital areas in Italy (as opposed to low-social capital ones), households are more likely to use checks, invest less in cash and more in stock, have higher access to institutional credit, and make less use of informal credit.

payout policies, corporate debt maturity choice, and can explain the leverage decisions of foreign joint ventures in China (e.g., Chui, Lloyd, and Kwok, 2002; Shao, Kwok, and Guedhami, 2008; Li, Griffin, Yue, and Zhao, 2011; Zheng, El Ghoul, Guedhami, and Kwok, 2012; El Ghoul, Guedhami, Kwok, and Zheng, 2017). Fourth, some research shows that national culture affects mergers and acquisitions (M&A): effective integration between M&A partners, merger volume, and synergy gains (e.g., Weber, Shenkar, and Raveh, 1996; Siegel, Licht, and Schwartz, 2011; Ahern, Daminelli, and Fracassi, 2015) and influences bank loan supply and terms to borrowers (Giannetti and Yafeh, 2012; Fisman, Paravisini, and Vig, 2017). Fifth, some studies find that national culture can explain compensation and human resources practices and policies (e.g., Schuler and Rogovsky, 1998; Tosi and Greckhamer, 2004), government involvement in privatized firms (e.g., Boubakri, Guedhami, Kwok, and Saffar, 2015), life insurance policy consumption (e.g., Chui and Kwok, 2008), and corruption in bank lending (e.g., Zheng, El Ghoul, Guedhami, and Kwok, 2013).

Finally, the most closely related to our current research are studies that focus on the effects of culture on corporate risk-taking and investment, since bank failures may be the result of risk-taking incentives and/or bad investment decisions. Li, Griffin, Yue, and Zhao (2013) find that individualism has a positive and significant association with corporate risk taking, whereas uncertainty avoidance is negatively related to such risk taking. Mihet (2013) finds that firm risk-taking is higher in countries with high individualism, low uncertainty avoidance, and low tolerance for hierarchical relationships. Guiso, Sapienza, and Zingales (2009) find that culture affects trade between countries, portfolio investment, and direct investment. Shao, Kwok, and Zhang (2013) find that firms

in individualistic countries invest more in long-term (risky) than in short-term (safe) assets. Moreover, the effect of individualism on long-term investment hinges on R&D: firms in individualistic countries invest more in R&D projects but not more in physical assets. Buck and Shahrim (2005) find that national culture has implications for the translation of innovations in Germany. Looking at the banking industry, Kanagaretnam, Lim, and Lobo (2011) find that banks in high individualism, high masculinity, and low uncertainty avoidance societies manage earnings to just-meet-or-beat the prior year's earnings.

Extant literature on bank failure does not consider the role of national culture. Building on this literature, our paper looks at the role of cultural values in understanding bank failures around the world.

2.3 HYPOTHESIS DEVELOPMENT

We develop hypotheses relating each of the four cultural dimensions to the likelihood of bank failure. For all four, we give reasons why it might be either positively or negatively associated with the bank failure probabilities.

Individualism and Bank Failure

As discussed above, individualism is associated with independence, personal achievement, overconfidence, and overoptimism in the culture literature. The emphasis on personal achievements in individualist countries may lead managers in these countries to choose relatively high expected return-high risk portfolios and be less likely to adopt compensating risk mitigation controls such as maintaining higher capital ratios or providing stronger risk management oversight. Moreover, managers in individualist cultures tend to believe more that their abilities are above average, which may result in

overconfidence and overoptimism, which may also result in more trading volume and volatility (Chui, Titman, and Wei, 2010). All of these mechanisms may result in higher likelihoods of bank failure.

Alternatively, individualism may be negatively related to bank failure probabilities. In less individualist countries, people tend to be integrated into cohesive groups or extended families, resulting in poor lending decisions based on collective ties, rather than sound economic principles or herding behavior that can cause lending booms (e.g., Beckmann, Menkhoff, and Suto, 2008). Such booms may ultimately result in financial bubbles that burst and cause financial crises that are associated with widespread bank failures (e.g., Rajan, 1994; Acharya and Naqvi, 2012; Berger and Bouwman, 2017).

These arguments yield the following opposing hypotheses:

H1a: Individualism is positively related to the likelihood of bank failure, ceteris paribus.

H1b: Individualism is negatively related to the likelihood of bank failure, ceteris paribus.

Masculinity and Bank Failure

The masculinity characteristic stresses competitiveness and achievements, material success, and little sympathy for the weak, and can be associated with orientations toward acquisition and overinvestment. In more masculine societies, bank managers may be less risk-averse, and less likely to restrict credit availability to new, unestablished borrowers who pose high credit risks (e.g., Bellucci, Borisov, and Zazzaro, 2010), and may be more likely to manage earnings than control risk (e.g., Kanagaretnam, Lim, and Lobo, 2011). The greater competitiveness and less sympathy for the weak may result in more financially

distressed banks being allowed to fail, rather than being bailed out by authorities. Thus, masculinity may be positively related to the likelihood of bank failure.

Alternatively, low masculinity is associated with a less intensive focus on work and business, and more focus on cooperation, caring for the weak, and nurturing relationships. Therefore, bank managers in relatively low masculine countries may be less willing to cut off credit to borrowers that pose credit risks, and less inclined to fire employees that are not performing well. Thus, masculinity may also be associated with a lower probability of bank failure.

These opposing predictions for bank failure yield the following hypotheses:

H2a: Masculinity is positively related to the likelihood of bank failure, ceteris paribus.

H2b: Masculinity is negatively related to the likelihood of bank failure, ceteris paribus.

Power Distance and Bank Failure

As indicated, power distance refers to the extent to which the less powerful accept and expect that power is distributed unequally. High power distance societies are relatively stratified, information is constrained by hierarchy, and conformity is valued over independence. Power distance may be positively associated with bank failure because: 1) organizational stratification and constrained information flows can enable problems to fester, rather than being resolved quickly; 2) centralization of authority may allow bank managers to pursue personal objectives other than optimizing bank performance (e.g., Kanagaretnam, Lim, and Lobo, 2011); and 3) emphasis on conformity and not being open to differing viewpoints may block innovative risk management solutions to problems.

Alternatively, power distance may be negatively related to bank failure. Low power distance societies value equitable rewards and penalties, and may be more likely to allow banks to fail, rather than bailing them out. In addition, bank managers in low power distance countries tend to be more trusting, which may result in higher risk-taking (e.g., Growiec and Growiec, 2011; Das and Teng, 2004), slower cutoffs of risky investments, and increased probability of failure.

Again, the disparate arguments result in opposing hypotheses:

H3a: Power distance is positively related to the likelihood of bank failure, ceteris paribus.

H3b: Power distance is negatively related to the likelihood of bank failure, ceteris paribus.

Uncertainty Avoidance and Bank Failure

As discussed, uncertainty avoidance refers to the extent to which a culture may avoid unknown or unstructured situations.

Uncertainty avoidance may be positively associated the probability of bank failure because high uncertainty avoidance countries tend to avoid competition, which may be associated with greater bank risk according to the "*competition-stability*" view. Low competition results in high loan rates, which increase moral hazard and adverse selection problems, making the bank loans riskier and increasing the probability of failure (e.g., Boyd and De Nicolo, 2005).

Alternatively, uncertainty avoidance may be negatively associated with bank failures. According to the "*competition-fragility*" view, low competition is associated with

high charter values, which discourage risk taking (e.g., Keeley, 1990).[19] In addition, managers in uncertainty avoidance countries may eschew risks that might otherwise result in failures.

Thus, uncertainty avoidance yields the following opposing hypotheses:

H4a: Uncertainty avoidance is positively related to the likelihood of bank failure, ceteris paribus.

H4b: Uncertainty avoidance is negatively related to the likelihood of bank failure, ceteris paribus.

2.4 FAILURE REGRESSION MODEL

We next turn to our empirical model in which we test which of the "a" and "b" hypotheses described above empirically dominate using the following logit model of the probability of bank failure:

$$\log\left(\frac{\text{Prob}(\text{FAILURE}_{i,c,t})}{1-\text{Prob}(\text{FAILURE}_{i,c,t})}\right) = \alpha + \sum_{k=1}^{4}\beta_k \cdot \text{CULTURE}_{k,c} + \varphi \cdot \text{X}_{i,t} + \gamma \cdot \text{Z}_{ct} + \tau \cdot \text{TIME}_t + \varepsilon_{i,c,t} \quad (1)$$

where $\log\left(\frac{\text{Prob}(\text{FAILURE}_{i,c,t})}{1-\text{Prob}(\text{FAILURE}_{i,c,t})}\right)$ measures the likelihood that bank i from country c failed during year t. *FAILURE* is a dummy for bank failures discussed in Section 5.1 just below, $\text{CULTURE}_{k,c}$ represent the four cultural values: individualism, masculinity, power distance, and uncertainty avoidance as defined in Section 2. $\text{X}_{i,t}$ is a set of bank controls

[19] Both the "*competition-stability"* and "*competition-fragility"* views receive some empirical support (e.g., Berger, Klapper, and Turk-Ariss, 2009). There is also an argument for a potential nonmonotonic relationship between competition and bank risk (Martinez-Miera and Repullo 2010).

and $Z_{c,t}$ is a set of country controls. $TIME_t$ represents year fixed effects. Finally, to ensure that our results are robust to any possible intertemporal correlation among the banks in each country–year period, we estimate the model with error clustering at the country–year level following prior research (e.g., Bertrand, Duflo, Mullainathan, 2004; Love, Preve, Sarria-Allende, 2007; Beck, De Jonghe, and Schepens, 2013).

2.5 DATA AND SAMPLE

Data Sources and Sample

To construct our dataset, we identify the largest 25 commercial banks and bank holding companies (or the maximum number if it is under 25) in all countries – both developed and developing – covered in BankScope as of year 2000. To identify bank failures, we follow these banks from year 2000 until one of the following exit events takes place: failure as manifested through: (i) license suspension/revocation by the regulators; (ii) liquidation, bankruptcy, or cease of operations (iii) receivership, or (iv) bank merger or acquisition (M&A). Following the prior research on bank failures, we also add to our list of bank failures the cases of bank insolvencies / technical default, where the bank became critically undercapitalized (capital equity falls to 2% or below as in Wheelock and Wilson, 1995, 2000; Assaf, Berger, Roman, and Tsionas, 2017).[20] As in Brown and Dinc (2005), we evaluate each bank M&A on a case-by-case basis to decide whether it is a government takeover of a failing bank. If one of the merger partners is a private bank but the resulting entity is majority government owned, then the merger is considered a bank failure. If a

[20] This definition of technical default is consistent with the Improvement Act of 1991 in the US, which requires regulators to close or impose prompt corrective actions on any bank whose equity ratio falls below 2%.

bank is acquired by another bank and the government provides financial support for the acquisition, it is considered a government-assisted acquisition, and thus also a bank failure. Finally, if the bank is acquired by another bank where there is a change of majority ownership, but the government does not provide financial support for the bank acquisition, then it is considered a bank acquisition exit event. We exclude these events in our main bank failure measures as it is not clear whether the bank indeed failed in these cases. However, later we add these bank acquisitions back into our failure variable and the results are consistent.[21,22]

We use unconsolidated financial statements from Bureau van Dijk's BankScope if available, and exclude financial statements which have missing key financial variables such as bank total assets. We then remove financial statement duplicates for a given bank (identified with its Bankscope unique bank identification number) and ensure we favor the longest possible time series for each bank in our sample, following the code recommendation of Duprey and *Lé* (2015).

We determine government and foreign ownership of the banks through Bureau van Dijk's BankScope historical CDs, BankScope web-based interface, the foreign ownership dataset provided by Claessens and van Horen (2014, 2015), and other manual data collection where the information in the first sources is unavailable. Government takeovers,

[21] There are other ways in which governments can intervene in a bank: by providing liquidity support, limiting bank operations, or purchasing nonperforming assets. However, the data on these are simply not available or are likely to be very poor, as discussed in Brown and Dinç (2011). This is because governments may have an incentive to remain confidential about these latter forms of intervention to prevent bank runs and other destabilizing market effects.

[22] Note that surprisingly the U.S. does not have any failures according to our first standard definition, because none of the bank acquisitions in the sample were done with government assistance or included in the FDIC failure list. However, U.S. does show failures when we include also regular bank acquisitions. Wachovia Bank, one of the institutions in our U.S. sample, although originally intended to be a government-assisted acquisition by Citigroup, it met with significant shareholder disapproval, and eventually on October 3, 2008 it announced its merger with Wells Fargo. The two entities had agreed to merge in an all-stock transaction, requiring no government involvement. Thus, Wachovia was not included on the FDIC failure list as it was not placed into receivership and it was not a government-assisted acquisition, and hence it does not appear in our main failure variable.

government-assisted acquisitions, and other bank merger deal types are identified using the BankScope dataset, Zephyr M&A dataset, LexisNexis News, and various Internet sources (including the bank's website).

The cultural values data on individualism (*IDV*), masculinity (*MAS*), power distance (*PDI*), and uncertainty avoidance (*UAI*)) are collected from Hofstede (2001), Hofstede, Hofstede, and Minkov (2010), and Geert Hofstede website.[23] Data on explicit deposit insurance scheme and presence of multiple regulators supervising banks in a country are obtained from the World Bank Surveys on Bank Regulation of Barth, Caprio, and Levine (2013). We control for the country's economic environment using several proxies from the World Bank Development Indicators and the International Financial Statistics (IFS) databases. We also control for several country stability dimensions using the Worldwide Governance Indicators (WGI) of Kaufmann, Kraay, and Mastruzzi (2010).

We merge the financial and failure data with the cultural values and other country characteristics. The regressions exclude the first year of observations because of the use of lagged values for some of the exogenous variables. This leaves us with a final sample of 15,693 bank-year observations for 1,541 banks from 92 countries over the entire time period of 2000 to 2014.

Controls

The main regression results are run using a broad set of country and bank controls shown by prior research to affect bank failure. Each control is lagged one year in the regressions to mitigate potential endogeneity problems, except when noted otherwise.[24]

[23] http://geert-hofstede.com/

[24] In Appendix C, we also try three-year lags and find consistent results.

Following prior research on bank failures in an international context, we control for several country characteristics. First, we control for indicators of economic growth and development, given that prior research finds these to be associated with more bank failures (e.g., Brown and Dinc, 2005, 2011). *GDP_GROWTH* is the rate of growth in the country's real gross domestic product (GDP). *RESERVE* is the country total foreign exchange reserves (less gold). *GDP_CAPITA* is the logarithm of the country real gross domestic product (GDP). *INFLA* is the rate of inflation.

Second, we control for explicit deposit insurance scheme in the country (*NODEPINSUR*) using a dummy equal to one if there is no explicit deposit insurance scheme and depositors were not fully compensated the last time a bank failed. A value equal to one indicates more deposit insurance supervision. Some research suggests that greater deposit insurance protection is associated with a higher risk of banking collapse (e.g., Gorton and Rosen,1995; Wheelock and Wilson, 1995, 2000; Barth, Caprio, and Levine, 2006).[25] However, it is also possible that deposit insurance may reduce bank failure by reducing depositor runs (e.g., Diamond and Dybvig, 1983; Fungacova and Weill, 2013).

Third, we control for several country institutional factors. Rule of law (*RULE_OF_LAW*) is an indicator of the effectiveness of regulatory enforcement (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny,1998). It captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Regulatory quality (*REGULATORY*) captures perceptions

[25] Peria and Schmukler (2001) find that the presence of deposit insurance does not reduce depositor discipline (as manifested by deposit withdrawals and requesting better rates) for a set of countries in South America.

of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Voice and accountability (*VOICE_ACCOUNT*) captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. Generally, a country that has stronger rule of law, stronger regulatory quality, and stronger voice and accountability is more stable, favoring less bank failures.

Finally, we control for the presence of multiple supervisors (*M_SUPER*), a dummy equal to one if multiple supervisors share responsibility for supervising the nation's banks. This variable captures the potential differences in quality of oversight and leniency when having multiple supervisors instead of one.

Next, we include a number of bank controls, most of which are standard in the bank failure literature. We first include bank size (*LN_ASSET*) the natural logarithm of bank total assets.[26] Bank size is expected to have a negative effect on the probability of bank failure because larger banks may have a greater capacity to absorb risk and have more stable earnings (e.g., De Haan and Poghosyan, 2012). Second, we control for bank capital ratio (*CAPITAL_ASSET*), defined as the bank's total equity divided by total assets. Capital is a valuable tool to assess the safety and soundness of banking organizations, and is used here as a measure of bank risk-taking. Third, we control for the nonperforming loans ratio (*NPL*), defined as the ratio of total nonperforming loans to total loans. Banks with riskier portfolios are more likely to fail (e.g., Ng and Rusticus, 2011). Fourth, we control for bank profitability, proxied by return on equity (*ROE*), calculated as bank net income divided by

[26] Results are robust to the alternative definition of bank size calculated as bank total assets normalized by the country total gross domestic product (GDP).

total equity.[27] Banks with lower profits may be more likely to fail (e.g., Arena, 2008). Fifth, we control for the loan to asset ratio (*LOAN_ASSET*), which may be associated with higher credit and liquidity risk (e.g., Beltratti and Stulz, 2012). Sixth, we capture the composition of the bank liabilities, by controlling for deposit to asset ratio (*DEP_ASSET*). Deposit financing is generally less subject to runs than money market funding (e.g., Gorton, 2010; Beltratti and Stulz, 2012). Seventh, we control for government ownership (*GOWN*), a dummy equal to one if a bank has 50% or more government ownership. Government-owned banks may be less likely to fail as governments are more likely to intervene and safeguard them in case of financial distress, and also these banks may receive greater confidence from their depositors (e.g., Fungacova and Weill, 2013). Brown and Dinc (2011) find that no government-owned bank ever lost its banking license.[28] Eighth, we control for foreign ownership (*FOWN*), a dummy equal to one if a bank has 50% or more foreign ownership. In developing countries, foreign banks tend to be associated with increased stability, in part because they reduce problems of related lending and may benefit from financial support from their foreign parents in case of distress (e.g., Giannetti and Ongena, 2009), but foreign banks are sometimes found to perform worse than domestic banks in developed countries (e.g., Berger, DeYoung, Genay, and Udell, 2000). Ninth, we control for the bank public listing status (*PUB_LISTED*), a dummy equal to 1 if a bank is listed on a stock exchange. Publicly listed banks are subject to increased monitoring by shareholders and improved access to capital, which may affect their performance positively (e.g., Berger and Bouwman, 2013).

[27] In untabulated results, we also try using return on assets defined as bank net income divided by total assets and results are consistent.

[28] Boubakri, Cosset, and Saffar (2013) find that government ownership also induces lower risk-taking for nonfinancials.

2.6 EMPIRICAL ANALYSIS

Summary Statistics

Table 2.1 Panel A shows definitions and Panel B shows summary statistics for all variables used in our analysis. For our key dependent variable, the average bank has a failure likelihood (*FAILURE*) of 3%. For the key independent variables, the average value of individualism (*IDV*) is 40.833, masculinity (*MAS*) is 49.371, power distance (*PDI*) is 62.493, and uncertainty avoidance (*UAI*) is 66.864, all on scales from 0 to 100, very close to the means reported in Hofstede (2001), suggesting that our sample represents well the overall population of countries.[29]

Turning to the country and bank controls. We find that the average value of GDP growth is 3.766%, inflation rate is 5.757%, log of total exchange reserves is 23.255, log of GDP per capita is 8.770, *RULE_OF_LAW* is 0.661, regulatory quality index *REGULATORY* is 0.736, and voice and accountability index *VOICE_ACCOUNT* is 0.760. We also note that 33.9% of the observations do not have an explicit deposit insurance scheme, and 10.5% have multiple bank supervisors.

The average bank in our sample has log of total assets of 7.893 (mean total assets of $32,479 million), capital ratio of 10.53%, *NPL* of 2.138%, *ROE* of 10.481%, loan ratio (*LOAN_ASSET*) of 50.73% and deposit ratio (*DEP_ASSET*) of 77.683%. These suggest that the average bank tends to be large, well-capitalized, and does not present any significant problems, although these averages may mask important differences across

[29] In Hofstede (2001), the means of the four culture dimensions are 43 for individualism, 49 for masculinity, 57 for power distance, and 65 for uncertainty avoidance.

banks and over time. We also find that 7.8% of the banks are government owned (*GOWN*), 37.8% are foreign owned (*FOWN*), and 31.4% are publicly listed (*PUB_LISTED*). Table 2.1 Panel B also provides summary statistics for additional controls used later in robustness tests.

Main Regression Results

Table 2.2 columns (1)-(5) report regressions of the failure variable on the four culture dimensions (*IDV*, *MAS*, *PDI*, and *UAI*), country level controls, bank level controls, and year fixed effects. In (1)-(4), we alternate the four culture variables, and include all four in (5). To mitigate potential endogeneity concerns, all controls are lagged one year to avoid potential endogeneity concerns (e.g., Duchin, Ozbas, and Sensoy, 2010).

Across specifications, we consistently find that individualism and masculinity are positively and statistically significantly associated with a higher likelihood of bank failure. Results are also economically significant. Based on the full specification in column (5), we find that a one standard deviation increase in individualism (*IDV*) produces, on average, a 46.82% increase in the probability of bank failure. Similarly, we find that a one standard deviation increase in masculinity (*MAS*) produces, on average, a 20.12% increase in the probability of bank failure. These results confirm the statistical and economical empirical dominance of hypothesis *H1a* over *H1b*, and the empirical dominance of *H2a* over *H2b*. The relatively greater effect of individualism on bank failure relative to masculinity is consistent with Markus and Kitayama (1991). The effects of power distance (*PDI*) and uncertainty avoidance (*UAI*) provide no consistent results for *hypotheses 3* and *4*, respectively.

