National culture and bank liquidity creation

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A B S T R A C T

This paper investigates the effects of national culture on bank liquidity creation. Using a sample that covers 66 countries over the 2001–2014 period, we find that individualism is associated with greater bank liquidity creation. This evidence lends more weight to the risk-taking and overconfidence bias explanations. We also find that the effect is stronger for larger banks. Moreover, individualism is associated with more (less) liquidity creation in developed (developing) countries, suggesting that social connections and better access to soft information are relevant explanations in developing countries. Additional analysis suggests that the other cultural dimensions of uncertainty avoidance and power distance are related to lower bank liquidity creation. The results remain robust for a battery of sensitivity checks, and for confronting endogeneity and omitted variables concerns.

1. Introduction

A primary role of banks in the economy is to create liquidity. Banks do this either on the balance sheet, by using liquid liabilities such as deposits to fund relatively illiquid assets such as business loans (e.g., Bryant, 1980; Diamond and Dybvig, 1983), or off–balance sheet, by issuing guarantees such as loan commitments and letters of credit (Holmström and Tirole, 1998; Kashyap et al., 2002). This financial intermediation role of banks has been shown to affect financial development and overall growth (Levine and Zervos, 1998). More specifically, research shows that bank liquidity creation is a strong determinant of capital allocation and a driver of economic growth (Bencivenga and Smith, 1991).

An emerging body of literature focusing on bank liquidity creation identifies capital, size, competition, M&A, corporate governance, religion, legal, and regulatory intervention as significant determinants (e.g., Berger and Bouwman, 2009, 2017; Pana et al., 2010; Fungáčová and Weill, 2012; Lei and Song, 2013; Horváth et al., 2014, 2016; Berger et al., 2016; Díaz and Huang, 2017; Fungáčová et al., 2017; Huang et al., 2018; Berger et al., 2019; Jiang et al., 2019; Berger et al., 2022a,2022c). However, most research to date has focused on a sample of banks in a single country. For example, Berger and Bouwman (2009) find that large U.S. banks tend to create more liquidity, and that capital has a positive (negative) relationship with liquidity creation for large (small) banks. Horváth et al. (2014) find similar results for bank capital for Czech banks. In the U.S., banks that face financial duress and high risk typically reduce liquidity creation (Cornett et al., 2011). Moreover, U.S. banks with better internal governance (Díaz and Huang, 2017) and more optimistic CEOs (Huang et al., 2018) tend to create more liquidity.

Focusing on a single country setting, however, leaves a wealth of data from cross-