Turning to the country controls with statistically significant results, inflation

(*INFLA*), total foreign exchange reserves (*RESERVE*), and voice and accountability (*VOICE_ACCOUNT*) are all negatively associated with bank failure. We also find that the GDP per capita (*GDP_CAPITA*) is positively associated with bank failure, consistent with Brown and Dinc's (2005) findings. Finally, no explicit deposit insurance (*NODEPINSUR*) is also positively associated with bank failure. This suggests that implementation of deposit insurance schemes can reduce the occurrence of bank failures in a country.

Turning next to statistically significant bank controls, both size (*LN_ASSET*) and capital ratio (*CAPITAL_ASSET*) are negatively associated with bank failure, consistent with virtually all prior bank failure studies. The nonperforming loans ratio (*NPL*) is positively associated with bank failure, and suggests that a higher loan portfolio risk leads to higher likelihood of bank failure. Both loan to assets (*LOAN_ASSET*) and deposits to assets (*DEPOSIT_ASSET*) ratios are negatively associated with bank failure, consistent with Beltratti and Stulz (2012). Finally, bank public listing status (*PUB_LISTED*) is negatively associated with bank failure, consistent with Berger and Bouwman (2013).

2.7 ROBUSTNESS TESTS

We present a number of robustness tests that include the same controls as in our main specifications, except when noted otherwise.

Instrumental Variable Analysis

Our main analysis could suffer from potential endogeneity. One source of this may be reverse causality, which in our setting corresponds to the possibility that bank failures may influence the cultural variables. However, we argue that such concern is unlikely, because culture is established over the order of centuries or millennia, and changes very slowly over

time (Williamson, 2000; Hofstede, 2001; Licht, Goldschmidt, and Schwartz, 2005). Another source may be potential omitted variables that affect bank failure and are correlated with national culture. We tackle this concern in several ways. In our main analysis, we control for a broad set of determinants of bank failures and lag these determinants. In later sections below, we saturate our model with even more controls and try even longer lag structures.

Here, we employ instrumental variables (IV). We apply an IV Probit 2SLS approach, which involves using instruments for our cultural measures to isolate the exogenous component of each cultural dimension, and then examine its relationship with bank failure.[30] To find instruments for our four cultural dimensions, we follow prior research on culture and finance (e.g., Guiso, Sapienza, and Zingales, 2009; Gorodnichenko and Roland, 2011; Zheng, El Ghoul, Guedhami, and Kwok, 2013; El Ghoul and Zheng, 2016). Our instrument for individualism (*IDV*) is *DISEASES*. This is the Murray and Schaller's (2010) overall index of the historical prevalence of nine diseases (i.e., constructed with data before the epidemiological revolution in treating pathogenic disease) within different geopolitical regions. Fincher, Thornhill, Murray, and Schaller (2008) argue that individualism is more likely to have emerged in societies that historically suffered a lower prevalence of pathogens, given that more individualistic societies are less wary of contact with outgroup members (strangers), and are more likely to try unusual foods. Thus, we expect a negative relation between prevalence of diseases and individualism.

Our instruments for masculinity (MAS) are demography and gender inequality. The demographic instrument builds on the argument that high masculinity is more prevalent in

[30] In unreported results, we also try a linear probability model using the same instruments, and results are similar.

countries with large populations, while low masculinity societies consider that "small is beautiful" (Hofstede, 2001). The rationale for the second instrument is that more gender inequality is more prevalent in high masculinity societies, where the division of gender roles in the society is very important. We therefore employ the measures of *POPULATION_90* (population of each country as of 1990) and *GENDER_INEQUALITY_90* (index of gender inequality in the 1990s) as instruments for masculinity. We expect a positive relation between population and masculinity, and also a positive relation between gender inequality and masculinity.

Our instrument for power distance (*PDI*) is *PRONOUN_POLITENESS*, which is a country's language that uses more than one 2nd person pronoun (you) to index social distance in interactions with other peoples from Davis and Abdurazokzoda's (2016).[31] According to Kashima and Kashima (1998, 2005), speakers of languages with multiple "yous" are more conscious of status or social distances than the speakers of other languages. Thus, the politeness distinction in personal pronouns bears implications for cultural norms associated with hierarchy and the degree of inequality in power. Therefore, we expect a positive relation between pronoun politeness distinction and power distance.

Finally, our instrument for uncertainty avoidance (*UAI*) is religion, given that a country's religious composition is viewed as an antecedent of cultural values (e.g., Stulz and Williamson, 2003; Siegel, Licht, and Schwartz, 2011). We use several dominant religion indicators circa 1900 from the World Christian Encyclopedia (Barrett, Kurian, and Johnson, 2001; Guiso, Sapienza, and Zingales,

[31] For example, English has only one 2nd person singular pronoun (i.e., "you") regardless of the social distance between speakers. French, however, has two 2nd person singular pronouns, "tu" (informal) and "vous" (formal). "Tu" is usually used with the same- or lower status people, while "vous" is used with higher-status people.

2003): *%PROTESTANT, %CATHOLIC, %ORTHODOX*, and *%OTHER_RELIGION* (the excluded category), which measure the percentage of a country's population that adheres to each of these religions. Hofstede (2001) reports that Roman Catholic and Orthodox countries tend to score higher on uncertainty avoidance, while Protestant countries tend to be more accepting of uncertainty (Hofstede, 2001).[32] One rationale is that Catholic and Orthodox religions are viewed as more "absolute" and certain religions, and thus its followers search more certainty in life, while Protestantism tends to be less "absolute" (Samovar, Porter, McDaniel, Sexton Roy, 2015).

The IV regression results are reported in Table 2.3. To facilitate comparison, we include the OLS results from column (5) of Table 2.2 in Column (1). Columns (2)-(5) present the IV first stage results for the culture dimensions and suggest that all instruments are significantly correlated with our culture dimensions at the 1% level with the predicted sign: prevalence of diseases is negatively associated with individualism, population and gender inequality are positively associated with masculinity, pronoun politeness is positively associated with power distance, and Catholicism and Orthodoxy are positively associated with uncertainty avoidance, while Protestantism is negatively associated with uncertainty avoidance.

Column (6) presents the IV second stage results, which again show after controlling for various country and bank characteristics and time fixed effects, and addressing endogeneity using instrumental variables analysis, we continue to find that that individualism (*IDV*) and masculinity (*MAS*) are positively and statistically and economically significantly associated with bank failure, consistent with our main results.

[32] Other religions, such as Judaic and Muslim tend to score in the middle on uncertainty avoidance.

We perform two tests to assess the suitability of the selected instruments. We conduct the Anderson-Rubin (AR) *F*-test and also the *Wald* test of the excluded exogenous variables in the first-stage regression, in which the null hypothesis is that the coefficient estimates of these variables are jointly equal to zero. We reject this null hypothesis at the 1% level. The value of each of these tests and *p*-value of the *F*-tests is reported in the last rows of Table 2.3. Finally, we test for overidentified restrictions, where the joint null hypothesis is that the instruments and the error term are uncorrelated. We find that the Hansen *J*-statistic in our model is statistically insignificant, which suggests that our instruments are not correlated with the error variables. Our instruments, therefore, appear to be both relevant and valid. Overall, the substantial time interval between the measurement of national culture and the measurement of bank-level failure, together with the instrumental variables analysis, help us rule out alternative causal interpretations of our main findings.

Alternative Econometric Specifications

In Table 2.4, we employ several alternative econometric models to evaluate robustness. We use a probit model in column (1), a linear probability model in column (2),[33] a proportional hazard model (e.g., Whalen, 1991; Shumway, 2001; Brown and Dinc, 2011) in column (3), and a maximum likelihood complementary log-log model in column (4). Finally, we run a weighted logit model where the weights are proportional to the number of banks in the country in column (5). Across all regressions in Table 2.4, we find that individualism and masculinity are significant at the 1% level, consistent with our baseline results.[34]

[33] In unreported results, we also tried a linear probability model IV 2SLS, and results are consistent.

[34] Results are also consistent when employing models that cluster the errors at the bank and country levels.

Other Potentially Omitted Variables

In Table 2.5, we saturate the model with additional controls. In columns (1)-(3) we include asset growth (*ASSET_GROWTH*), liquidity ratio (*LIQUID_ASSET*), and overhead costs ratio (*OVERHEAD_A*) as rapid asset growth, high liquidity, and high overhead costs (proxy for management inefficiency) may favor a higher likelihood of bank failure. In column (4), we include too-big-to-fail (*TBTF*), a dummy equal to one if the bank is ranked in the top three in the country based on total assets to control for TBTF effect, which prior research has shown to reduce the likelihood of bank failure (e.g., Brown and Dinc, 2011; Liu and Ngo, 2014).[35] In columns (5)-(6), we control for linear and non-linear effects of local market competition (*MKTSH_DEP* and *MKTSH_DEP_SQ*) on bank failure (e.g., Berger and Imbierowicz and Rauch, 2016). In column (7), we control for the too-many-to-fail (*TMTF*) effect (e.g., Brown and Dinc, 2011) by including *CAP_OTHER* (average capital ratio of other banks in the country).

Across all specifications in Table 2.5, both individualism and masculinity remain statistically significant at the 1% level, consistent with our main results.

Different Proxies for Failure and Culture

In Table 2.6, we use other proxies for failure and culture as robustness checks. Panel A columns (1)-(5) reports results when considering an alternative measure for failure, which includes also regular non-government-assisted bank acquisitions in addition to the other failures in our main proxy. Results are qualitatively similar to our main findings.

Panel B reports results when using other national culture proxies for individualism and

[35] In unreported results, we also tried controlling for TBTF using alterative definitions: when defining *TBTF* as a dummy variable that takes 1 if the bank is ranked in the top three in the country based on total loans and respectively when defining *TBTF* as a dummy variable that takes 1 if the bank is ranked in the top three in the country based on total deposits. Results are robust to these alternative definitions.

masculinity. In columns (1)-(3), we consider Tang and Koveos (2008) culture dimensions, which are based on changes in economic conditions (country GDP per capita), but available for a smaller number of countries. (*IDV_TK* and *MAS_TK*). In the first two columns, we include these two culture measures separately, while in column (3), we include both of them. We find that both individualism and masculinity are still significant at the 1% level. In column (4), we use Schwartz (1994)'s measure of conservatism (*EMBEDDED*), which consists of values important to societies based on close-knit harmonious relations, which is inverse to the individualism dimension in our main regressions. We find a negative and significant effect, consistent with our main results. In column (5), we include House, Hanges, Javidan, Dorfman, and Gupta (2004)'s cultural dimension *CLT_GLOBE* to capture Hofstede's collectivism (opposite of individualism) dimension. This measure is based on the Globe (Global Leadership and Organizational Behavior Effectiveness) project, a replication and elaboration of the Hofstede study using newer data and more survey questions, but comprising a much smaller number of countries. Our results continue to hold when using all these alternative cultural measures, even when the number of observations dropped by almost one third due to data limitations.

Subsample Analysis

Table 2.7 shows several subsample analyses. We exclude several potential outliers to ensure that this are not responsible for our results. We exclude the U.S. in column (1), exclude the G-10 countries in column (2)[36], and exclude countries that have less than three or less than five banks in the sample in columns (3) and (4)[37]. In column (5), we include

[36] G-10 countries include France, Germany, Belgium, Italy, Japan, the Netherlands, Sweden, the United Kingdom, the United States, Canada, and Switzerland.

[37] In unreported results, we also tried excluding countries which have less than four banks in the sample and results are consistent.

only the 40 countries in the Hofstede's original list. In column (6), we exclude the global financial crisis (2007-2009). Across all columns (1)-(6), we find that both individualism and masculinity are positively associated with bank failures.

Channels Analysis

We further investigate the channel(s) through which individualism and masculinity may affect bank failure. Specifically, we examine the extent to which these effects may occur via affecting banks' portfolio risk, capitalization, liquidity profile, and the willingness of country government to provide bailout support. As such, we will regress proxies for bank risk, capital, liquidity, government bailout probability on our cultural values to assess if these may help explain our results.

First, in Table 2.8 Panel A, we examine effects of the national culture on bank portfolio risk using several proxies. In column (1), we use bank *Z_SCORE* (e.g., Laeven and Levine, 2009; Houston, Lin, Lin, and Ma, 2010; Demirgüç-Kunt and Huizinga, 2010; Beltratti and Stulz, 2012). This is an inverse measure of bank risk calculated as the sum of a bank's mean ROA (net income over total assets) and mean capitalization (equity capital over total assets) divided by the standard deviation of ROA, calculated over a 5-year period.[38] In column (2), we use *LN(Z_SCORE)*, the natural log of *Z-SCORE,* a specification which helps mitigate the impact of outliers. In column (3), we use *SHARPE RATIO* over a 5-year period, calculated as the ratio of mean ROE (net income over equity) over the standard deviation of return on equity. In columns (4)-(5), we use two proxies for the volatility of ROA over a 5-year period: *STD ROA*, where ROA is net income over total assets, and *STD ROA2*, where ROA is pre-tax income over total assets. In columns (6)-(7),

[38] The Z-score variable employed here is based on Merton (1974)'s model where shareholders' equity is a call option on assets and has been used widely in the banking literature.

we use two proxies for the volatility of ROE over a 5-year period: *STD ROE*, where ROE is net income over total equity, and *STD ROE2*, where ROE is pre-tax income over total equity. We find consistent evidence that individualism is positively significantly associated with bank portfolio risk measured in many different ways. Thus, the channel through which individualism appears to increase the probability of bank failure is increased bank risk taking. Bank managers in individualistic societies may take more risks to increase returns that may ultimately result in more bank failures. In contrast, masculinity is either negatively or not significantly associated with bank portfolio risk, suggesting a different channel for the effects of masculinity on bank failure.

Second, in Table 2.8 Panel B, we examine effects of individualism and masculinity on bank capitalization, liquidity, activities restrictions, and government bailout support. We proxy for capitalization using two different measures shown in columns (1)-(2): *CAPITAL_ASSET*, the ratio of equity capital over total assets, and *TANGIBLE CAPITAL_ASSET*, the ratio of tangible capital over total assets. We proxy for liquidity using *LIQUID_ASSET*, the ratio of bank liquid assets to total assets, shown in column (3). The results on capital and liquidity indicate that in more masculine countries, banks have lower capital and fewer liquid assets which may reflect in part government tolerance for banks operating with lower tangible capital and liquidity.

Finally, in column (4), we proxy for bank activities' restrictions using *ACT_RESTRICT* (an index of regulatory restrictions on the activities of banks measuring extent to which a bank can both engage in securities, insurance, and real estate activities, and can own and control nonfinancial firms), More stringent activity restrictions could induce banks to make more prudent risk decisions that could result in less bank failures.

This test uses country-level regression and we control for all other country characteristics from our main specification and year fixed effects. We find that individualism is associated with less bank activities restrictions, which allow banks to take higher risks in non-traditional activities. In contrast, masculinity is associated with more activity restrictions, suggesting again that banks in these countries do not generally fail due to higher portfolio risk.

Finally, in columns (5)-(6), we test the effects of individualism and masculinity on government bailout probability. Our government bailout support measure (*BAILOUT_PROBABILITY*) is constructed using the support ratings provided by the rating agency Fitch, which reflect the rating agency's expectations of the likelihood of external support to individual banks. The mapping of the ratings into bailout probabilities between 0 and 1, follows the methodology in Table 1 of Gropp, Hakenes, and Schnabel (2011). We report estimates from an ordered logit model in column (6) and an ordered probit model in column (7). Individualism does not appear to have consistent effects across the two specifications, but masculinity is negatively significantly associated with the probability of government bailout in both specifications. This is consistent with the argument that more masculine societies less often bail out their troubled banks, which may help explain the higher bank failure in these countries.

Taken together, these results suggest very different channels through which individualism and masculinity increase the probability of bank failure. In masculine societies, government authorities allow banks to fail, while in individualistic societies it is the banks themselves that put themselves in the position to fail by taking on too much risk.

Other Robustness Tests

In an additional untabulated analysis, we conduct several additional robustness tests. We use three-year lags of our independent variables instead of one-year lags in our main specifications.[39] We use models excluding the countries with highest *IDV*, *MAS*, *PDI*, *UAI* index, or the highest index on all four cultural dimensions, and excluding the countries with the lowest index of *IDV*, *MAS*, *PDI*, *UAI*, or the lowest index on all four cultural dimensions. We use models including additional controls, *LTO* (long-term orientation) and *IND* (indulgence). The *LTO* (long-term orientation) dimension was measured only more recently by Hofstede to distinguish better between life orientations in Eastern and Western cultures. High *LTO* societies are more oriented towards the future. Managers in high *LTO* societies may be more willing to compromise and adapt, and may compromise the present for the future in order to gain long-term benefits. Thus, we may see more bank failures in high *LTO* countries. The *IND* (indulgence) dimension was also measured only more recently by Hofstede. High *IND* societies allow relatively free gratification of basic and natural human drives related to enjoying life and having fun. Thus, high *IND* countries may favor more risk taking in management actions, which can lead to more bank failures. We also saturate the model with three additional regulatory variables from Barth, Caprio, and Levine (2013) dataset: *ACT_RESTRICT* (an index of regulatory restrictions on the activities of banks measuring extent to which a bank can both engage in securities, insurance, and real estate activities, and can own and control nonfinancial firms), *OVERALL_RESTRICT* (an index of the overall restrictions on financial conglomerates), and *PRIVATEMONITORING* (an index of monitoring on the part of the private sector). Our main results remain unaltered.

[39] We also conducted tests using two-year lags instead of one- or three-year lags, and results are robust to this alternative specification.

2.8 CONCLUSION

We address two substantive and related omissions in the bank failure literature. First, prior research has typically focused on a single developed nation or a limited group of emerging nations. Second, prior research has not examined the roles of national culture. This paper analyzes bank-level failures in a large number of developed and developing countries and investigates for the first time the influences of national culture. We also investigate the channels through which the various dimensions of culture influence the probability of bank failure and find plausible results. The results add to the research knowledge about the causes of bank failure and may assist in the formulation of prudential best practices.

Using a unique dataset of international bank failures – covering 92 countries over 2000-2014 – and considering Hofstede's (2001) national culture dimensions as potential failure determinants, we have several important results: 1) Individualism – which stresses independence, personal achievement, and has been linked with overconfidence and overoptimism – increases the probability of bank failure, and the channel for this effect appears to be high bank portfolio risk. 2) Masculinity – which stresses competitiveness and achievements, material success, little sympathy for the weak, and an orientation toward acquisition and overinvestment – also increases the probability of bank failure, and the channel through which this appears to occur is that government authorities in masculine nations allow banks to operate with less capital and liquidity and less often bail out weak institutions. 3) Other national culture dimensions, power distance and uncertainty avoidance, do not have consistent effects on the likelihood of bank failure.

Our results are robust to a baterry of tests including controlling for a broad set of

both country and bank determinants, accounting for endogeneity, considering alternative econometric techniques, and using alternative bank failure and culture measures.

From a policy standpoint, the results of this study suggest that one-size-fits-all prudential policies, regulation, and supervision may not be appropriate, and instead may be most effective if tailored to individual countries' cultures. Prudential policies, regulation, and supervision might be most effective if tailored to individual countries' cultures. For more individualist countries, managerial risk taking might be curbed through prudential actions such as tighter supervision, increased transparency of bank conditions, and/or bail-in mechanisms to induce more capital market monitoring. For more masculine nations, the findings suggest potential rebalancing of the enforcement of capital and/or liquidity guidelines, or bailout policies. Taking advantage of state-level arrests data from 1994 to 2012, I found that an increase on real minimum wage level can significantly reduce adult arrest rates but not for youth. This paper provides a newer and clearer evidence of one aspect of the effects of minimum wage policy. This effect is robust using different specification and data. Increasing the real minimum wage level by dollar leads to a 2.78% reduction on total arrest rate relative to 2012 level. Furthermore, due to the cyclical pattern of real minimum wage, the effect on crime rates also follows a cyclical trend. When nominal minimum wage increase, as well as real minimum wage, the crime rate would decrease. In following years, as inflation reducing the real minimum wage level, the crime rate should climb back. This effect is not negligible, thus, policy-makers should recognize this unintended side effect of minimum wage policy and take this effect into account.

Table 2.1: Variable Definitions and Summary Statistics

Panel A: Variable Definitions

Variable Type	Source	Variable	Definition
Key Dependent Variable			
Failure Variable	Bankscope (2016) Historical Information and Financials, Zefyr M&A Deals, LexisNexis	*FAILURE*	A dummy equal to one in the time period that a bank fails (failures include actual bank closures, license revocations, insolvencies (bank capitalization falls to 2% or below), liquidations, bankruptcies, receiverships, government takeovers, and government-assisted acquisitions).
		FAILURE (INCL. ACQ)	A dummy equal to one in the time period that a bank fails (failures include actual bank closures, license revocations, insolvencies (bank capitalization falls to 2% or below), liquidations, bankruptcies, receiverships, government takeovers, and government-assisted acquisitions) plus all other acquisitions.
Key Independent Variables			
Culture Variables	Hofstede (2001, 2010) & Hofstede Website	*IDV*	Hofstede's culture index of individualism.
		MAS	Hofstede's culture index of masculinity.
		PDI	Hofstede's culture index of power distance.
		UAI	Hofstede's culture index of uncertainty avoidance.
	Tang and Koveos (2008)	*IDV_TK*	Tang and Koveos' updated cultural index of individualism.
		MAS_TK	Tang and Koveos' updated cultural index of masculinity.
	Schwartz (1994)	*EMBEDDED*	Schwartz's culture index on conservatism.
	House, Hanges, Javidan, Dorfman, and Gupta (2004)	*CLT_GLOBE*	GLOBE's in-group collectivism practice value.
Other Main Controls			
Main Country Controls	World Bank Development Indicators, International Financial Statistics (IFS), Barth, Caprio and Levine (2011) Bank Supervisory Dataset, Worldwide Governance Indicators (WGI)	*GDP GROWTH*	Real gross domestic product (GDP) percentage change, winsorized at the 5% level.
		INFLA	Inflation percentage, winsorized at the 5% level.
		RESERVE	Log of foreign exchange reserves of the central bank, winsorized at the 5% level.
		GDP_CAPITA	Log of real gross domestic product (GP) per capita, winsorized at the 5% level.
		NODEPINSUR	A dummy variable that equals one if a country has no explicit deposit insurance scheme, and 0 otherwise.
		RULE_OF_LAW	Rule of law, a measure capturing the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
		REGULATORY	Regulatory quality, a measure capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
		VOICE_ACCOUNT	Voice and accountability, a measure capturing the extent to which a country's citizens are able to participate in selecting their government, freedom of expression, freedom of association, and free media.
		M_SUPER	An indicator equal to 1 if a country has multiple banking supervisors.
Main Bank Controls	Bankscope (2016) Ownership CDs & Website, Claessens and Van Horen (2014, 2015) Foreign Ownership Dataset, LexisNexis News, Other Internet Sources	*LN_ASSET*	The natural logarithm of bank total assets, winsorized at the 5% level.
		CAPITAL_ASSET	The ratio of total capital to total assets of each individual bank, winsorized at the 5% level.
		NPL	The ratio of bank nonperforming loan to total assets, winsorized at the 5% level.
		ROE	Return on equity, winsorized at the 5% level.
		LOAN_ASSET	The ratio of total loans to total assets of each individual bank, winsorized at the 5% level.
		DEP_ASSET	The ratio of total deposits to total assets of each individual bank, winsorized at the 5% level.
		GOV_OWN	An indicator equal to 1 if a bank has foreign ownership of 50% or more in a particular year.
		FOREIGN_OWN	An indicator equal to 1 if a bank has foreign ownership of 50% or more in a particular year.
		PUB_LISTED	A dummy variable equal to 1 if an individual bank is a publicly listed in a particular year.
Other Controls for Additional Analyses			
Instrumental Variables	Spolaore and Wacziarg	*DISEASES*	An overall index of the historical prevalence of nine diseases within different geopolitical regions worldwide: leishmanias, schistosomes,

	(2009), Murray and Schaller (2010), La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1999), World Bank and International Monetary Fund (IMF) Indicators		trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis. Scheme employed: 0 = completely absent or never reported, 1 = rarely reported, 2 = sporadically or moderately reported, 3 = present at severe levels or epidemic levels at least once. All nine disease prevalence ratings were standardized by conversion to z-scores. Overall index is the mean of z-scores for nine diseases. Mean is approximately 0; positive scores show prevalence > mean, and negative scores indicate prevalence < mean.
		POPULATION_90	The natural logarithm of a country's population measured in 1990.
		GENDER_INEQUALITY_90	The index of gender inequality from IMF, averaged over the 1990s.
		PRONOUN POLITENESS	An index of 2nd pronoun politeness distinctions in personal pronouns in a country's language.
		%PROTESTANT	Percent of people in a country whose religion is Protestant in 1900.
		%CATHOLIC	Percent of people in a country whose religion is Roman Catholic in 1900.
		%ORTHODOX	Percent of people in a country whose religion is Orthodox in 1900.
		%OTHER_RELIGION	Percent of people in a country whose religion not Protestant, Roman Catholic, or Orthodox in 1900.
Other Controls Used in Additional Analyses	Bankscope (2016) Financials	*ASSET_GROWTH*	The rate of asset growth of each individual bank.
		LIQUID ASSETS/TA	The ratio of liquid assets to total assets ratio of each individual bank, winsorized at the 5% level.
		OVERHEAD_A	The ratio of overhead expenses to total assets.
		TBTF	A dummy variable that takes 1 if the bank is ranked in the top three in the country based on total assets.
		MKTSH_DEP	A proxy for bank competition calculated as the market share of the bank in the country based on total deposits.
		MKTSH_DEP_SQ	A proxy for bank competition calculated as the market share squared of the bank in the country based on total deposits.
		CAP_OTHER	Average capital ratio of other banks in the country.
		BAILOUT_PROBABILITY	A proxy for bank bailout probability based on the Fitch rating of external support.
		IFRS	A dummy variable that is equal to 1 if the country accounting standard is International Financial Reporting Standard (*IFRS*).
		IAS	A dummy variable that is equal to 1 if the country accounting standard is International Accounting Standard (IAS).
		GAAP	A dummy variable that is equal to 1 if countries' accounting standard is Local GAAP.
		Z_SCORE	Bank's ROA plus the capital asset ratio divided by the stdv of ROA over a five years' period, winsorized at the 5% level.
		LN(Z_SCORE)	The natural logarithm of bank *Z_SCORE* over a five years' period, winsorized at the 5% level.
		SHARPE RATIO	Bank's ROE divided by the stdv of ROE over a five years' period, winsorized at the 5% level.
		STD ROA	Standard deviation of return on assets (net income over total assets) over a five years' period, winsorized at the 5% level.
		STD ROE	Standard deviation of return on equity (net income over total equity) over a five years' period, winsorized at the 5% level.
	World Bank Development Indicators, Worldwide Governance Indicators (WGI), United National (UN) Development Programme, Hofstede (2001, 2010) & Hofstede Website, Barth, Caprio and Levine (2011) Bank Supervisory Dataset	*CURRENT_ACCOUNT*	The natural logarithm of each country's current account balance, winsorized at the 5% level.
		DOMESTIC_CREDIT	The rate of growth of real domestic credit, winsorized at the 5% level.
		GOV_EFF	Government effectiveness, capturing perceptions of the quality of public services and the degree of its independence from political pressures, the quality of policy formulation and implementation, and government credibility.
		POLITICAL	Political stability, capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
		CORRUPTION	Control of corruption, capturing the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
		LTO	Hofstede's culture index of long-term orientation.
		IND	Hofstede's culture index of indulgence.
		ACT_RESTRICT	An index of regulatory restrictions on the activities of banks measuring extent to which a bank can both engage in securities, insurance, and real estate activities, and can own and control nonfinancial firms.
		OVERALL_RESTRICT	An index of overall restrictions on financial conglomerates.
		PRIVATEMONITORING	An index of monitoring on the part of the private sector.

Panel B: Summary Statistics

Variable Type	Variable	mean	p50	sd	p25	p75
Failure Variables	*FAILURE*	0.030	0.000	0.170	0.000	0.000
	FAILURE (INCL. ACQ)	0.046	0.000	0.209	0.000	0.000
Culture Variables	*IDV*	40.833	33.000	23.408	20.000	60.000
	MAS	49.371	50.000	18.291	40.000	63.000
	PDI	62.493	67.000	21.171	46.000	78.000
	UAI	66.864	70.000	21.319	50.000	86.000
	IDV_TK	49.932	48.000	28.956	22.000	81.000
	MAS_TK	50.047	47.000	12.756	44.000	57.000
	EMBEDDED	3.686	3.670	0.384	3.430	3.920
	CLT_GLOBE	5.129	5.410	0.687	4.660	5.590
Main Country Controls	*GDP_GROWTH*	3.766	3.797	2.895	1.797	5.661
	INFLA	5.757	3.902	5.738	1.889	7.749
	RESERVE	23.255	23.363	1.664	22.040	24.359
	GDP_CAPITA	8.770	8.762	1.452	7.655	10.124
	NODEPINSUR	0.339	0.000	0.473	0.000	1.000
	RULE_OF_LAW	0.661	0.670	0.230	0.500	0.830
	REGULATORY	0.736	0.730	0.202	0.590	0.910
	VOICE_ACCOUNT	0.760	0.830	0.212	0.630	0.920
	M_SUPER	0.105	0.000	0.307	0.000	0.000
	ASSET	32479.080	2419.597	1334517.000	593.621	12500.630
	CAPITAL_ASSET	10.530	8.653	7.381	5.879	12.356
	NPL	2.138	0.674	3.183	0.000	2.837
	ROE	10.481	10.606	11.156	4.274	17.266
	LOAN_ASSET	50.730	53.495	19.509	37.500	65.785
	DEP_ASSET	77.683	81.659	13.141	72.712	86.983
	GOV_OWN	0.078	0.000	0.269	0.000	0.000
	FOREIGN_OWN	0.378	0.000	0.485	0.000	1.000

Variable Type	Variable	mean	p50	sd	p25	p75
Instrumental Variables	*DISEASES*	-0.035	0.090	0.670	-0.750	0.500
	POPULATION_90	7.296	7.256	0.698	6.756	7.759
	GENDER_INEQUALITY_90	0.399	0.413	0.194	0.232	0.561
	PRONOUN_POLITENESS	2.009	2.000	0.821	1.000	2.000
	%PROTESTANT	0.120	0.047	0.179	0.009	0.147
	%CATHOLIC	0.398	0.271	0.359	0.029	0.800
	%ORTHODOX	0.069	0.006	0.206	0.000	0.013
	%OTHER_RELIGION	0.413	0.276	0.348	0.106	0.728
Other Controls Used in Additional Analyses	*ASSET_GROWTH*	0.031	0.011	0.310	0.000	0.032
	LIQUID_ASSET	25.452	20.996	17.111	12.093	35.385
	OVERHEAD_A	3.358	2.628	2.471	1.518	4.563
	TBTF	0.228	0.000	0.420	0.000	0.000
	MKTSH_DEP	0.080	0.025	0.139	0.007	0.086
	MKTSH_DEP_SQ	0.026	0.001	0.098	0.000	0.007
	CAP_OTHER	6.590	10.464	42.613	7.725	13.692
	BAILOUT_PROBABILITY	0.350	0.000	0.450	0.000	1.000
	IFRS	0.281	0.000	0.450	0.000	1.000
	IAS	0.044	0.000	0.205	0.000	0.000
	GAAP	0.675	1.000	0.468	0.000	1.000
	Z_SCORE	31.468	23.900	26.020	12.868	42.415
	LN(Z_SCORE)	3.139	3.215	0.889	2.629	3.771
	SHARPE RATIO	3.299	2.537	3.073	1.090	4.713
	STD ROA	0.758	0.413	0.924	0.213	0.863
	STD ROE	8.471	4.614	10.891	2.539	8.634
	CURRENT_ACCOUNT	-0.520	-1.072	5.780	-4.453	2.835
	DOMESTIC_CREDIT	66.090	48.539	47.535	25.949	98.913
	GOV_EFF	0.665	0.750	0.242	0.500	0.750
	POLITICAL	0.736	0.750	0.107	0.670	0.810
	CORRUPTION	0.491	0.420	0.209	0.330	0.670
	LTO	46.630	47.000	22.96	27.000	63.000
	IND	46.070	45.000	23.300	26.000	65.000
	ACT_RESTRICT	7.150	7.000	2.070	6.000	9.000
	OVERALL_RESTRICT	6.660	7.000	1.780	6.000	8.000
	PRIVATEMONITORING	8.070	8.000	1.430	7.000	9.000

Table 2.2: Effects of National Culture on Bank Failure–Main Results

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure. The dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Column	(1)	(2)	(3)	(4)	(5)
Dependent Variable	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE
Independent Variable					
IDV	0.016***				0.020***
	(3.508)				(4.316)
MAS		0.011***			0.011***
		(3.845)			(4.041)
PDI			0.005		0.011***
			(1.148)		(2.897)
UAI				-0.002	0.002
				(-0.582)	(0.468)
L_GDP_GROWTH	-0.037	-0.043	-0.048*	-0.047*	-0.041
	(-1.287)	(-1.547)	(-1.715)	(-1.684)	(-1.421)
L_INFLA	-0.046***	-0.037**	-0.040***	-0.041***	-0.040***
	(-2.844)	(-2.489)	(-2.656)	(-2.700)	(-2.627)
L_RESERVE	-0.120***	-0.118***	-0.099***	-0.099***	-0.156***
	(-2.998)	(-3.119)	(-2.686)	(-2.659)	(-4.060)
L_GDP_CAPITA	0.271***	0.272***	0.329***	0.314***	0.282***
	(2.932)	(2.971)	(3.545)	(3.387)	(3.163)
L_NODEPINSUR	0.437***	0.533***	0.532***	0.482***	0.548***
	(3.160)	(3.891)	(3.811)	(3.416)	(3.621)
L_RULE_OF_LAW	-1.215***	-0.665*	-0.571	-0.846**	-0.674
	(-2.732)	(-1.659)	(-1.224)	(-2.001)	(-1.358)
L_REGULATORY	-0.319	-0.124	-0.293	-0.275	-0.179
	(-0.653)	(-0.248)	(-0.604)	(-0.567)	(-0.350)
L_VOICE_ACCOUNT	-1.599***	-0.810**	-0.875**	-0.878**	-1.740***
	(-3.225)	(-1.967)	(-2.142)	(-2.139)	(-3.618)
L_M_SUPER	0.229	0.314	0.334	0.318	0.248
	(1.022)	(1.367)	(1.458)	(1.390)	(1.084)
L_LN_ASSET	-0.162***	-0.152***	-0.149***	-0.149***	-0.170***
	(-4.455)	(-4.122)	(-4.032)	(-4.067)	(-4.612)
L_CAPITAL_ASSET	-0.325***	-0.324***	-0.327***	-0.329***	-0.319***
	(-5.238)	(-5.267)	(-5.239)	(-5.235)	(-5.202)
L_NPL	0.135***	0.130***	0.129***	0.129***	0.134***
	(6.972)	(6.771)	(6.824)	(6.732)	(6.891)
L_ROE	0.002	0.003	0.003	0.003	0.002
	(0.332)	(0.511)	(0.535)	(0.472)	(0.331)
L_LOAN_ASSET	-0.013***	-0.013***	-0.014***	-0.014***	-0.012***

	(-4.292)	(-4.249)	(-4.353)	(-4.303)	(-3.975)
L_DEP_ASSET	-0.031***	-0.033***	-0.032***	-0.032***	-0.033***
	(-7.253)	(-7.533)	(-7.390)	(-7.257)	(-7.511)
L_GOWN	0.115	0.156	0.132	0.124	0.175
	(0.548)	(0.748)	(0.643)	(0.597)	(0.838)
L_FOWN	0.023	-0.001	0.006	0.012	0.007
	(0.197)	(-0.010)	(0.051)	(0.098)	(0.061)
L_PUB_LISTED	-0.752***	-0.738***	-0.736***	-0.747***	-0.720***
	(-4.895)	(-4.883)	(-4.839)	(-4.943)	(-4.712)
CONSTANT	4.894***	3.852***	3.289***	4.028***	3.765***
	(4.231)	(3.402)	(2.762)	(3.484)	(3.081)
Year Fixed Effect	YES	YES	YES	YES	YES
Observations	15,693	15,693	15,693	15,693	15,693
Banks	1541	1541	1541	1541	1541
Countries	92	92	92	92	92
Pseudo R2	0.234	0.233	0.230	0.230	0.239

Table 2.3: Instrumental Variable (IV) Analysis

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure using an ivprobit instrumental variable (IV) analysis. The instruments used are *DISEASES* (an overall index of historical prevalence of nine diseases) for *IDV*, *POPULATION_90* (the natural logarithm of a country's population in 1990) and *GENDER_INEQUALITY_90* (the average gender inequality index in the 1990s from IMF) for *MAS*, *PRONOUN POLITENESS* (index of politeness distinctions in personal pronouns in a country's language) for *PDI*, and religion indicators *%PROTESTANT, %CATHOLIC,* and *%ORTHODOX* (the percentage of a country's population in 1900 that is Protestant, Catholic, and Orthodox, where other religions is the excluded category) for *UAI*. The dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Column	(1)	(2)	(3)	(4)	(5)	(6)
Model	**OLS**	**IV First Stage**	**IV First Stage**	**IV First Stage**	**IV First Stage**	**IV Second Stage**
Dependent Variable	FAILURE	IDV	MAS	PDI	UAI	FAILURE
Independent Variables						
IDV	0.020***					0.016***
	(4.316)					(3.055)
MAS	0.011***					0.014**
	(4.041)					(2.565)
PDI	0.011***					0.030***
	(2.897)					(3.274)
UAI	0.002					-0.005
	(0.468)					(-0.901)
DISEASES		-16.249***	-3.057**	5.663***	0.002	
		(-17.581)	(-2.219)	(5.070)	(0.001)	
POPULATION_90		15.349***	10.843***	-1.700	-3.178**	
		(19.585)	(9.949)	(-1.522)	(-2.349)	
GENDER_INEQUALITY_90		-15.500***	11.839**	-1.353	35.016***	
		(-3.659)	(2.280)	(-0.285)	(7.876)	
PRONOUN POLITENESS		-6.342***	-4.486***	1.703***	2.042***	
		(-12.725)	(-6.614)	(3.145)	(3.025)	
%PROTESTANT		-9.357***	-33.595***	-14.763***	-32.102***	
		(-5.936)	(-12.453)	(-5.971)	(-10.970)	
%CATHOLIC		-20.579***	-4.508**	13.243***	26.691***	
		(-15.410)	(-2.300)	(7.975)	(13.086)	
%ORTHODOX		-30.809***	-22.270***	32.436***	45.527***	
		(-20.058)	(-9.276)	(14.712)	(21.265)	
Country Controls	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES

Observations	15,693	14,554	14,554	14,554	14,554	14,554
Banks	1,541	1,401	1,401	1,401	1,401	1,401
Countries	92	81	81	81	81	81
Anderson-Rubin Weak Instrument *F*-test						70.00***
Anderson-Rubin Weak Instrument *p*-value						0.000***
Wald Weak Instrument test						66.72***
Wald Weak Instrument *p*-value						0.000***
Hansen's *J* test						1.980
Hansen's *J p*-value						0.577

Table 2.4: Alternative Econometric Specifications

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure using several alternative econometric specifications: a probit model in column (1), a linear probability model in column (2), a proportional hazard model in column (3), a complementary log-log model in column (4), , and a weighted logit model with the weight proportional to the number of banks in the country in column (5). The dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Column	(1)	(2)	(3)	(4)	(5)
Model	**Probit Model**	**Linear Probability Model**	**Hazard Model**	**Cloglog Model**	**Weighted Logit (Weight: Number Banks)**
Dependent Variable:	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE
Independent Variables:					
IDV	0.009***	0.000**	0.017***	0.020***	0.009***
	(4.285)	(2.429)	(2.630)	(4.493)	(4.288)
MAS	0.006***	0.000***	0.015***	0.009***	0.007***
	(4.481)	(4.569)	(4.410)	(3.631)	(3.737)
PDI	0.005***	0.000***	0.002	0.011***	0.001
	(2.774)	(3.511)	(0.253)	(2.860)	(0.529)
UAI	0.002	0.000	0.006	0.002	-0.001
	(1.045)	(0.311)	(1.614)	(0.523)	(-0.420)
Country-Level Controls	YES	YES	YES	YES	YES
Bank-Level Controls	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Observations	15,693	15,693	15,693	15,693	15,693
Banks	1541	1541	1541	1541	1541
Countries	92	92	92	92	92
Pseudo R2 or R-squared	0.215	0.064			

Table 2.5: Other Potentially Omitted Correlated Variables

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure using several additional bank and country controls. The dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include the previous set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and the previous set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). We also control here for additional bank controls: asset growth (*ASSET_GROWTH*), liquidity ratio (*LIQUID_ASSET*), overhead costs ratio (*OVERHEAD_A*), too-big-to-fail (*TBTF*), market share and market share squared (*MKTSH_DEP* and *MKTSH_DEP_SQ*), *CAP_OTHER* (average capital ratio of other banks in the country). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE
Independent Variables							
IDV	0.022***	0.023***	0.021***	0.021***	0.021***	0.022***	0.020***
	(4.622)	(4.684)	(4.158)	(4.167)	(4.162)	(4.196)	(4.187)
MAS	0.012***	0.011***	0.011***	0.010***	0.010***	0.010***	0.010***
	(4.499)	(3.828)	(3.500)	(3.297)	(3.286)	(3.143)	(3.042)
PDI	0.011***	0.010**	0.010**	0.010**	0.010**	0.009**	0.010**
	(2.649)	(2.233)	(2.133)	(2.062)	(2.072)	(2.065)	(2.074)
UAI	0.002	0.002	0.003	0.003	0.003	0.003	0.002
	(0.529)	(0.437)	(0.855)	(0.812)	(0.810)	(0.768)	(0.689)
L_ASSET_GROWTH	-1.078	-0.861	-0.912	-0.896	-0.893	-0.886	-2.066
	(-0.813)	(-1.202)	(-1.273)	(-1.258)	(-1.257)	(-1.237)	(-1.064)
L_LIQUID ASSETS _TA		-0.016***	-0.017***	-0.017***	-0.017***	-0.017***	-0.016***
		(-3.566)	(-3.827)	(-3.818)	(-3.813)	(-3.800)	(-3.627)
L_OVERHEAD_A			-0.031	-0.028	-0.027	-0.030	-0.038
			(-0.752)	(-0.678)	(-0.667)	(-0.727)	(-0.872)
L_TBTF				-0.403**	-0.305*	-0.495**	-0.468**
				(-2.502)	(-1.663)	(-2.260)	(-2.121)
L_MKTSH_DEP					-0.522	2.239	2.192
					(-0.919)	(1.331)	(1.296)
L_MKTSH_DEP_SQ						-4.305**	-4.237**
						(-2.136)	(-2.107)
L_CAP_OTHER							-0.000
							(-0.005)
Previous Country-Level Controls	YES	YES	YES	YES	YES	YES	YES
Previous Bank-Level Controls	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Observations	14,153	14,109	13,603	13,603	13,603	13,603	13,486

Table 2.6: Alternative Measures for Failure and Culture

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure using alternative failure measure in Panel A, and alternative culture measures in Panel B. In Panel A, the dependent variable is *FAILURE (INCL. ACQ)*, a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%) plus bank acquisitions. In Panel B, the dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). We use Tang and Koveos (2008)' culture measures (*IDV_TK*, *MAS_TK*) in models (1)-(3), Schwartz (1994)'s conservatism (*EMBEDDED*) to capture collectivism in model (4), and Globe measures (*CLT_GLOBE*) for collectivism in model (5). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Panel A: Alternative Measure for Failure

Column	(1)	(2)	(3)	(4)	(5)
Dependent Variable	FAILURE (INCL. ACQ)	FAILURE (INCL. ACQ)	FAILURE (INCL. ACQ)	FAILURE (INCL. ACQ)	FAILURE (INCL. ACQ)
Independent Variable					
IDV	0.009***				0.011***
	(2.635)				(3.456)
MAS		0.008***			0.008***
		(3.976)			(4.061)
PDI			0.004		0.007***
			(1.398)		(2.617)
UAI				0.001	0.003
				(0.423)	(1.243)
Country Controls	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES
Observations	15,693	15,693	15,693	15,693	15,693
Banks	1541	1541	1541	1541	1541
Countries	92	92	92	92	92
Pseudo R2	0.165	0.166	0.164	0.164	0.169

Panel B: Alternative Measures for Culture

Column	(1)	(2)	(3)	(4)	(5)
Dependent Variable	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE
Independent Variable					
IDV_TK	0.017***		0.017***		
	(2.904)		(2.792)		
MAS_TK		0.020***	0.020***		
		(5.016)	(5.059)		
EMBEDDED				-1.694***	
				(-4.123)	
CLT_GLOBE					-0.317**
					(-2.141)
Country-Level Controls	YES	YES	YES	YES	YES
Bank-Level Controls	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES
Observations	9,584	9,584	9,584	11,449	9,890
Banks	951	951	951	1119	976
Countries	47	47	47	59	50
Pseudo R2	0.253	0.256	0.259	0.154	0.254

Table 2.7: Subsample Analysis

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank failure using several robustness tests: models that exclude U.S., G-10 countries, countries with ≤ 3 banks, countries with ≤ 5 banks, model that includes only countries in Hofstede's original list, model that excludes the global financial crisis (2007-2009), model that excludes country systemic crises, and a country-level analysis of averages. The dependent variable is *FAILURE*, which is a dummy equal to 1 if the bank failed during a particular year or if the bank became insolvent (capitalization ratio is less or equal to 2%). All independent variables are lagged one year. If a bank does not have financial information in the previous year, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Column	(1)	(2)	(3)	(4)	(5)	(6)
	Exclude U.S.	**Exclude G10**	**Exclude Countries with ≤ 3 banks**	**Exclude Countries with ≤ 5 banks**	**Include Only Countries in Hofstede's Original List**	**Exclude Global Financial Crisis (2007-2009)**
Dependent Variable	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE	FAILURE
Independent Variable						
IDV	0.022***	0.014**	0.021***	0.021***	0.038***	0.015***
	(4.431)	(2.248)	(4.436)	(4.446)	(4.923)	(2.885)
MAS	0.011***	0.018***	0.011***	0.011***	0.018***	0.012***
	(4.107)	(5.994)	(4.037)	(3.967)	(3.956)	(3.812)
PDI	0.012***	0.006	0.012***	0.012***	0.001	0.010**
	(3.036)	(1.305)	(2.941)	(2.921)	(0.096)	(2.260)
UAI	0.001	0.002	0.002	0.002	0.015*	0.004
	(0.253)	(0.401)	(0.521)	(0.541)	(1.890)	(1.107)
Country Controls	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Country-Year Clusters	YES	YES	YES	YES	YES	YES
Observations	15,436	13,290	15,605	15,309	7,931	12,614
Banks	1,516	1,297	1,529	1,499	798	1,538
Countries	91	81	87	80	40	91
Pseudo R2	0.239	0.263	0.240	0.239	0.203	0.243

Table 2.8: Channels

This table reports estimates from regression estimates for analyzing the effects of cultural values on bank portfolio risk in Panel A, and capitalization, liquidity, activity restrictions, and government bailout support in Panel B. All independent variables are lagged five years when the dependent variable is calculated over 5 years, and are lagged one year for all other variables. If a bank does not have financial information in the previous year necessary for the lags, we consider the financial information from the most recent financial statement available in Bankscope. The key explanatory variables are *IDV*, which is the Hofstede's cultural dimension of individualism, *MAS*, which is the Hofstede's cultural dimension of masculinity, *PDI*, which is the Hofstede's cultural dimension of power distance, and *UAI* which is the Hofstede's cultural dimension of uncertainty avoidance. We include a broad set of country controls such as *GDP_GROWTH* (country GDP growth rate), *INFLA* (country rate of inflation), *RESERVE* (country reserves), *GDP_CAPITA* (country GDP per capita), *NODEPINSUR* (indicator equal to one if a country does not have explicit deposit insurance), *RULE_OF_LAW* (country rule of law indicator), *REGULATORY* (country regulatory quality indicator), *VOICE_ACCOUNT* (country indicator for the strength of voice and accountability), *M_SUPER* (indicator equal to one if a country has multiple supervisors), and a broad set of bank level-level controls such as *LN_ASSET* (the natural logarithm of bank total assets), *CAPITAL_ASSET* (the bank capital ratio), *NPL* (the bank ratio of nonperforming loans), *ROE* (return on equity), *LOAN_ASSET* (the ratio of bank loans to total assets), *DEP_ASSET* (the ratio of bank deposits to total assets), *GOWN* (an indicator equal to 1 if a bank is government owned in a particular year), *FOWN* (an indicator equal to 1 if a bank is foreign owned in a particular year), and *PUB_LISTED* (an indicator equal to one if a bank is publicly listed). All regressions include year fixed effects. All variables are defined in Table 2.1. Standard errors are clustered at country-year level. *, **, and *** denote significance at 10%, 5%, and 1% level.

Panel A: Bank Portfolio Risk

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Criteria	**Bank Portfolio Risk**						
Dependent Variable	Z_SCORE (over 5 years)	LN(Z_SCORE) (over 5 years)	SHARPE RATIO (over 5 years)	STD ROA (over 5 years)	STD ROA2 (over 5 years)	STD ROE (over 5 years)	STD ROE2 (over 5 years)
Independent Variables							
IDV	-0.146***	-0.006***	-0.022***	0.005***	0.005***	0.071***	0.080***
	(-4.841)	(-5.695)	(-5.858)	(3.967)	(4.323)	(5.524)	(5.938)
MAS	0.062***	0.001	0.008***	0.000	-0.000	0.002	0.002
	(2.602)	(1.023)	(2.607)	(0.027)	(-0.073)	(0.208)	(0.130)
PDI	0.006	0.000	-0.006*	-0.001	-0.002	0.004	-0.006
	(0.222)	(0.287)	(-1.776)	(-0.708)	(-1.633)	(0.341)	(-0.501)
UAI	-0.127***	-0.005***	-0.016***	0.004***	0.004***	0.039***	0.039***
	(-5.818)	(-6.477)	(-6.387)	(5.969)	(5.315)	(4.834)	(4.406)
Country Controls	YES	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	9,484	9,484	9,471	9,547	9,547	9,547	9,547
Banks	1154	1154	1152	1156	1156	1156	1156
Countries	84	84	84	84	84	84	84
Adjusted R2	0.099	0.128	0.172	0.175	0.187	0.094	0.093

Panel B: Bank Capitalization, Liquidity, and Government Bailout Support

Column	(1)	(2)	(3)	(4)	(5)	(6)
Criteria	**Bank Capitalization, Liquidity, Activities Restrictions, Government Bailout Support**					
Dependent Variable	CAPITAL_ ASSET	TANGIBLE CAPITAL _ASSET	LIQUID _ASSET	ACT_ RESTRICT	BAILOUT_ PROBABLITY (OLOGIT)	BAILOUT_ PROBABLITY (OPROBIT)
Independent Variables						
IDV	-0.007***	-0.015***	0.118***	-0.018***	0.002	0.001
	(-3.058)	(-6.357)	(6.724)	(-4.856)	(0.560)	(0.605)
MAS	-0.001	-0.005***	-0.041***	0.005*	-0.010***	-0.005***
	(-0.819)	(-3.056)	(-3.408)	(1.712)	(-5.397)	(-5.510)
PDI	-0.000	-0.003	0.035**	-0.014***	-0.000	-0.000
	(-0.156)	(-1.221)	(2.267)	(-3.468)	(-0.236)	(-0.106)
UAI	-0.007***	-0.006***	0.065***	0.008***	-0.002	-0.001
	(-4.397)	(-3.945)	(5.195)	(2.995)	(-1.007)	(-0.993)
Country Controls	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	NO	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	15,250	15,225	15,199	1,128	15,693	15,693
Banks	1537	1536	1533		1541	1541
Countries	92	92	92	90	92	92
Adjusted R2 or Pseudo R2	0.760	0.752	0.418	0.246	0.308	0.316

CHAPTER 3: ECONOMIC POLICY UNCERTAINTY AND BANK LIQUIDITY HOARDING[40]

3.1 INTRODUCTION

Uncertainty about economic policy can have significant negative consequences for the real economy (e.g., Bloom (2014), Baker, Bloom, and Davis (2016)). Such uncertainty may lead firms to invest less and hire fewer employees and cause households to purchase fewer homes and consumer durables. In this paper, we investigate another channel through which economic policy uncertainty (*EPU*) may harm the real economy – bank liquidity hoarding.

The potentially harmful effects of *EPU* on the real economy both with and without the effects of bank liquidity hoarding are illustrated in Figure 3.1. On the left, *EPU* (represented by the U.S. Democratic and Republican Parties fighting) adversely affects the real economic agents of firms and households (depicted by the factory and house, respectively), as well as banks and other nonbank financial institutions and markets (represented by the bank and stock exchange, respectively). Through a number of channels, the real economy (illustrated by the soup lines) is damaged. Arrows represent the directions of causation through which these channels operate.

When *EPU* is high, firms cut back on investment and hiring and households make fewer purchases, both of which directly harm the economy. Banks may hoard liquidity on the asset or liability sides of their balance sheets or off of their balance sheets in response

[40] Berger, A.N., Guedhami, O., Kim, H.H., Li, X.. To be submitted.

to *EPU*. These actions absorb liquidity directly from the firms and households, and also soak up funds that would otherwise be available for firms and households from other financial institutions and markets. In turn, firms and households reduce their spending more, further damaging the economy.

Turning to specifics of the bank channel, banks may hoard liquidity in response to high *EPU* by holding more liquid assets to protect themselves against increased risks of liquidity shocks and/or anticipated funding difficulties that might otherwise require them to sell illiquid assets at fire-sale prices and/or miss out on profitable future loan opportunities (e.g., Diamond and Rajan (2011)). Liquid assets may also be increased to absorb higher expected loan losses and/or potential declines in the values of their other assets in the face of greater uncertainty. The liquid assets may be on the balance sheet, such as cash and marketable securities, or off the balance sheet in the form of derivative contracts with positive market values that effectively function as liquid assets. Banks may also supply less credit when *EPU* is high because of less certainty about whether firms and projects they might otherwise fund could be harmed by increased uncertainty. The reduced credit may be on the balance sheet, such as fewer commercial loans, or off the balance sheet, in the form of reduced loan commitments, standby letters of credit, or similar financial guarantees. Banks may also raise more liquid deposits and other liquid liabilities on the liability side of their balance sheets, leaving fewer funds to be intermediated through nonbank financial institutions and markets.[41]

Prior literature investigates the channels illustrated in Figure 1 that do not involve

[41] Although not shown in the figure, these effects may be amplified to the extent that banks hoard liquidity from each other in interbank markets, exacerbating the effects of liquidity shocks (e.g., Allen and Gale (2000), Diamond and Rajan (2011), Heider, Hoerova, and Holthausen (2015)).

banks and other financial agents. This literature focuses primarily on the channel that operates through firm behavior and uses new *EPU* measures developed by Baker, Bloom, and Davis (BBD, 2016), among other policy uncertainty indicators. This literature finds that *EPU* indeed directly affects corporate behavior in a negative way. Gulen and Ion (2016) find that U.S. corporate investment declines for an extended period following an increase in *EPU*. *EPU* is also found to reduce venture capital investment (Tian and Ye (2017)), hinder merger and acquisition (M&A) activities (Nguyen and Phan (2017), Bonaime, Gulen, and Ion (2018)), increase risk premiums on stocks (Pastor and Veronesi (2013), Kelly, Pastor, and Veronesi (2016)), raise corporate debt financing costs (Francis, Hasan, and Zhu (2014), Waisman, Ye, and Zhu (2015)), and distort the relation between investment and the cost of capital (Drobetz, El Ghoul, Guedhami, and Janzen (2018)).[42] On the household channel, Giavazzi and McMahon (2012) find that German households increase their savings significantly either by consuming less or by working more in reaction to the increase in uncertainty observed in the run-up to the close general elections in 1998. Aaberge, Liu, and Zhu (2017) find that Chinese households reduced expenditure and increased savings in the face of abrupt political turmoil following the Tian'anmen Square event.[43]

We argue that part of the measured direct effects of *EPU* on firms and households in the literature could also reflect the indirect effects of bank liquidity hoarding on firm and household behavior as discussed above. That is, part of the observed reductions in firm and

[42] Francis, Hasan, and Zhu (2014) use measures of political uncertainty, rather than *EPU*. Waisman, Ye, and Zhu (2015) focus on election uncertainty, but also use BBD's composite *EPU* measure in a robustness check and find that it increases debt financing costs.

[43] Research using other measures of political and policy uncertainty similarly find negative economic consequences (Barro (1991), Julio and Yook (2012), Bhattacharya, Hsu, Tian, and Xu (2017), Jens (2017)). See Bloom (2014) for a general review of the economic effects of political uncertainty.

household spending may be due to bank liquidity hoarding, rather than any direct effects of *EPU* on firm and household behavior. Our empirical analysis finds significant evidence of a causal role of bank liquidity hoarding induced by policy uncertainty.

To investigate the effects of *EPU* on bank liquidity hoarding, we create a comprehensive measure of bank liquidity hoarding, *LH(total)*. As discussed in detail in Section 2, *LH(total)* focuses on the sources and uses of liquid funds, and is inclusive of hoarding on the asset-side (*LH(asset)*), liability-side (*LH(liab)*), and off-balance sheet-side (*LH(off)*) of banks. Thus, *LH(total)* is the sum of *LH(asset)*, *LH(liab)*, and *LH(off).*

Importantly, we recognize that liquidity hoarding is a result of banks' supply and demand choices as well as those of their customers, and the *LH* measures are quantities that result from both sides of the markets. Our use of quantities and calling them liquidity hoarding follows the literature but, as discussed below, we conduct multiple identification analyses to differentiate between bank and customer choices.

We also contribute to the bank liquidity hoarding literature in several dimensions. We develop the only comprehensive measure of bank liquidity hoarding (*LH(total)*) that takes into account bank assets, liabilities, and off-balance sheet activities. Theoretical models of bank liquidity hoarding focus on increased holdings of liquid assets, such as cash (e.g., Diamond and Rajan (2011), Acharya, Gromb, and Yorulmazer (2012), Gale and Yorulmazer (2013), Heider, Hoerova, and Holthausen (2015)) or reserve balances (e.g., Acharya and Merrouche (2012)). Another model focuses on reduced lending (e.g., Acharya and Skeie (2011)).

Empirical studies of bank liquidity hoarding typically examine levels or changes in various categories of liquid assets (e.g., Cornett, McNutt, Strahan, and Tehranian (2011),

Berrospide (2012), Acharya and Mora (2015)), or prices and quantities of interbank federal funds (Afonso, Kovner, and Schoar (2011)). Some papers also consider the effects on the quantities of loans and/or off-balance sheet loan commitments in addition to liquid assets, but do not incorporate these credit categories into their liquidity hoarding measures (e.g., Cornett, McNutt, Strahan, and Tehranian (2011), Acharya and Mora (2015)). Some of these papers also find that banks tried to attract more deposits in response to the financial crisis, but again do not incorporate these deposits in their liquidity hoarding measures (Berrospide (2012), Acharya and Mora (2015)). In contrast, our comprehensive *LH(total)* measure combines the contributions to liquidity hoarding on the asset and liability sides of the balance sheet and off the balance sheet. In addition, most papers in the literature focus on bank liquidity hoarding during the subprime financial crisis. We focus on the effects of *EPU* and cover a much longer time period. Most importantly, as discussed below, we address identification and disentangle the effects on bank supply and demand choices from customer choices.

Other studies look at the effects of uncertainty beyond the subprime financial crisis on quantities of bank loans. Gissler, Oldfather, and Ruffino (2016) find that banks that perceive more regulatory uncertainty reduce mortgage loans more severely. Raunig, Scharler, and Sindermann (2017) similarly find reduced loan quantities after four uncertainty events based on the Chicago Board Options Exchange (CBOE) volatility index (VXO). Bordo, Duca, and Koch (2016) document a negative relation *EPU* and bank loan quantities.

A significant identification issue in these papers is that lending declines do not necessarily imply a causal impact of uncertainty on bank loan supply. Reduced lending

might also reflect less demand for bank loans by firms and households due to uncertainty, as illustrated in Figure 3.1. Bordo, Duca, and Koch (2016) deal with this issue by showing that the reductions in lending are associated with bank characteristics, such as low capital ratios that are related to bank financial distress. Such distress would likely cause reductions in credit supply by these banks. However, we argue that low bank capital ratios and other indicators of bank distress could also cause reductions in demand for credit from these banks, as firms and households value the certainty of funds availability from loan commitments and long-term relationships that may be interrupted by bank financial distress or failure (e.g., Petersen and Rajan (1994), Berger and Udell (1995)).

Accordingly, we conduct several additional analyses to determine whether bank supply and demand choices dominate customer choices in explaining the bank liquidity hoarding effects of *EPU*. In particular, we examine bank supply of on-balance sheet commercial loans and off-balance sheet loan commitments versus borrower demand effects. We test whether *EPU* results in higher or lower credit spreads on individual commercial term loans and commercial revolving lines of credit (a type of loan commitment). Both analyses use DealScan data for credit contract characteristics and control for borrower risks using Compustat data as well as bank risks using Call Report data. Higher credit spreads would suggest that reductions in supply of credit exceed any reductions in credit demand and *vice versa* in the event of lower credit spreads. We also examine the relations between *EPU* and responses to the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS), which directly measures credit supply through bank lending standards, and provides additional information on commercial loan credit spreads.

Analogously, we use deposit interest rate spreads calculated from RateWatch data

to determine if increases in bank deposits in response to higher *EPU* primarily reflect increased bank demand for deposits versus greater supply by customers. Higher deposit spreads would suggest that bank demand increases exceed any increases in customer deposit supply and *vice versa* in the event of lower spreads. Thus, for assets, liabilities, and off-balance sheet activities, we test whether bank supply and demand choices in response to uncertainty dominate customer choices.

The only other liquidity hoarding papers of which we are aware that use interest rates to distinguish between supply and demand effects are Afonso, Kovner, and Schoar (2011) and Acharya and Mora (2015). The former paper examines spreads in the interbank federal funds market during the subprime financial crisis, and the latter uses implicit deposit rates calculated from Call Report data to examine whether banks facing more liquidity problems during this crisis increased demand for liquid funds. We extend these studies to the more general *EPU* measure, to the more comprehensive measure of bank liquidity hoarding (*LH*), to a much longer time period, and to identification analyses using loans on the asset side of the balance sheet, deposits on the liability side of the balance sheet, and loan commitments off of the balance sheet.

Our main analysis includes data on virtually all U.S. commercial banks quarterly for over 30 years from 1985:Q2 to 2016:Q4, for a total of over 17,000 unique banks and over one million bank-quarter observations. Our supply versus demand analyses for loans and commitments use credit spreads on over 28,000 individual term loans and revolvers from DealScan and data on the borrowing firms from Compustat, as well as national statistics on 107 quarters from SLOOS. Finally, our deposit spread analysis employs nearly five million observations from RateWatch.

By way of preview, we find that higher *EPU* results in statistically and economically significant increases in total bank liquidity hoarding, as well as increases in the asset-, liability- and off-balance sheet-side components. Our findings are robust to the use of instrumental variable estimation and placebo tests. The results also hold after controlling for market volatility and other alternative measures of uncertainty, across bank size classes, for banks with both high and low equity capital ratios, pre- and post-Basel III capital and liquidity requirements, for banks in markets with both favorable and unfavorable local economic conditions, and for banks in different survival categories. We also find that an increase in *EPU* leads to increases in credit spreads and deposit rate spreads, suggesting that our baseline results are driven primarily by bank supply and demand choices, rather than customer choices. Our findings also suggest a causal effect of *EPU* in harming the real economy through the banking sector and may help explain some of the prior findings on the negative effects of *EPU* on firm and household behavior.

The remainder of the paper is organized as follows. Section 3.2 briefly discusses the bank liquidity hoarding (*LH*) and economic policy uncertainty (*EPU)* measures, and Section 3.3 develops our hypotheses about the relations between these measures. Section 3.4 describes our main methodology and control variables. Section 3.5 reports our main empirical results that test our hypothesis about the relations between *EPU* and *LH*, including instrumental variable analysis and placebo tests. Section 3.6 provides the analyses that distinguish bank supply and demand choices from those of customers. Section 3.7 presents conclusions, policy implications, and topics for future research.

3.2 BANK LIQUIDITY HOARDING AND ECONOMIC POLICY UNCERTAINTY

In this section, we describe and provide summary statistics and correlations for the

dependent and key independent variables for our main analyses, bank liquidity hoarding (*LH*) and economic policy uncertainty (*EPU*).

Bank liquidity hoarding measures

Our key dependent variables are our comprehensive measure of bank liquidity hoarding *LH(total)* and its components, *LH(asset)*, *LH(liab)*, and *LH(off)*. These measures assign various balance sheet and off-balance sheet activities weights of +1/2 and -1/2. The weights depend on whether these items contribute to or subtract from the hoarding of liquidity by banks. Table 1 shows the formula for these measures and provides details of which activities are included in each category. Total bank liquidity hoarding, *LH(total)* is defined as *LH(asset)* + *LH(liab)* + *LH(off)*, where *LH(asset)* = (+1/2) × liquid assets + (-1/2) × illiquid assets, *LH(liab)* = (+1/2) × liquid liabilities, and *LH(off)* = (-1/2) × illiquid guarantees + (+1/2) × liquid derivatives.

The logic behind the measures is straightforward. Banks hoard liquidity by holding liquid assets, such as cash and securities, and off-balance sheet derivative contracts with positive market values that function similarly to liquid assets, like in-the-money interest rate swaps. Because these items contribute to banks' liquidity hoarding, they are assigned positive weights. These liquid assets and derivatives can be increased by decreasing illiquid assets, such as C&I loans, so these are given negative weights. Similarly, liquid funds can be boosted by increasing liquid liabilities, like transactions deposits, so these items are assigned positive weights. Illiquid off-balance sheet financial guarantees, like loan commitments, are also given negative weights, since decreasing these items boosts future liquid assets by reducing future claims against them. The +1/2 and -1/2 weights assure that raising $1 of liquid assets by reducing $1 of illiquid assets increases bank liquidity hoarding

by $1, and similarly for the other combinations of assets, liabilities, and off-balance sheet activities. Thus, the weighting scheme ensures that all sources and uses of liquid funds are accounted for and weighted appropriately.

The classifications of which assets, liabilities, and off-balance sheet activities are liquid and illiquid in Table 3.1 are adapted from Berger and Bouwman's (2009) classifications for their "cat fat" bank liquidity creation measure. These authors classify asset categories as liquid, semiliquid, or illiquid based on the ease, cost, and time for banks to dispose of their obligations to obtain liquid funds. Similarly, liabilities classifications are based the ease, cost, and time for customers to obtain liquid funds from the bank. Off-balance sheet guarantees and derivatives are classified consistently with treatments of functionally similar on-balance sheet items.

A few items that are included in and excluded from Table 1 require some clarification. First, we show only liquid and illiquid assets, liquid liabilities, illiquid guarantees, and liquid derivatives, because our bank liquidity hoarding measures depend only on these items. We exclude items classified as semiliquid by Berger and Bouwman (2009), as well as other balance sheet and off-balance sheet items that are not needed for calculation of the *LH* measures.[44]

Second, we include "net participations sold" as illiquid guarantees, instead of Berger and Bouwman's (2009) classification of its opposite, "net participations acquired", as liquid guarantees. This is a semantic difference that allows us to use fewer categories, but does not affect the measurement of liquidity hoarding.

Finally, the liquid derivatives entries in Table 1 are the gross fair values of liquid

[44] Examples of semiliquid assets are residential real estate loans and consumer loans, since most of these can be securitized to raise liquid funds with modest amounts of effort and expense.

derivative contracts, which function similarly to liquid securities on the asset side of the balance sheet. Those with positive gross fair values contribute to liquidity hoarding and those with negative values detract from such hoarding. The contributions of derivatives to liquidity hoarding are usually zero or very small. Most banks have no derivatives, and those that do typically have well-matched books and frequent settlements, so their gross fair values are close to zero.

It is important to distinguish bank liquidity hoarding (*LH*) from Berger and Bouwman's bank liquidity creation (*LC*). *LH* refers to liquidity held by the bank, whereas *LC* is liquidity supplied to the public. Some of the *LH* components are direct opposites from the components of *LC* and are measured using the *LC* data on Bouwman's website **(**https://sites.google.com/a/tamu.edu/bouwman/data). In particular, we measure *LH(asset)* as -*LC(asset)*, since *LC(asset)* gives weights of -1/2 to liquid assets, +1/2 weights to illiquid assets, and 0 weights to semiliquid assets, and we need to reverse the negative and positive signs. Similarly, *LH(off)* is measured by -*LC(off)*, since *LC(off)* assigns positive weights to illiquid guarantees and negative weights to liquid derivatives.

However, key differences occur on the liability side of the balance sheet. *LH(liab)* equals +1/2 times all bank liquid liabilities, the *same* sign as *LC(liab)* instead of the opposite sign, given that liquid liablities can be used to raise funds to hoard liquidity. Thus, liquid liabilities like core deposits may be used to hoard liquidity for the bank despite creating liquidity for the public. Also, unlike *LC(liab)*, *LH(liab)* does not include illiquid items on the liability side of the balance sheet, such as subordinated debt and equity. These long-duration items are normally not used to raise liquid assets. In contrast, they are given -1/2 weights in *LC(liab)*. Our goal is different from Berger and Bouwman (2009) – we are

interested in liquidity hoarding by the banks, rather than the liquidity they provide to the public.

LH(total) is also much more comprehensive than the liquid assets usually employed in the bank liquidity hoarding literature. We use the *LH(asset)*, *LH(liab)*, and *LH(off)* components to assess the sources of bank liquidity hoarding and to test additional hypotheses about supply versus demand choices of banks and their customers. We normalize the *LH* measures by gross total assets (*GTA*) in our regression analyses so that the measures are comparable across banks, and the regression results are not dominated by the largest banks.[45] Dollar values are also adjusted to real 2016 values using the implicit GDP price deflator.

Bank liquidity hoarding measures

Our key explanatory variables are measures of *EPU*, which are obtained from BBD's website (http://www.policyuncertainty.com). They are based on textual analysis of newspaper articles and compilation of policy uncertainty related to government spending, inflation risk, and tax code expiration.

The newspaper element *EPU(News)* is based on textual analysis of ten large newspapers.[46] BBD count the number of news articles containing a combination of terms related to *EPU*. These terms are "economic" or "economy;" "uncertain" or "uncertainty;" and one or more of "Congress," "deficit," "Federal Reserve," "legislation," "regulation," or "White House." For example, an article mentioning "economy," "uncertain," and "Federal Reserve" would be included in the count. This is scaled by the total number of

[45] Gross total assets (*GTA*) equals total assets (*TA*) plus the allocation for loan and lease losses (*ALLL*), which accounts for expected losses, and the allocated transfer risk reserve (*ATRR*), a reserve for certain troubled foreign loans. *GTA* incorporates the full value of all the assets that are included in the bank liquidity hoarding measures.

[46] These are *USA Today*, *Miami Herald*, *Chicago Tribune*, *Washington Post*, *Los Angeles Times*, *Boston Globe*, *San Francisco Chronicle*, *Dallas Morning News*, *Houston Chronicle*, and *Wall Street Journal*.

articles published by each newspaper. The fraction of *EPU*-related articles for each newspaper is further scaled to have unit variance. The normalized fractions are summed across these ten newspapers. The final index is then adjusted to have a mean of 100 from 1985 to 2009.[47]

Other *EPU* elements are related to specific policy categories. The government spending measure *EPU(Govt.)* is the scaled interquartile range of four-quarter-ahead purchases by federal and state/local government. Inflation-related policy uncertainty *EPU(CPI)* is based on the interquartile range of four-quarter-ahead inflation risk compiled by the Federal Reserve Bank of Philadelphia. The tax measure *EPU(Tax)* draws on temporary federal tax code provisions. It is a weighted sum of the total dollar amount of future federal tax code provisions with higher weights assigned to tax codes expiring in the near future. The composite measure *EPU(Composite)* is the weighted sum of these measures with a weight of 1/2 for *EPU(News)*, and weights of 1/6 for each of the other measures, *EPU(Govt.), EPU(CPI),* and *EPU(Tax)*. We examine the composite measure as well as each of the four elements.[48] The *EPU* measures constructed by BBD have a monthly frequency. We follow Gulen and Ion (2016) and take the natural log of the arithmetic average of the BBD indices over the three months of the quarter.

Descriptions, summary statistics, size classes, and correlations

Table 3.2 provides descriptions, summary statistics, and correlations for the *LH* and *EPU* measures. Panel A presents the descriptions, and Panel B reports summary statistics for the 1,022,644 bank-quarter observations from 1985:Q2 through 2016:Q4.

[47] To validate their computer-generated index, BBD provide several types of checks, including an extensive human audit of newspaper articles.

[48] BBD show that their news-based index exhibits considerable time-series variation, spikes during events that increase policy-related uncertainty, and correlates with other measures of economic uncertainty.

Total normalized bank liquidity hoarding *LH(total)/GTA* has a mean of 0.163, suggesting that banks hoard liquidity of 16.3% of the gross total assets (*GTA*) on average. There is a wide dispersion in liquidity hoarding across banks, with the 25th and 75th percentile values at 0.043 and 0.286, respectively. Asset-side liquidity hoarding, *LH(asset)/GTA*, has a mean value of -0.009 with the 25th and 75th percentile values at -0.111 and 0.092, respectively. The mean of *LH(asset)/GTA* is negative because banks often hold more illiquid assets (e.g., commercial loans) with negative weights than liquid assets (e.g., cash and due from other institutions, securities) with positive weights.[49] Mean liability-side liquidity hoarding (*LH(liab)/GTA*) is 0.215. The mean liquidity hoarding off the balance sheet (*LH(off)/GTA*) is -0.043. The negative sign mostly reflects loan commitments, which are illiquid from banks' point of view.

Turning to the *EPU* variables, *EPU(Composite*) has a mean of 4.642 and standard deviation of 0.247. The news-based element *EPU(News*) has a mean value of 4.631. *EPU* related to government spending *EPU(Govt.)*, inflation risk *EPU(CPI)*, and tax code expiration *EPU (TAX)* have mean values of 4.560, 4.572, and 3.760, respectively.

Table 3.2 Panel C provides summary statistics of bank liquidity hoarding variables by bank size class. The *EPU* measures have only a time dimension and so have essentially no variation by bank size. Following Kashyap and Stein (2000), we categorize banks into small, medium, and large classes based on the 95th and 99th percentile cutoff values of *GTA*. The 95th and 99th percentile values of *GTA* correspond to $1.3 billion and $11.0 billion, respectively. The small size class roughly corresponds to the usual research definition of

[49] For example, JPMorgan Chase holds about as much in securities as loans, presumably reflecting its liquidity needs for trading purposes, unexpected deposit withdrawals or loan commitment takedowns, and/or as well as meeting regulatory liquidity requirements (Berger and Bouwman (2016), p. 21, Table 3.1).

community banks, those with up to $1 billion in assets (e.g., DeYoung, Hunter, and Udell (2004)). The size cutoff between medium and large banks is close to an alternative upper limit sometimes used for community banks, $10 billion in assets (e.g., Whalen (2013), Lux and Greene (2015)). Large banks hoard less liquidity per dollar of assets (*LH(total)/GTA*) than small banks, with roughly half of the difference due to *LH(off)/GTA*. The mean *LH(off)/GTA* decreases in bank size class, suggesting that large banks extend proportionately more credit off the balance sheet than small banks.

Figure 3.2 shows the temporal patterns of total liquidity hoarding for the nation as a whole as well as *EPU(Composite)* over our sample period. The figure shows *LH(total)/GTA* as the sum of liquidity hoarding for the banking industry at each point in time divided by the sum of *GTA* for the industry at that time, and similarly for the components. This represents the industry, rather than the average of the ratios, which would be dominated by the small banks. The data show that *EPU(Composite)* generally declined over time, shot up during the recent financial crisis, and stayed high for a time as policymakers figured out their responses. These aggregate data also appear to suggest that *LH(total)/GTA* and *EPU(Composite)* are positively related, consistent with banks hoarding more liquidity in response to an increase in *EPU*.

3.3 HYPOTHESIS DEVELOPMENT

Our focus is on how *EPU* may affect bank liquidity hoarding. Our measures of liquidity hoarding can be affected by the supply and demand choices of banks and as well as those of firms, households, and nonbank financial institutions and markets. In this section, we develop hypotheses about these choices, and these hypotheses are tested in the following sections.

Our first hypothesis covers *LH(total)* and its three components, *LH(asset)*, *LH(liab)*, and *LH(off)*, and is inclusive of the choices of banks and their customers. As discussed in the introduction, when *EPU* is high, banks may wish to hoard liquidity to protect themselves against increased risk of liquidity shocks, fire sale of illiquid assets, declining value of assets, or increasing loan losses. At the same time, more uncertain firms, households, and nonbank financial institutions and markets may also change their demands and supplies for banking services as they wish to spend and intermediate less. Thus, *LH(total)* may increase due to both supply and demand effects for different banking services.

These supply and demand effects can occur for all three components of liquidity hoarding. On the asset side, banks may react to *EPU* by demanding more liquid assets such as cash and securities and by cutting their commercial loan supplies, both of which increase *LH(asset)*. Firms and households may demand fewer loans as they wish to borrow less for spending, and nonbank financial institutions and markets may want to intermediate less, also increasing *LH(asset)*.

On the liability side, banks may respond to *EPU* by trying to raise more funds through liquid liabilities. Banks demand more deposits, which increases *LH(liab)*, attracting them by raising deposit rates in times of uncertainty. This is despite the general stickiness of these rates (Hannan and Berger (1991)). The supply of deposits by the nonbank public generally moves in the same direction in response to uncertainty. Firms and households may increase the supply of deposits in times of high uncertainty because deposits serve as safe havens (e.g., Gatev and Strahan (2006), Pennacchi (2006)), also increasing *LH(liab)*.

Finally, on the off-balance sheet side, the arguments above about decreased supply and demand for bank loans in the face of high *EPU* apply to off-balance financial guarantees like loan commitments as well. When *EPU* is high, banks may wish to renew fewer loan commitments, and borrowers may need fewer commitments to fund new investments and spending, both of which increase *LH(off)*. Loan commitments may further decrease in the face of uncertainty as borrowers draw down their existing commitments out of fear that the banks may not be willing or able to honor them (Ivashina and Scharfstein (2010)). The demand and supply arguments above for liquid assets also apply to liquid derivatives.

Thus, our first hypothesis is:

Hypothesis 1: *EPU increases total bank liquidity hoarding, LH(total), and its three components, LH(asset), LH(liab), and LH(off), ceteris paribus.*

The following *Hypotheses 2, 3,* and *4* are contingent on *Hypothesis 1* being true, and are about whether each component of bank liquidity hoarding is primarily driven by bank supply and demand choices versus those of their customers:

Hypothesis 2a: EPU increases asset-side bank liquidity hoarding, LH(asset), primarily through banks' supply and demand choices, ceteris paribus.

Hypothesis 2b: EPU increases asset-side bank liquidity hoarding, LH(asset), primarily through bank customers' supply and demand choices, ceteris paribus.

Hypothesis 3a: EPU increases liability-side bank liquidity hoarding, LH(liab), primarily through banks' supply and demand choices, ceteris

paribus.

Hypothesis 3b: EPU increases liability-side bank liquidity hoarding, LH(liab), primarily through bank customers' supply and demand choices, ceteris paribus.

Hypothesis 4a: EPU increases off-balance sheet-side bank liquidity hoarding, LH(off), primarily through banks' supply and demand choices, ceteris paribus.

Hypothesis 4b: EPU increases off-balance sheet-side bank liquidity hoarding, LH(off), primarily through bank customers' supply and demand choices, ceteris paribus.

These hypotheses have implications for the real economy. To the extent that *Hypotheses 2a*, *3a*, and *4a* hold – bank supply and demand choices dominate customer choices – the banking sector is a channel through which *EPU* harms the real economy through the negative effects of bank liquidity hoarding on firms and households. In contrast, to the extent that *Hypotheses 2b*, *3b*, and *4b* hold – customer supply and demand choices dominate bank choices – the effects of *EPU* on the banking sector may primarily reflect rather than cause these adverse outcomes. In Section 3.6, we test these hypotheses by investigating price impacts of *EPU* – when supply and demand move in the same direction, the direction of the price movement reveals whether supply or demand changes dominate.

3.4 REGRESSION METHODOLOGY AND CONTROL VARIABLES

In this section, we describe our regression methodology and control variables for our main analysis.

Regression methodology

To test *Hypothesis 1*, we estimate regressions of the form:

$$(LH/GTA)_{i,t} = \beta EPU_{t-1} + \delta' X_{i,t-1} + \theta' W_{i,t-1} + \gamma' Z_{t-1} + \alpha_i + q_t + \epsilon_{i,t}, \quad (1)$$

where *i* indexes a bank, and *t* indicates a calendar quarter. The dependent variable is one of the normalized liquidity hoarding measures, *LH(total)/GTA*, *LH(asset)/GTA*, *LH(liab)/GTA,* or *LH(off)/GTA*. The key independent variable(s) are one or more of the *EPU* variables, *EPU(Composite*), *EPU(News), EPU(Govt.), EPU(CPI)*, or *EPU(Tax)*. We lag the independent variables to mitigate potential reverse-causality concerns. We include an extensive set of controls to isolate the effects of *EPU.* Our bank controls (*X*) consist of *Ln(GTA), sqr. Ln(GTA)*, and *Capital ratio* to account for differences across bank size and leverage. Controls related to local market and corporate demand for investment (*W*) are *HHI, Population, Tobin's Q,* and *Cash flows*. Controls for political, financial market, and general economic uncertainty (*Z*) include *Election year*, *SD (stock ret.)*, and *GDP dispersion*. Finally, we include bank fixed effects (α) to control for omitted bank characteristics that are invariant over time, and quarter dummies (q) to account for seasonality. We cluster standard errors by bank and year-quarter to account for correlations of error terms.[50]

Regression methodology

Table 3.3 shows the definitions and summary statistics for the control variables, as well as the instrumental variable and additional uncertainty measures used in the robustness tests.

[50] Given that the *EPU* measures are common across all banks and potentially serially correlated, in untabulated analyses we also adjust standard errors to allow for cross-sectional and temporal dependence based on Driscoll and Kraay (1998) and Hoechle (2007). Our results are robust to this adjustment of standard errors.

We obtain bank-specific variables such as asset size and equity ratio from bank Call Reports. Population is taken from the Federal Reserve Bank of St. Louis. Economic conditions of potential customers, *Tobin's Q,* and *Cash flows*, are computed for Compustat firms in the banks' states to control for the demand for banking services. These variables are averaged for each bank based on the proportion of deposits in each area. Data for bank deposit amount per branch is from the Summary of Deposits by FDIC (from 1994 to 2016) and Bouwman's website (from 1985 to 1993). To control for other types of uncertainty, we include a binary variable for election years (*Election year*), stock market return volatility (*SD(stock ret.)*) and forecast dispersion of real GDP (*GDP dispersion*).

The average size of banks (*GTA*) is $1.133 billion.[51] The distribution of bank size is highly right-skewed with the median value of *GTA* being $116 million. Thus, most banks are quite small, but sizes range to over $2 trillion. The average capital ratio (*Capital ratio*) is 0.070. The average Herfindahl–Hirschman index (*HHI*) based on bank deposits is 0.083. The average *Tobin's Q* of firms in the banks' states is 2.087, comparable to the average of the full CRSP/Compustat universe (e.g., Bertrand and Schoar (2003)). The percentiles of *Cash flows* (25^{th} percentile = 0.000 and 75^{th} percentile = 0.022) suggest that *Cash flows* has a wide dispersion across companies in different states where banks are operating. Not surprisingly, about one-quarter of our sample covers U.S. presidential election years. The average standard deviation of aggregate stock market returns is 0.009. On average, GDP forecast dispersion is 42.7% over the sample period.

3.5 THE EFFECTS OF EPU ON BANK LIQUIDITY HOARDING

In this section, we present our tests of *Hypothesis 1* about the effects of *EPU* on

[51] *GTA* shown in Table 3.3 is measured in thousands of real 2016 dollars.

total bank liquidity hoarding and all of its components. We also discuss results of instrumental variable estimation, placebo tests, and additional robustness checks.

Main regressions of bank liquidity hoarding on EPU

Table 3.4 presents coefficients estimates from regressions of *LH(total)/GTA* on the *EPU* measures. The coefficient on *EPU(Composite)* in column 1 is positively and statistically significant at the 1% level (coeff. = 0.091, *t*-statistic = 8.85). This suggests that banks' total liquidity hoarding increases in response to *EPU*, consistent with *Hypothesis 1*. Given that the standard deviation of *EPU(Composite)* is 0.247, a one-standard-deviation increase in *EPU(Composite)* leads to an 13.8% increase in bank liquidity hoarding relative to its average value.

In columns 2–5 of Table 3.4, we replace the key independent variable *EPU(Composite)* with one of its four elements: *EPU(News)*, *EPU(Govt.)*, *EPU(CPI),* or *EPU(Tax)*. The coefficient estimates on the first two elements are positive and statistically significant at the 1% level. One-standard-deviation increases in *EPU(News)* and *EPU(Govt.)* result in estimated 13.8% and 17.2% increases in bank liquidity hoarding, respectively, relative to average *LH(total)*. In contrast, the uncertainty from inflation (*EPU(CPI)*) and tax code expiration (*EPU(Tax)*) are not significantly related to overall liquidity hoarding. The result suggests that inflation- and tax-related policy uncertainty do not pose a substantial risk for banks to hoard liquidity.

In Table 3.4 column 6, we include all the *EPU* elements in the same regression. The coefficient estimates on *EPU(News)* and *EPU(Govt.)* are of the same sign and similar magnitudes as in columns 2–3. After controlling for other *EPU* elements, the effect of *EPU(Tax)* becomes negative and statistically significant, but remains small in magnitude.

This result is consistent with arguments that banks are more highly levered, and thus tax-advantaged relative to their shadow-banking competitors. They may therefore be better positioned than other financial institutions when tax-related policy uncertainty is high.

Estimated coefficients on the controls are generally consistent with expectations. Small banks hoard more liquidity per dollar of assets. High competition (inversely measured by *HHI*) reduces bank liquidity hoarding, consistent with the idea that bank competition increases lending (e.g., Braggion, Dwarkasing, and Moore (2017)). Banks in states with firms having high cash flows tend to hoard more liquidity, consistent with low credit demand in those states. *Election year* has essentially no effect after including *EPU* elements in the regressions, and financial market uncertainty has a counterintuitive negative effect on bank liquidity hoarding. High uncertainty about future economic growth (proxied by *GDP dispersion*) is associated with less liquidity hoarding, but with marginal statistical significance. Our findings that *EPU* has strong effects even after controlling for these other measures of uncertainty corroborate Baker, Bloom, and Davis' (2016) claims about the independent effects of *EPU*. In the interest of brevity, we suppress coefficient estimates on control variables in subsequent tables, although they are included in all the regressions.

Table 3.5 Panels A, B, and C present estimates from regressions of *LH(asset)/GTA*, *LH(liab)/GTA*, and *LH(off)/GTA*, respectively, on the *EPU* measures. In Panel A column 1, the estimated coefficient on *EPU(Composite)* is 0.040 (*t-statistic* = 6.40), suggesting that a one-standard-deviation increase in uncertainty is associated with a 4.3% increase in the asset-side liquidity hoarding. In the other columns, coefficient estimates on *EPU(News)* and *EPU(Govt.)* are also positive and statistically significant at the 1% level. The

insignificant coefficient estimate on *EPU(CPI)* suggests that asset-side liquidity hoarding is not affected much by inflation-related policy uncertainty. The estimated coefficient on *EPU(Tax)* is -0.007 (*t-statistic* = -5.10), suggesting that policy uncertainty from tax code expiration decreases asset-side liquidity hoarding. As discussed above, the *EPU(Tax)* result is consistent with the idea that banks are highly levered with tax advantages, and they are better positioned to extend credit than other financial institutions when tax-related policy uncertainty is high.

In Table 3.5 Panel B with *LH(liab)/GTA* as the dependent variable, the estimated coefficient on *EPU(Composite)* is 0.029 (*t-statistic* = 5.59), suggesting that an increase in *EPU* leads to an increase in liability-side bank liquidity hoarding. The estimated coefficients on *EPU(News)* and *EPU(Govt.)* are positive and statistically significant, 0.032 (*t-statistic* = 5.72) and 0.011 (*t-statistic* = 3.74), respectively. Interestingly, the coefficient on *EPU(CPI)* is negative, although not significant, consistent with the possibility that firms and households prefer hedging against inflation with investments having higher expected returns than deposits. In column 5, the positive coefficient on *EPU(Tax)* is consistent with the arguments that firms and households may demand more liquid funds to pay unexpected taxes. Alternatively, banks may want to raise more liquidity when *EPU(Tax)* is high because their tax-advantageous status enables them to extend more credit when tax-related economic policy uncertainty is high. The results from Panel B are consistent with the prediction that *EPU* increases liability-side liquidity hoarding.

In Table 3.5 Panel C, the estimates from regressions of *LH(off)/GTA* on *EPU(Composite)* and all its elements are positive and statistically significant, except for *EPU(Tax)*, which is insignificant. These results are consistent with the arguments above

that both demand and supply of loan commitments decline and banks hoard more liquidity in reaction to *EPU*.

In unreported tables, we estimate from regressions of selected bank balance sheet and off-balance sheet categories on *EPU(Composite)* and controls to help understand the mechanisms behind the main findings. The results show that banks increase cash holdings in response to an increase in *EPU*. At the same time, they decrease loans and loan commitments. They also hoard more liquidity through increased deposits. This item-by-item analysis reinforces our main findings.

Collectively, these results support *Hypothesis 1 – EPU* increases total bank liquidity hoarding, *LH(total)* and its three components, *LH(asset)*, *LH(liab)*, and *LH(off)*.

Instrumental variable analysis and placebo tests

A concern with our analysis is potential endogeneity of *EPU*. Although we saturate our regressions with an extensive set of controls, bias may arise from omitted explanatory variables. For example, indicators of general economic uncertainty other than those for which we control could drive both *EPU* and bank liquidity hoarding. Similarly, a significant increase in bank liquidity hoarding could create uncertainty among regulators and politicians regarding how to respond, creating a reverse causality problem.

To address these concerns, we follow Gulen and Ion (2016) and implement an instrumental variable approach using the U.S. Senate polarization index of McCarty, Poole, and Rosenthal (1997) as an instrument for *EPU(Composite)*. Prior research suggests that increased polarization can bring political gridlock, which in turn breeds uncertainty about policy choices (McCarty, (2012)), indicating that our instrument satisfies the relevance condition. It is unlikely that U.S. Senate polarization would directly affect bank liquidity

hoarding other than through its impact on policy uncertainty, satisfying the exclusion restriction. The first-stage regression in column 1 of Table 3.6 Panel A shows the expected positive and significant effect of Senate polarization on *EPU(Composite)*, suggesting that the relevance condition of our instrument is satisfied.[52] In the second-stage regressions in columns 2–5, we regress the liquidity hoarding measures on the instrumented *EPU* measure, $\widehat{EPU}(Composite)$, and the controls. The *t*-statistics are based on bootstrapped standard errors to mitigate biases from errors in the estimated independent variables. The coefficients estimates all have the same positive signs and significance with comparable magnitudes as our main results.

To rule out the possibility of spurious correlations between *EPU* and bank liquidity hoarding measures, we perform placebo tests in Table 3.6 Panel B. We replace the true *EPU(Composite)* measure with $\widetilde{EPU}$*(Composite)* randomly drawn from the sample distribution of *EPU(Composite)*. We estimate regression coefficients with 100 different random samples of $\widetilde{EPU}$*(Composite)* and report the average coefficient estimates on $\widetilde{EPU}$*(Composite)*. We find that $\widetilde{EPU}$*(Composite)* is neither statistically nor economically significantly related to any components of bank liquidity hoarding, further supporting our hypotheses.

Additional robustness checks

We conduct a number of additional robustness checks. Table 3.7 replicates the baseline result in column 1 of Table 3.4, but controls for additional uncertainty measures: the implied volatility of equity options (*VIX*), monetary policy uncertainty (*Monetary uncerty*), financial regulation uncertainty (*Fin reg uncerty*), regulation uncertainty

[52] In our first-stage regression, the *F*-statistic for the instrumental variable is 28.68, which is well above the weak instrument criteria (Stock and Yogo (2005)).

(*Regulation uncerty*), and overall macroeconomic uncertainty (*Macro uncerty*). The *Monetary uncerty*, *Fin reg uncerty*, and *Regulation uncerty* are from BBD and *Macro uncerty* is based on Jurado, Ludvigson, and Ng (2015).[53] We find the impact of *EPU* on bank liquidity hoarding holds after controlling both individually and jointly for the additional uncertainty measures.

In unreported tables, our main results hold across bank size classes, for banks with both high and low equity capital ratios, pre- and post-Basel III capital and liquidity requirements, for banks in markets with both favorable and unfavorable local economic conditions, and for banks in different survival categories. Thus, our evidence that *EPU* increases bank liquidity hoarding is quite robust.

3.6 BANK SUPPLY AND DEMAND CHOICES VERSUS CUSTOMER CHOICES

In this section, we test *Hypotheses 2–4* to determine whether bank supply and demand choices dominate customer choices in explaining the increases in bank liquidity hoarding from *EPU* found in Section 3.5. The extent to which our findings primarily reflect supply and demand choices of banks is key to distinguishing whether our findings suggest causal effects on the real economy. Returning to Figure 3.1, if the observed positive effects of *EPU* on liquidity hoarding primarily reflect customer choices, rather than bank choices, the effects on bank liquidity hoarding would have little impact on the real economy. Moreover, this would suggest that banks play almost no role in explaining the prior research findings that policy uncertainty negatively influences corporate and household behavior. In contrast, to the extent that bank choices dominate, our findings may reflect important

[53] Monetary policy uncertainty, financial regulation uncertainty, and regulation uncertainty are from BBD's website. Macroeconomic uncertainty is from Ludvigson's website (https://www.sydneyludvigson.com/data-and-appendixes/).

effects of *EPU* on the real economy through the banking sector, and may help explain some of the findings in the literature.

We first focus on asset-side and off-balance sheet-side liquidity hoarding through selected loan and loan commitment categories. We examine supply versus demand choice channels at the *intensive margin* using credit spreads from Loan Pricing Corporation's (LPC's) DealScan database on commercial term loans and revolving lines of credit, representing on- and off-balance sheet credits, respectively.[54] Credit spreads should rise if the decrease in supply of credit by banks dominates the reduction in demand by borrowers, and *vice versa* if the reduction in demand dominates, controlling for borrower credit risk and other factors. We estimate regressions of the form:

$$Credit\ spread_{i,j,t} = \rho EPU_{t-1} + \omega' X_{i,t-1} + \pi' V_{j,t-1} + \vartheta' K_{i,j,t} + \alpha_i + q_t + \epsilon_{i,j,t} \quad (2)$$

where *i* indexes a bank, *j* indexes a borrower, and *t* indicates a calendar quarter. The dependent variable (*Credit spread*) is the borrowing credit spread plus annual fee (if any) the borrower pays in basis points over LIBOR, obtained from DealScan.[55] We match the data with borrowers' accounting information from Compustat and bank characteristics from Bank Call Reports, since credit spreads should crucially depend on the risk of the borrowing firm and the condition of the supplying bank.[56] We include only the lead bank because it is the main decision-maker on credit terms.[57]

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[54] Term loans refer to loans of fixed amounts with fixed maturities. Revolvers refer to credits for which the borrower may draw down and repay any amount up to a fixed maximum as often as desired until maturity.

[55] DealScan dataset includes borrower firms' identities, credit spreads over LIBOR, credit amount, credit types, lenders' names and lenders' roles in the credit contract.

[56] We use the DealScan-Compustat link file available from WRDS for matching with Compustat before year 2012. Thanks to Raluca Roman for sharing her manually matched DealScan–Compustat links data from 2013 to 2014. We further extend the matched DealScan–Compustat links from 2015 to 2016. Based on bank names, locations, and other bank characteristics, we manually merge the DealScan with Bank Call Report.

[57] We identify a lead bank of each credit contract based on its designated role. We denote a lender as a lead bank when the lender role is described as "Administrative agent," "Agent," "Arranger," "Lead arranger," "Lead bank," "Lead manager," or "book-runner." When multiple banks are identified as lead banks in the above way, we choose the bank

We control for bank characteristics (X), bank fixed effects (α), and quarter dummies (q) as in equation (1). We also control in equation (2) for borrower characteristics (V), including firm size (*Ln(ME)*), book-to-market ratio (*BE_ME*), leverage (*Leverage*), tangible asset ratio (*Tangible*), cash ratio (*Cash*), Altman (1968) Z-score (*Z_score*), and credit rating (*Credit rating*). To further control for loan risk, we include credit contract variables (K), including credit amount (*Credit size*), maturity (*Ln(Maturity)*), collateral (*Secured*), and covenants (*Covnt. index*).

Table 3.8 Panels A1 and A2 show definitions and summary statistics, respectively, for the variables used in our analysis based on the DealScan data. This sample includes observations at the facility-bank level for 438 lead banks and 5,866 borrowing firms from 1985:Q2 through 2016:Q4.[58]

Table 3.9 Panel A columns 1–4 report the results of estimating the credit spread equation (2) for term loans, and columns 5–8 report results for revolvers with varying sets of control variables. For both term loans and revolvers, we report the results of OLS and two-stage least squares analysis (2SLS) using *Senate polarization* as an instrument for *EPU(Composite)*. In all regressions, the estimated coefficient on *EPU(Composite)* are positive and statistically and economically significant, implying that supply effects dominate demand effects. The results imply that a one-standard-deviation increase in *EPU(Composite)* leads to an increase in the spread of about 13.90 to 26.93 basis points for term loans and about 17.53 to 29.07 basis points for revolvers. The estimated coefficients on control variables are generally consistent with expectations that risky borrowers are

with the largest assets as the lead lender.

[58] We find similar results when we follow Qian and Strahan (2007) and begin the sample period in 1994 to account for DealScan's improved coverage of lending to companies outside the U.S.

charged high interest spreads.[59]

Table 3.9 Panel B replicates the analysis by replacing the *EPU(Composite)* with its elements. The results still hold except for CPI- and tax-related policy uncertainty for on-balance sheet loans. Spreads for off-balance sheet revolvers are increasing in all *EPU* elements.

In our second analysis to test for bank credit supply effects, we evaluate the effects of *EPU* on the net tightening of credit standards on an aggregate basis using the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending Practices. We use responses to four SLOOS questions about banks' treatment of their commercial and industrial (C&I) loan and credit line customers.[60] The survey asks respondent banks quarterly whether their credit standards for large and middle-market firms and for small firms changed, as well as the spreads on these credits. For the credit standards, on- and off-balance sheet credits are combined, while the spreads are for on-balance sheet loans only. We use simple correlations in this analysis, rather than regressions because we have access only to aggregate time series responses, so we are unable to control for borrower and loan risk. The data for these correlations start in 1990:Q2, rather than 1985:Q2 because earlier SLOOS data are not publicly available. Table 3.8 Panels B1 and B2 show definitions and summary statistics, respectively, for the variables used in the analyses based on selected responses to the SLOOS from 1990:Q2 to 2016:Q4. There are 107 quarterly observations.

Table 3.10 shows the correlations between the *EPU* measures and the net percentages of SLOOS bank respondents reporting tightening credit standards and increasing spreads

[59] In an additional untabulated analysis, we also use fees for undrawn credits as a dependent variable. Consistent with the results in Table 9, these fees increase with *EPU*.

[60] C&I loans in the SLOOS analysis are loans to firms that are not secured by real estate. The commercial loans in our DealScan analysis include both C&I and commercial real estate (CRE) loans.

on loans to large and medium firms and to small firms. The net percentages are the differences at each point in time between tightening and loosening standards or increasing or decreasing spreads. The net tightening variables may be viewed as pure measures of loan supply, since they refer to lending standards. The net spread increases reflect whether supply or demand factors dominate.

These correlations suggest that *EPU* is associated with reduced supplies of credit to firms of both sizes. For *EPU(Composite)*, *EPU(News)*, and *EPU(CPI),* the correlations are large and positive in all cases, and statistically significant in all but one case. The effects of *EPU(Govt.)* are not significant and the effects of *EPU(Tax)* are negative and mostly statistically significant, consistent with much of our earlier analysis.

The results in this section suggest that our main findings of positive effects of *EPU* on asset-side and off-balance sheet-side liquidity hoarding primarily reflect reductions in credit supply by banks, rather than reduced demand by borrowers, consistent with *Hypotheses 2a* and *4a*. Although we do not rule out demand effects, our results suggest that supply effects dominate demand effects in determining the impact of *EPU* on bank liquidity hoarding. These supply findings suggest that the effects of *EPU* on asset-side and off-balance sheet-side liquidity hoarding may cause harm to the real economy and could be one of the channels behind the findings in the literature that uncertainty adversely affects corporate and consumer behavior.

We next test whether the higher liability-side liquidity hoarding (*LH(liab)*) in response to greater *EPU* is more attributable to banks' increased demand for deposits versus customers' increased supply (*Hypothesis 3a* versus *3b*). To the extent that banks' demand dominates customer supply, deposit interest rate spreads would increase in

response to an increase in *EPU*. We test this prediction using the following specification:

$$Deposit\ Spread_{i,t} = gEPU_{t-1} + l'X_{i,t-1} + m''W_{i,t-1} + n'Z_{t-1} + \alpha_i + q_t + \epsilon_{i,j,t} \quad (3)$$

where i indexes a bank, and t indicates a calendar quarter. The dependent variable is a deposit spread for checking accounts, saving accounts, or money market accounts, and the key independent variable is one or more of the *EPU* variables, *EPU(Composite*), *EPU(News), EPU(Govt.), EPU(CPI)*, or *EPU(Tax)*. We lag the independent variables to mitigate potential reverse-causality concerns and include the extensive set of controls from equation (1).

We obtain the deposit spreads data from RateWatch. Table 3.8 Panels C1 and C2 present definitions and summary statistics for the deposit spreads. The RateWatch data begin in 1998. There are 6,175 unique banks and nearly 5 million observations at the bank-deposit product-calendar quarter level from 1998:Q1 to 2016:Q4.

Table 3.11 presents the results from estimating equation (3). Columns 1–3 present coefficient estimates from OLS and 4–6 present coefficient estimates from 2SLS. All estimated coefficients on *EPU(Composite)* are positively and statistically significant. The results show that a one-standard-deviation increase in *EPU(Composite)* leads to an increase in the deposit rate spreads of about 91.96 to 129.40 basis points for checking accounts, 41.65 to 71.94 basis points for savings accounts, and 42.62 to 71.19 basis points for money market accounts. These results are consistent with the prediction of *Hypothesis 3a* that banks' increased demand for deposits dominates increased customer supply.

Thus, for all three *LH* components, the evidence suggests that bank supply and demand choices dominate customer choices in explaining our main findings.

3.6 CONCLUSIONS, POLICY IMPLICATIONS

An exciting new research agenda explores the implications of economic policy uncertainty (*EPU*), and finds adverse effects on corporate and household behavior. Much of this literature employs the innovative *EPU* measures provided by Baker, Bloom, and Davis (2016). We extend this literature by investigating another important potential channel through which *EPU* may affect the real economy – by increasing bank liquidity hoarding. We build a comprehensive new measure of bank liquidity hoarding and its components, which incorporate asset-, liability-, and off-balance sheet-side activities. We examine the effects of *EPU* on bank total liquidity hoarding and its three components, and test different hypotheses about these effects.

Our main empirical analysis covers over one million U.S. bank-quarter observations on over 17,000 banks for more than 30 years from 1985:Q2 to 2016:Q4, and yields economically and statistically significant results. We find that *EPU* increases bank liquidity hoarding on the asset-, liability-, and off-balance sheet-sides, resulting in increased total bank liquidity hoarding, findings that are robust to the use of instrumental variables and many other checks. This may be an important channel through which *EPU* affects the real economy.

We further investigate the extent to which our findings are driven by bank supply and demand choices versus customer choices. Only bank-driven effects would imply causality from *EPU* to the real economy running through the impact on bank liquidity hoarding. Our results using credit spreads for over 28,000 term loans and revolvers from DealScan, responses to the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS) for 107 quarters, and nearly five million deposit interest rate spreads from RateWatch suggest that

bank supply and demand choices primarily explain our findings, implying harm to the real economy. These findings also suggest that the banking channel may explain part of the negative effects of economic policy uncertainty on corporate and household behavior in the literature.

The findings have important policy implications. First, they suggest that policymakers might take into account the adverse consequences of leaving the public uncertain of their actions, which may harm the real economy through effects on banks, firms, households, and other nonbank financial institutions and markets. Second, they suggest that policymakers may consider promulgating policies that ensure that banks have sufficient liquidity during times of uncertainty.

Our findings also evoke potential ideas for future research. Clearly, more research on the relations among *EPU*, bank liquidity hoarding, and the real economy are in order. We also suggest that future research consider the effects of *EPU* on nonbank financial institutions and markets, which may also have significant real economic implications.

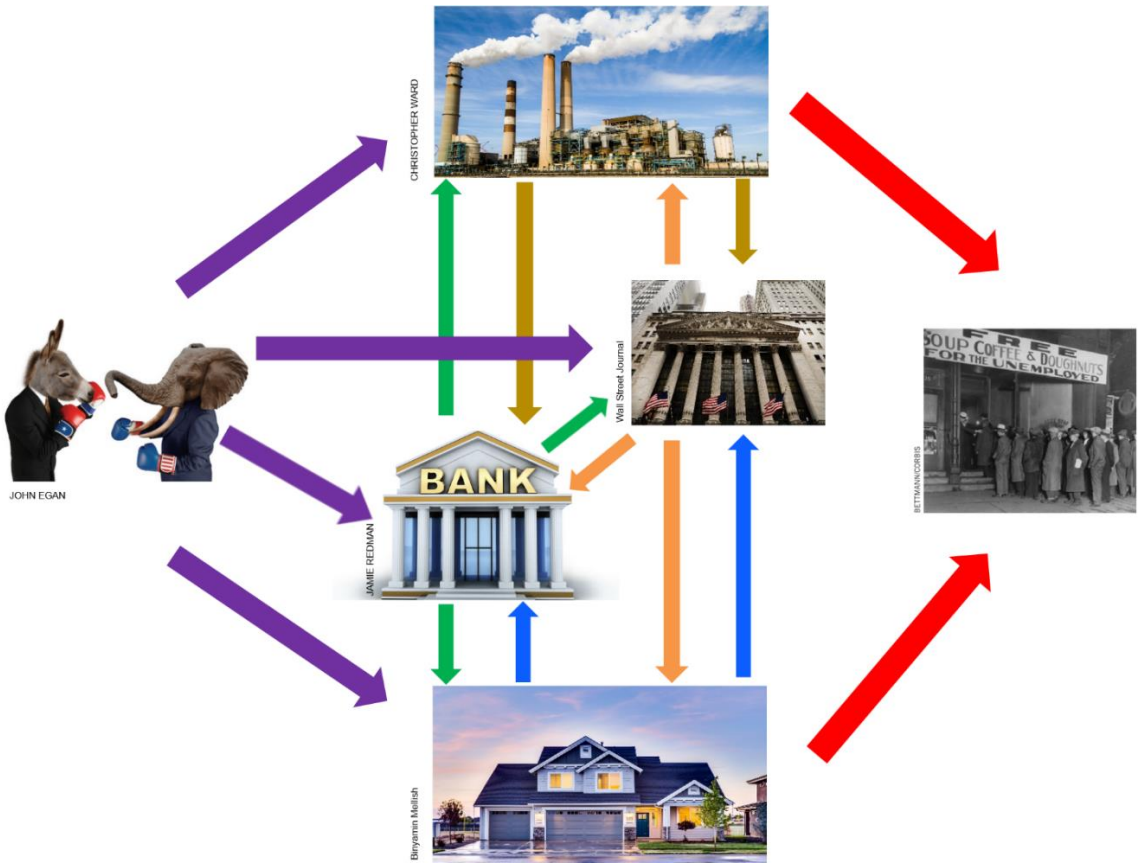

Figure 3.1: How Economic Policy Uncertainty Can Affect the Real Economy

Figure 3.1 shows how economic policy uncertainty (*EPU*) can affect the real economy through both real economic agents and financial intermediaries. *EPU* is represented by the symbols of the U.S. Democratic and Republican Parties fighting. The real economic agents of firms and households are depicted by the images of the factory and house, respectively. Banks are represented by the bank office building, and other financial agents such as nonbank financial institutions and markets are represented by the New York Stock Exchange. The real economy in an adverse condition is illustrated by the soup lines. Arrows represent directions of causation.

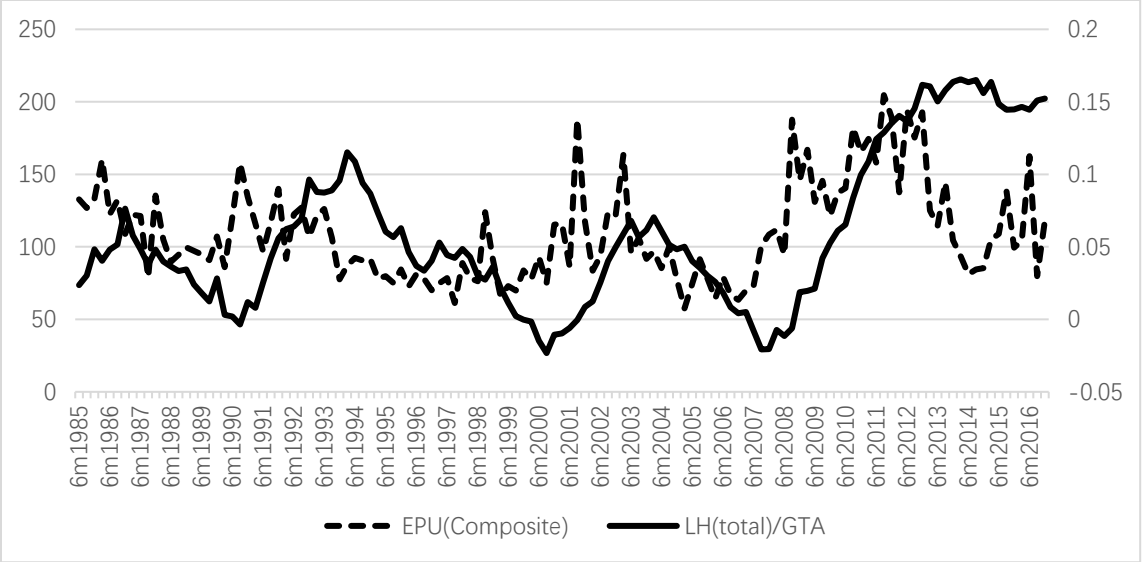

Figure 3.2: Patterns of Bank Liquidity Hoarding and Economic Policy Uncertainty

This figure shows the temporal patterns of bank liquidity hoarding for the nation as a whole as well as *EPU(Composite)* over our sample period from 1985:Q2 to 2016:Q4. Total bank liquidity hoarding (*LH(total)/GTA*) is defined as the sum of liquidity hoarding for the banking industry at each point in time divided by the sum of the gross total assets (*GTA*) for the industry at that time. Sources: authors' calculation, bank liquidity hoarding data is adapted from liquidity creation data from Bouwman's website (https://sites.google.com/a/tamu.edu/bouwman/data) and Call Report information, and *EPU* data is from Baker, Bloom, and Davis' website (http://www.policyuncertainty.com).

Table 3.1: Calculation of Bank Liquidity Hoarding

This table presents classifications of various balance sheet and off-balance sheet activities used to build the total bank liquidity hoarding measures. We assign positive weights (+1/2) to items contributing to liquidity hoarding by banks, and negative weights (-1/2) to items reducing liquidity hoarding by banks. Total bank liquidity hoarding, $LH(total) = LH(asset) + LH(liab) + LH(off)$, where $LH(asset) = (+1/2) \times$ liquid assets + $(-1/2) \times$ illiquid assets, $LH(liab) = (+1/2) \times$ liquid liabilities, and $LH(off) = (-1/2) \times$ illiquid guarantees + $(+1/2) \times$ liquid derivatives.

LH(asset)	
Liquid assets (weight = + 1/2)	**Illiquid assets (weight = - 1/2)**
Cash and due from other institutions	Commercial real estate loans (CRE)
All securities (regardless of maturity)	Loans to finance agricultural production
Trading assets	Commercial and industrial loans (C&I)
Fed funds sold	Other loans and lease financing receivables
	Other real estate owned (OREO)
	Customers' liability on bankers' acceptances
	Investment in unconsolidated subsidiaries
	Intangible assets
	Premises
	Other assets

LH(liab)	***LH(off)***	
Liquid liabilities (weight = + 1/2)	**Illiquid guarantees (weight = - 1/2)**	**Liquid derivatives (weight= + 1/2)**
Transactions deposits	Unused commitments	Interest rate derivatives
Savings deposits	Net standby letters of credit	Foreign exchange derivatives
Overnight federal funds purchased	Commercial and similar letters of credit	Equity and commodity derivatives
Trading liabilities	Net participations sold	
	All other off-balance sheet liabilities	

Table 3.2: Descriptions, Summary Statistics, Size Classes, and Correlations

This table presents descriptions, summary statistics, size classes, and correlations for bank liquidity hoarding (*LH*) and economic policy uncertainty (*EPU*), the dependent and key independent variables, respectively, for the main analysis. The sample includes 17,164 banks from 1985:Q2 through 2016:Q4. The observations are on a bank-calendar quarter level. Panel A presents variables definitions. Panel B reports descriptive statistics and Panel C provides descriptive statistics by bank size. Banks are categorized into size classes based on gross total assets (*GTA*). Panel D presents Pearson correlation coefficients across dependent variables and key independent variables. All dollar values are adjusted to real 2016 values using the implicit GDP price deflator. All control variables except macro variables are winsorized at 1% and 99% level.

Panel A: Descriptions of the dependent and key independent variables

Variable	Description
Dependent variables	
LH(total)/GTA	A bank's total liquidity hoarding measure including on- and off-balance sheet activities normalized by the gross total assets of a bank: *LH(total) = LH(asset)+LH(liab)+LH(off)*.
LH(asset)/GTA	A bank's liquidity hoarding measure in the asset-side, defined as (+1/2)×all items of liquid assets + (-1/2)×all items of illiquid assets normalized by the gross total assets of a bank. For a more detailed definition of all items belonging to liquid and illiquid assets, see Table 1.
LH(liab)/GTA	A bank's liquidity hoarding measure in the liability-side, defined as (+1/2)×all liquid liabilities normalized by the gross total assets of a bank. For a more detailed definition of all items belonging to liquid liabilities, see Table 1.
LH(off)/GTA	A bank's liquidity hoarding measure in the off-balance sheet-side, defined as (+1/2)×all items of illiquid guarantees + (-1/2)×all items of liquid derivatives normalized by the gross total assets of a bank. For a more detailed definition of all items belonging to liquid derivatives and illiquid guarantees, see Table 1.
Key independent variables	
EPU(Composite)	The natural log of the arithmetic average of the overall economic policy uncertainty measure developed by Baker, Bloom, and Davis (BBD 2016) over the three months of calendar quarter *t*.
EPU(News)	The natural log of the arithmetic average of the news-based element of the economic policy uncertainty measure developed by BBD over the three months of calendar quarter *t*.

EPU(Govt.)	The natural log of the arithmetic average of the government spending element of the economic policy uncertainty measure developed by BBD over the three months of calendar quarter *t*.
EPU(CPI)	The natural log of the arithmetic average of the inflation element of the economic policy uncertainty measure developed by BBD over the three months of calendar quarter *t*.
EPU(Tax)	The natural log of the arithmetic average of the tax-code element of the economic policy uncertainty measure developed by BBD over the three months of calendar quarter *t*.

Panel B: Summary statistics for the dependent and key independent variables

	N	Mean	StDev	25th Percentile	Median	75th Percentile
LH(total)/GTA	1,022,644	0.163	0.182	0.043	0.168	0.286
LH(asset)/GTA	1,022,644	-0.009	0.147	-0.111	-0.009	0.092
LH(liab)/GTA	1,022,644	0.215	0.068	0.168	0.209	0.258
LH(off)/GTA	1,022,644	-0.043	0.040	-0.061	-0.033	-0.013
EPU(Composite)	1,022,644	4.642	0.247	4.463	4.636	4.809
EPU(News)	1,022,644	4.631	0.277	4.427	4.586	4.828
EPU(Govt.)	1,022,644	4.560	0.451	4.164	4.544	4.882
EPU(CPI)	1,022,644	4.572	0.293	4.402	4.556	4.807
EPU(Tax)	1,022,644	3.760	1.614	2.602	2.821	4.871

Panel C: Descriptive statistics for bank liquidity hoarding dependent variables by bank size class

	Small banks (*GTA*<95th percentile ($1.3 billion))			Medium banks (95th percentile ($1.3 billion) ≤*GTA* <99th percentile ($11.0 billion))			Large banks (99th percentile ($11.0 billion) ≤*GTA*)		
	N	Mean	StDev	N	Mean	StDev	N	Mean	StDev
LH(total)/GTA	971,511	0.168	0.180	40,906	0.083	0.181	10,227	0.024	0.177
LH(asset)/GTA	971,511	-0.006	0.147	40,906	-0.072	0.132	10,227	-0.056	0.125
LH(liab)/GTA	971,511	0.213	0.067	40,906	0.252	0.077	10,227	0.237	0.088
LH(off) /GTA	971,511	-0.040	0.036	40,906	-0.097	0.054	10,227	-0.158	0.058

Table 3.3: Descriptions and Summary Statistics for the Main Analysis

This table presents descriptions and summary statistics for the control variables, instrumental variables, and additional uncertainty measures for the main analysis. The sample includes 17,164 banks from 1985:Q2 through 2016:Q4. The observations are on a bank-calendar quarter level. Panel A describes variables definitions. Panel B reports descriptive statistics for the whole sample. All dollar values are adjusted to real 2016 values using the implicit GDP price deflator. All control variables except macro variables are winsorized at 1% and 99% level.

Panel A: Description of control variables, instrumental variables, and additional uncertainty measures

Variable	Description
Control variables	
Ln(GTA)	The natural log of the *GTA* of a bank defined as the total asset + allowance for loan and lease losses + allocated transfer risk reserve (a reserve for certain foreign loans) in $1000.
Capital ratio	The total equity capital as a proportion of *GTA* for each bank.
HHI	A bank-level competition level calculated as a weighted average of the Herfindahl–Hirschman index in all areas (Metropolitan Statistical Area (MSA) or counties, if not included in MSA) in which a bank has a business. For each bank, the proportion of deposits in each area is used as weights.
Population	A bank-level population index calculated as the natural log of a weighted average of the population (in millions) in all areas in which a bank has a business. For each bank, the proportion of deposits in each area is used as weights.
Tobin's Q	A state-level cross-sectional average of normalized Tobin's Q defined as a firm-level Tobin's Q in quarter *t* normalized by a lagged total asset of each firm in the Compustat data whose headquarters is located in a corresponding state. Tobin's Q is defined as the market value of assets divided by the book value of assets (Compustat Item 6). A firm's market value of assets equals the book value of assets plus the market value of common stock less the sum of the book value of common stock (Compustat Item 60) and balance sheet deferred taxes (Compustat Item 74).
Cash flows	A state-level cross-sectional average of operating cash flows for each firm in quarter *t* divided by lagged total assets of each firm in the Compustat data whose headquarters is located in a corresponding state. Cash flow is calculated as the sum of earnings before extraordinary items (Compustat Item 18) and depreciation (Compustat Item 14).
Election year	A binary variable equal to one if the calendar year is a presidential election year and zero otherwise.

SD (stock ret.)	The standard deviation of daily value-weighted stock market returns from WRDS in quarter *t*.
GDP dispersion	Forecast dispersion of real GDP defined as 75th percentile minus 25th percentile scaled by the absolute value of 75th percentile of expected real GDP growth in the next quarter from the Survey of Professional Forecasters of the Federal Reserve Bank of Philadelphia.
Instrumental variable	
Senate polarization	An instrumental variable for economic policy uncertainty (*EPU*). A measure of partisan polarization tracking legislators' ideological positions based on McCarty, Poole, and Rosenthal (1997).
Additional uncertainty measures	
VIX	Implied volatility conveyed by S&P 500 stock index option prices from 1990 to 2016 obtained from the Federal Reserve Bank of St. Louis.
Monetary uncerty	A measure of monetary policy uncertainty based on terms related to monetary policy and economic policy uncertainty from 2,000 U.S. newspapers of the Access World News database. For additional information, refer to BBD's website.
Fin reg uncerty	A measure of financial regulation uncertainty based on terms related to financial regulation and economic policy uncertainty from 2,000 U.S. newspapers of the Access World News database. For additional information, refer to BBD's website.
Regulation uncerty	A measure of regulation uncertainty based on terms related to regulation and economic policy uncertainty from 2,000 U.S. newspapers of the Access World News database. For additional information, refer to BBD's website.
Macro uncerty	A measure of 3-month ahead common macro uncertainty based on Jurado, Ludvigson, and Ng (2015). For additional information, refer to Ludvigson's website.

Panel B: Summary statistics control variables, instrumental variables, and additional uncertainty measures

	N	Mean	StDev	25th Percentile	Median	75th Percentile
GTA	1,022,644	1,133,312	22,900,000	61,440	116,168	250,467
Capital ratio	1,022,644	0.070	0.030	0.049	0.064	0.086
HHI	1,022,644	0.083	0.099	0.019	0.053	0.119
Population	1,022,644	1.776	0.888	1.182	1.693	2.469
Tobin's Q	1,022,644	2.087	0.844	1.625	1.876	2.272
Cash flows	1,022,644	0.008	0.024	0.000	0.013	0.022
Election year	1,022,644	0.242	0.429	0.000	0.000	0.000
SD (stock ret.)	1,022,644	0.009	0.005	0.006	0.008	0.010
GDP dispersion	1,022,644	0.427	0.454	0.240	0.304	0.437
Senate polarization	975,206	0.717	0.107	0.611	0.732	0.796
VIX	794,137	19.552	7.118	14.080	17.840	22.840
Monetary uncerty	1,022,644	4.445	0.486	4.109	4.439	4.814
Fin reg uncerty	1,022,644	4.235	0.838	3.633	4.225	4.849
Regulation uncerty	1,022,644	4.536	0.413	4.242	4.497	4.835
Macro uncerty	1,022,644	0.776	0.069	0.726	0.772	0.807

Table 3.4: Effects of EPU On Bank Total Liquidity Hoarding

This table presents coefficient estimates from regressions of the total bank liquidity hoarding normalized by the gross total assets (*LH(total) / GTA*) on the economic policy uncertainty measures (*EPU*) and controls. The sample includes 17,164 banks from 1985:Q2 through 2016:Q4. All variables are described in Tables 3.2 and 3.3. Coefficients on constant terms are omitted for brevity. t-statistics are reported in parentheses and are based on standard errors clustered at a bank and year-quarter level. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
EPU(Composite)	0.091***					
	(8.85)					
EPU(News)		0.081***				0.053***
		(7.00)				(3.94)
EPU(Govt.)			0.062***			0.056***
			(8.53)			(7.69)
EPU(CPI)				0.010		-0.012
				(1.16)		(-1.34)
EPU(Tax)					-0.001	-0.008***
					(-0.46)	(-4.08)
Ln(GTA)	-0.097***	-0.099***	-0.088***	-0.097***	-0.097***	-0.084***
	(-12.62)	(-12.79)	(-11.40)	(-12.29)	(-12.23)	(-10.89)
Sqr. Ln(GTA)	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(4.82)	(4.89)	(4.76)	(4.95)	(4.97)	(4.72)
Capital ratio	-0.506***	-0.569***	-0.274***	-0.511***	-0.508***	-0.191**
	(-6.15)	(-6.67)	(-3.42)	(-5.47)	(-5.18)	(-2.51)
HHI	-0.078***	-0.080***	-0.082***	-0.099***	-0.100***	-0.071***
	(-6.08)	(-6.60)	(-6.68)	(-7.40)	(-7.61)	(-6.61)
Population	-0.003	-0.008	0.027*	0.006	0.007	0.038***
	(-0.23)	(-0.67)	(1.98)	(0.45)	(0.51)	(2.83)
Tobin's Q	0.001	0.001	-0.000	-0.002	-0.002	0.002
	(0.50)	(0.78)	(-0.17)	(-1.25)	(-1.24)	(1.51)
Cash flows	0.134***	0.142***	0.076*	0.135***	0.134***	0.091**
	(3.16)	(3.10)	(1.83)	(2.80)	(2.76)	(2.19)
Election year	0.007	0.006	0.009*	0.007	0.007	0.010*
	(1.20)	(0.97)	(1.67)	(0.90)	(0.92)	(1.94)
SD (stock ret.)	-3.143***	-3.771***	-1.597**	-2.075**	-2.076**	-2.722***
	(-3.55)	(-3.91)	(-2.01)	(-2.25)	(-2.21)	(-3.02)
GDP dispersion	-0.014*	-0.010	-0.016**	-0.005	-0.003	-0.017**
	(-1.67)	(-1.16)	(-2.54)	(-0.75)	(-0.49)	(-2.07)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.719	0.717	0.723	0.707	0.707	0.728
Number of obs.	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644

Table 3.5: Effects of EPU on Components of Bank Liquidity Hoarding

This table presents coefficient estimates from regressions of components of liquidity hoarding measures on elements of economic policy uncertainty measures. The sample includes 17,164 banks from 1985:Q2 through 2016:Q4. *Controls* include *Ln(GTA)*, *Sqr. Ln(GTA)*, *Capital ratio*, *HHI*, *Population*, *Tobin's Q*, *Cash flows*, *Election year*, *SD (stock ret.), GDP dispersion*. Coefficients on *Controls* are omitted for brevity. Panels A–C present coefficients estimates from regressions of asset-side liquidity hoarding (*LH(asset)/GTA*), liability-side liquidity hoarding (*LC(liab)/GTA*), and off-balance sheet liquidity hoarding (*LH(off)/GTA*), respectively. All variables are described in Tables 3.2 and 3.3. *t*-statistics are reported in parentheses and are based on standard errors clustered at a bank and year-quarter level. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Panel A: The effects of *EPU* on asset-side liquidity hoarding (*LH(asset)/GTA*)

	Dep. = *LH(asset) / GTA*					
	(1)	(2)	(3)	(4)	(5)	(6)
EPU(Composite)	0.040***					
	(6.40)					
EPU(News)		0.037***				0.028***
		(5.79)				(3.59)
EPU(Govt.)			0.036***			0.036***
			(7.51)			(7.65)
EPU(CPI)				0.005		-0.001
				(0.96)		(-0.19)
EPU(Tax)					-0.007***	-0.012***
					(-5.10)	(-9.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.724	0.724	0.728	0.720	0.723	0.736
Number of obs.	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644

Panel B: The effects of *EPU* on liability-side liquidity hoarding (*LH(liab)/GTA*)

	Dep. = *LH(liab) / GTA*					
	(1)	(2)	(3)	(4)	(5)	(6)
EPU(Composite)	0.029***					
	(5.59)					
EPU(News)		0.032***				0.020***
		(5.72)				(2.82)
EPU(Govt.)			0.011***			0.007*
			(3.74)			(1.70)
EPU(CPI)				-0.009		-0.020***
				(-1.62)		(-2.76)
EPU(Tax)					0.006***	0.005***
					(3.67)	(2.99)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.683	0.686	0.678	0.676	0.683	0.695
Number of obs.	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644

Panel C: The effects of *EPU* on off-balance sheet liquidity hoarding (*LH(off)/GTA*)

	Dep. = *LH(off) / GTA*					
	(1)	(2)	(3)	(4)	(5)	(6)
EPU(Composite)	0.022***					
	(13.57)					
EPU(News)		0.012***				0.004**
		(5.08)				(2.22)
EPU(Govt.)			0.015***			0.013***
			(14.42)			(9.90)
EPU(CPI)				0.014***		0.009***
				(6.20)		(3.83)
EPU(Tax)					0.000	-0.002***
					(0.49)	(-5.88)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.702	0.692	0.707	0.696	0.688	0.711
Number of obs.	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644	1,022,644

Table 3.6: Instrumental Variable Analysis and Placebo Tests

This table presents coefficient estimates from instrumental variable analysis (Panel A) and placebo tests (Panel B). The instrumental variable analysis is based on the two-stage least-squares regressions approach with the U.S. Senate polarization measure as an instrumental variable for the overall policy uncertainty (*EPU(Composite)*). The sample period for the *Senate polarization* is 1985:Q2 to 2015:Q1. The placebo test is based on random samples of *EPU(Composite)* drawn from the sample distribution of *EPU(Composite)*. We present an average coefficient estimate on *EPU(Composite)* based on 100 random samples of *EPU(Composite)*. *Controls* include *Ln(GTA)*, *Sqr. Ln(GTA)*, *Capital ratio*, *HHI*, *Population*, *Tobin's Q*, *Cash flows*, *Election year*, *SD (stock ret.), GDP dispersion*. Coefficients on *Controls* are omitted for brevity. All variables are described in Tables 3.2 and 3.3. *t*-statistics are reported in parentheses and are based on bootstrap standard errors clustered at a bank and quarter level (Panel A) or sample standard errors of the estimated coefficients (Panel B). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Panel A: Instrumental variable analysis

	First Stage	Second Stage			
	(1) *EPU (Composite)*	(2) *LH(total)/GTA*	(3) *LH(asset)/GTA*	(4) *LH(liab)/GTA*	(5) *LH(off)/GTA*
$\widehat{EPU}(Composite)$		0.096***	0.027***	0.035***	0.035***
		(6.11)	(3.12)	(4.47)	(12.34)
Senate polarization	4.208***				
	(5.36)				
Controls	Yes	Yes	Yes	Yes	Yes
Bank FE	-	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.485	0.138	0.205	0.266	0.213
Number of obs.	119	975,206	975,206	975,206	975,206

Panel B: Placebo tests

	(1) *LH(total) / GTA*	(2) *LH(asset) / GTA*	(3) *LH(liab) / GTA*	(4) *LH(off) / GTA*
$\widehat{EPU}$*(Composite)*	0.002	0.001	0.000	0.001
	(0.22)	(0.23)	(0.06)	(0.30)
Controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes
Number of obs.	1,022,644	1,022,644	1,022,644	1,022,644

Table 3.7: Controlling for other Uncertainty Measures

This table replicates column 1 of Table 3.4 with other uncertainty measures as additional controls. Columns 1–5 include implied volatility of equity options (*VIX*), monetary policy uncertainty (*Monetary uncerty*), financial regulation uncertainty (*Fin reg uncerty*), regulation uncertainty (*Regulation uncerty*), overall macroeconomic uncertainty (*Macro uncerty*), respectively. All variables are described in Tables 3.2 and 3.3. *Controls* include *Ln(GTA)*, *Sqr. Ln(GTA)*, *Capital ratio*, *HHI*, *Population*, *Tobin's Q*, *Cash flows*, *Election year*, *SD (stock ret.)*, *GDP dispersion*. Coefficients on *Controls* are omitted for brevity. *t*-statistics are reported in parentheses and are based on standard errors clustered at a bank and year-quarter level. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1) *LH(total)/GTA*	(2) *LH(total)/GTA*	(3) *LH(total)/GTA*	(4) *LH(total)/GTA*	(5) *LH(total)/GTA*	(6) *LH(total)/GTA*
EPU(Composite)	0.101***	0.100***	0.105***	0.085***	0.103***	0.094***
	(9.02)	(8.51)	(6.77)	(6.24)	(12.21)	(6.90)
VIX	-0.001*					-0.001**
	(-1.91)					(-2.07)
Monetary uncerty		-0.013*				-0.016**
		(-1.93)				(-2.62)
Fin reg uncerty			-0.007			-0.002
			(-1.43)			(-0.47)
Regulation uncerty				0.006		0.015*
				(0.72)		(1.91)
Macro uncerty					-0.425***	-0.466***
					(-10.08)	(-10.86)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.756	0.719	0.719	0.719	0.731	0.771
Number of obs.	794137	1022644	1022644	1022644	1022644	794137

Table 3.8: Description and Summary Statistics for Supply/Demand Choices Analyses

This table presents definitions of variables and summary statistics for the variables used in bank supply/demand choices versus customer choices analyses. Panels A1 and A2 show the definitions and summary statistics, respectively, for the variables used in the analysis of the impact of *EPU* on credit spreads based on DealScan data. The observations are at the credit facility–bank level from 1985:Q2 through 2016:Q4. Panels B1 and B2 show the definitions and summary statistics, respectively, for the variables used in the analyses based on selected responses to the Federal Reserve's Senior Loan Officer Survey from 1990:Q2 to 2016:Q4. The data for these correlations start in 1990:Q2 rather than 1985:Q2 because earlier data from the Survey are not publicly available. Panels C1 and C2 present definitions and summary statistics for the deposit spreads. There are 6,175 unique banks and observations are at the bank-deposit product-calendar quarter level from 1998:Q1 to 2016:Q4.

Panel A1: Description of variables for the samples used in bank credit supply versus customer demand analyses for DealScan data, 1985:Q2 to 2016:Q4.

Variable	Description
Bank loan variables	
Credit spread	The all-in spread drawn defined as the borrowing spread and annual fee (if any) the borrower pays in basis points over LIBOR or LIBOR equivalent for each dollar drawn down.
Credit size	Loaned amount scaled by the borrower's total asset.
Ln(Maturity)	The natural log of the loan maturity (in months) from the credit facility's issue date.
Secured	A binary variable equal to one if a credit facility is secured by collateral and zero otherwise.
Covnt. Index	Covenant intensity index based on Bradley and Roberts (2015), which is defined as the sum of all covenants embedded in the loan (i.e., two or more restricted accounting ratios, secured loans, dividend restriction, asset sweep, debt sweep, equity sweep).
Term loans	A binary variable equal to one if a credit contract belongs to the following credit types in the LPC DealScan data: Term Loan, Term Loan A, Term Loan B, Term Loan C, Term Loan D, Term Loan E, Term Loan F, Term Loan G, Term Loan H, Term Loan I, or Delay Draw Term Loan, and zero otherwise.
Revolvers	A binary variable equal to one if a credit contract belongs to the following credit types in the LPC DealScan data: Revolver/Line < 1 Yr or Revolver/Line ≥ 1 Yr, and zero otherwise.

Borrowing firms variables

Ln(ME)	The natural log of the market value of a firm defined as the number of outstanding shares (in 1,000) multiplied by the market price per share.
BE_ME	The book value of equity defined as the total stockholder's equity plus deferred taxes and investment tax credit minus preferred stock value divided by the market value of a firm.
Leverage	Total debt (short-term debt + long-term debt) divided by total assets.
Tangible	Net property, plant, and equipment divided by the total assets.
Cash	Cash and short-term investment divided by total assets.
Z_score	(3.3×pre-tax income + sales + 1.4×retained earnings + 1.2×(current assets – current liability)) / book assets (Altman (1968)).
Credit rating	A credit rating score ranging from zero (for C or below) to 20 (for AAA) with an increment of one for each rating category based on an issuer's long-term S&P credit rating.

Panel A2: Summary statistics for the variables used in bank credit supply versus customer demand analyses for DealScan data, 1985:Q2 to 2016:Q4.

	N	Mean	StDev	25th	Median	75th
Bank loan variables						
Credit spread	28,202	187.362	120.103	100.000	175.000	255.000
Credit size	28,202	0.221	0.225	0.070	0.150	0.290
Ln(Maturity)	27,434	3.821	0.548	3.611	4.111	4.111
Secured	28,202	0.321	0.467	0.000	0.000	1.000
Covnt. Index	28,202	1.810	2.053	0.000	1.000	4.000
Term loans	28,202	0.292	0.455	0.000	0.000	1.000
Borrower variables						
Ln(ME)	28,202	13.435	2.009	11.980	13.498	14.873
BE_ME	28,202	0.768	1.200	0.272	0.485	0.820
Leverage	28,202	0.282	0.215	0.116	0.256	0.403
Tangible	28,202	0.324	0.239	0.127	0.263	0.484
Cash	28,202	0.088	0.113	0.015	0.043	0.116
Z_score	28,202	1.647	1.239	0.814	1.607	2.413
Credit rating	14,222	10.292	3.161	8.000	10.000	12.000

Panel B1: Description of variables for the samples used in bank credit supply versus customer demand analyses for selected responses to the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending Practices, 1990:Q2 to 2016:Q4.

Net tightened standards for C&I loans or credit lines to large and medium firms	Net percentage of domestic respondents reporting tightened standards for C&I loans or credit lines on large and medium firms from the Federal Reserve's SLOOS on Bank Lending Practices from 1990:Q2 to 2016:Q4.
Net tightened standards for C&I loans or credit lines to small firms	Net percentage of domestic respondents reporting tightened standards for C&I loans or credit lines on small firms from the Federal Reserve's SLOOS on Bank Lending Practices from 1990:Q2 to 2016:Q4.
Net increased interest rates spread on loans to large and medium firms	Net percentage of domestic respondents reporting increased spreads of loan rates over banks' cost of funds on large and medium firms from the Federal Reserve's SLOOS on Bank Lending Practices from 1990:Q2 to 2016:Q4.
Net increased interest rates spread on loans to small firms	Net percentage of domestic reporting increased spreads of loan rates over banks' cost of funds on small firms from the Federal Reserve's SLOOS on Bank Lending Practices from 1990:Q2 to 2016:Q4.

Panel B2: Summary statistics for the samples used in bank credit supply versus customer demand analyses for selected responses to the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending Practices, 1990:Q2 to 2016:Q4.

	N	Mean	StDev	25th Percentile	Median	75th Percentile
Net tightened standards for C&I loans or credit lines to large and medium firms	107	5.942	22.871	-8.800	-0.900	14.000
Net tightened standards for C&I loans or credit lines to small firms	107	5.467	19.593	-7.000	-1.800	9.400
Net increased interest rates spread on loans to large and medium firms	107	-10.440	42.921	-46.100	-28.800	27.100
Net increased interest rates spread on loans to small firms	107	-8.130	33.442	-32.700	-16.700	14.000

Panel C1: Description of variables for the samples used in bank demand versus customer supply of deposit analyses for RateWatch data, 1998:Q1to 2016:Q4.

Variable	Description
Deposit spread (checking accounts)	Checking account rate minus 3-month T-bill rate. Checking account rate is defined as the average rate of same checking account products across all balances requirements in basis points.
Deposit spread (saving accounts)	Savings account rate minus 3-month T-bill rate. Savings account rate is defined as the average rate of same savings account products across all balances requirements in basis points.
Deposit spread (money market accounts)	Money market account rate minus 3-month T-bill rate. Money market account rate is defined as the average rate of same money market account products across all balances requirements in basis points.

Panel C2: Summary statistics for the variables used in bank demand versus customer supply of deposit analyses for RateWatch data, 1998:Q1 to 2016:Q4.

	N	Mean	StDev	25th Percentile	Median	75th Percentile
Deposit spread (checking accounts)	327,323	-113.909	155.118	-236.667	-31.667	3.000
Deposit spread (saving accounts)	1,420,872	-18.343	88.009	-8.000	5.000	15.000
Deposit spread (money market accounts)	3,198,535	-15.435	91.485	-11.000	8.000	23.000

Table 3.9: Effects of EPU on Credit Spreads at the Intensive Margin

This table presents coefficient estimates from regressions of the credit spreads on the economic policy uncertainty measures and controls. Panel A reports the effects of *EPU(Composite)* on credit spreads and Panel B replicates Panel A by replacing the *EPU(Composite)* with each element of *EPU*. The sample includes 438 lead banks and 5,866 borrowing firms from 1985:Q2 through 2016:Q4. Senate polarization is used as an instrumental variable for *EPU(Composite)*. Controls include *Ln(GTA), Sqr. Ln(GTA), Capital ratio, HHI, Population, Tobin's Q, Cash flows, Election year, SD (stock ret.), GDP dispersion*. All variables are described in Tables 3.2, 3.3, and 3.8. t-statistics are reported in parentheses and are based on standard errors clustered at a bank and year-quarter level (for OLS) and bootstrap standard errors clustered at a bank and quarter level (for 2SLS). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Panel A: The effects of *EPU (Composite)* on credit spreads

	Term loans (On-balance sheet)				*Revolvers (Off-balance sheet)*			
	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) OLS	(6) OLS	(7) 2SLS	(8) 2SLS
EPU(Composite)	58.681***	56.282***	109.021***	99.779***	70.976***	72.759***	117.694***	116.284***
	(3.99)	(4.21)	(5.05)	(5.36)	(6.29)	(7.30)	(7.28)	(7.49)
Ln (ME)	-71.149***	-89.059***	-68.851***	-86.022***	-60.010***	-53.207***	-61.853***	-54.909***
	(-4.20)	(-7.25)	(-4.14)	(-7.18)	(-13.20)	(-8.15)	(-13.81)	(-9.97)
Sqr. Ln(ME)	2.055***	2.687***	1.984***	2.587***	1.790***	1.839***	1.854***	1.887***
	(3.45)	(6.03)	(3.33)	(5.89)	(11.43)	(9.00)	(11.45)	(9.74)
BE_ME	-3.201*	-2.581	-2.912	-2.343	-2.376**	1.753	-2.424**	1.531
	(-1.96)	(-1.37)	(-1.46)	(-1.23)	(-2.02)	(1.38)	(-2.29)	(1.42)
Leverage	-6.800	-15.452	-6.516	-15.211	19.445**	20.780***	19.780***	20.990***
	(-0.49)	(-1.13)	(-0.46)	(-1.11)	(2.52)	(3.36)	(3.12)	(3.81)
Tangible	2.780	11.507**	1.230	9.821*	-18.452***	-16.330***	-19.321***	-17.297***
	(0.45)	(2.13)	(0.20)	(1.87)	(-3.19)	(-3.09)	(-3.67)	(-3.36)
Cash	41.314*	44.353**	40.139*	43.436**	3.610	-15.195***	5.917	-12.246**
	(1.89)	(2.27)	(1.80)	(2.16)	(0.59)	(-2.76)	(0.91)	(-2.07)
Z_score	-7.853***	-6.791***	-8.000***	-6.962***	-6.526***	-6.094***	-6.468***	-6.110***
	(-3.66)	(-3.56)	(-3.80)	(-3.52)	(-7.98)	(-8.51)	(-9.18)	(-6.88)
Credit rating	-18.945***	-14.944***	-18.959***	-14.991***	-17.445***	-15.070***	-17.222***	-14.858***
	(-10.01)	(-7.24)	(-9.87)	(-7.95)	(-15.82)	(-12.62)	(-13.82)	(-11.97)
Credit size		0.292		0.176		-11.792***		-11.207***
		(0.14)		(0.09)		(-7.16)		(-7.65)

Ln(Maturity)		-3.102		-2.988		-20.456***		-20.218***
		(-0.53)		(-0.50)		(-5.40)		(-5.14)
Secured		78.061***		77.491***		25.446***		25.665***
		(12.88)		(12.34)		(6.51)		(7.23)
Covnt. index		-1.272		-1.473		5.108***		4.898***
		(-0.94)		(-1.13)		(5.00)		(5.36)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.376	0.431	0.382	0.435	0.582	0.621	0.589	0.626
Number of obs.	4228	4147	4228	4147	9994	9721	9994	9721

Panel B: The effects of *EPU* elements on the credit spreads

	Term loans (On-balance sheet)					*Revolvers (Off-balance sheet)*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EPU(News)	41.294***				35.451**	43.971***				21.220**
	(2.97)				(2.07)	(5.94)				(2.06)
EPU(Govt.)		40.538***			35.403***		49.678***			39.209***
		(5.26)			(3.90)		(6.40)			(4.74)
EPU(CPI)			8.624		13.613			27.347***		8.079
			(0.71)		(1.09)			(2.97)		(1.01)
EPU(Tax)				-1.826	-7.309***				7.094***	2.209
				(-0.83)	(-2.72)				(2.71)	(1.47)
Borrower controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Loan controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Seasonal FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.429	0.432	0.424	0.424	0.436	0.609	0.621	0.604	0.607	0.624
Number of obs.	4147	4147	4147	4147	4147	9721	9721	9721	9721	9721

Table 3.10: Correlations of EPU with SLOOS on Bank Lending Practices

This table presents the correlations between the *EPU* measures and the net percentages of respondents that reported tightening credit standards and increasing spreads to the two size classes of firms. Commercial and industrial (C&I) loans are made to a firm and not secured by real estate. The sample period is 1990:Q2 to 2016:Q4. The data start in 1990:Q2, rather than 1985:Q2 as in previous analyses because earlier data from the Survey are not publicly available. All variables are described in Tables 3.2, 3.3, and 3.8. Correlations with *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Net tightened standards for C&I loans or credit lines to large and medium firms	*Net tightened standards for C&I loans or credit lines to small firms*	*Net increased interest rates spread on loans to large and medium firms*	*Net increased interest rates spread on loans to small firms*
EPU(Composite)	0.191**	0.225**	0.195**	0.192**
EPU(News)	0.320***	0.311***	0.296***	0.261***
EPU(Govt.)	-0.083	-0.048	-0.009	0.050
EPU(CPI)	0.158	0.219**	0.233**	0.281***
EPU(Tax)	-0.194**	-0.098	-0.199**	-0.193**

Table 3.11: Effects of EPU on Deposit Rate Spreads At The Intensive Margin

This table presents coefficient estimates from regressions of the deposit interest rate spreads on the economic policy uncertainty measures and controls. Panel A reports the effects of *EPU(Composite)* on deposit interest rate spreads and Panel B replicates Panel A by replacing the *EPU(Composite)* with each element of *EPU*. The sample includes 6,175 banks and 4,946,730 deposit products×quarter observations from RateWatch covering the sample period 1998:Q1 through 2016:Q4. *Senate polarization* is used as an instrumental variable for *EPU(Composite)*. All variables are described in Tables 3.2, 3.3, and 3.8. *t*-statistics are reported in parentheses and are based on standard errors clustered at a bank and year-quarter level (for OLS) and bootstrap standard errors clustered at a bank and quarter level (for 2SLS). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Panel A: The effects of *EPU (Composite)* on deposit interest rate spreads

	OLS			2SLS		
	(1) *Checking accounts*	(2) *Savings accounts*	(3) *Money market accounts*	(4) *Checking accounts*	(5) *Savings accounts*	(6) *Money market accounts*
EPU(Composite)	372.327***	168.602***	172.554***	523.893***	291.240***	288.204***
	(8.99)	(5.38)	(5.86)	(7.76)	(5.00)	(5.67)
Ln(GTA)	-7.620	1.257	7.110	-16.701	6.465	8.270
	(-0.56)	(0.10)	(0.74)	(-0.98)	(0.46)	(0.77)
Sqr. Ln(GTA)	2.451***	2.970***	1.803***	2.820***	2.899***	1.800***
	(4.51)	(5.07)	(3.82)	(4.13)	(4.36)	(3.30)
Capital ratio	847.506***	1109.225***	858.331***	739.652**	1106.027***	856.281***
	(3.73)	(6.89)	(6.34)	(2.48)	(5.00)	(4.54)
HHI	-51.472**	-38.583***	-30.938***	-122.833***	-60.877***	-54.292***
	(-2.12)	(-4.11)	(-3.17)	(-3.39)	(-4.15)	(-3.69)
Population	151.020***	130.351***	118.845***	159.483***	120.350***	111.387***
	(3.47)	(3.20)	(3.47)	(3.03)	(2.99)	(3.14)
Tobin's Q	-14.113***	-3.307	-4.022**	-6.627**	-2.248	-2.398
	(-4.81)	(-1.65)	(-2.12)	(-2.04)	(-1.24)	(-1.36)
Cash flows	-40.038	18.832	24.004	-200.725	-62.669	-51.466
	(-0.38)	(0.33)	(0.40)	(-1.58)	(-1.04)	(-0.80)
Election year	-1.039	-25.772***	-21.818**	7.817	-22.080*	-16.206
	(-0.05)	(-2.70)	(-2.10)	(0.33)	(-1.88)	(-1.35)
SD (stock ret.)	-3480.696	-1788.125	-1150.878	129.865	-1881.846	-902.713
	(-1.32)	(-1.33)	(-0.82)	(0.05)	(-1.33)	(-0.67)
GDP dispersion	20.061	26.217*	27.130*	-54.079**	-5.168	-6.827
	(0.88)	(1.80)	(1.86)	(-2.14)	(-0.34)	(-0.45)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.666	0.508	0.510	0.606	0.501	0.503
Number of obs.	327,323	1,420,872	3,198,535	299,411	1,116,685	2,579,954

Panel B: The effects of *EPU components* on deposit interest rate spreads

	(1)	(2)	(3)	(4)	(5)
	Checking accounts	*Checking accounts*	*Checking accounts*	*Checking accounts*	*Checking accounts*
EPU(News)	323.429***				274.034***
	(8.13)				(6.64)
EPU(Govt.)		213.470***			117.629***
		(7.27)			(3.67)
EPU(CPI)			82.067*		71.008*
			(1.75)		(1.88)
EPU(Tax)				25.631***	-4.543
				(3.18)	(-0.54)
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Seasonal FE	YES	YES	YES	YES	YES
Adj. R-squared	0.634	0.540	0.357	0.391	0.703
Number of obs.	327,323	327,323	327,323	327,323	327,323

	(1)	(2)	(3)	(4)	(5)
	Savings account	*Savings account*	*Savings account*	*Savings account*	*Savings account*
EPU(News)	164.228***				160.591***
	(4.13)				(4.08)
EPU(Govt.)		120.305***			86.852***
		(5.77)			(4.96)
EPU(CPI)			71.271***		56.043**
			(4.22)		(2.20)
EPU(Tax)				12.983***	-11.859*
				(3.28)	(-1.99)
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Seasonal FE	YES	YES	YES	YES	YES
Adj. R-squared	0.476	0.477	0.329	0.340	0.592
Number of obs.	1,420,872	1,420,872	1,420,872	1,420,872	1,420,872

	(1)	(2)	(3)	(4)	(5)
	Money market accounts	*Money market accounts*	*Money market accounts*	*Money market accounts*	*Money market accounts*
EPU(News)	162.570***				154.357***
	(4.67)				(4.75)
EPU(Govt.)		118.893***			79.640***
		(6.23)			(4.53)
EPU(CPI)			75.259***		64.090***
			(4.19)		(2.68)
EPU(Tax)				13.009***	-10.874**
				(3.32)	(-2.13)
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Seasonal FE	YES	YES	YES	YES	YES
Adj. R-squared	0.476	0.469	0.336	0.342	0.578
Number of obs.	3,198,535	3,198,535	3,198,535	3,198,535	3,198,535

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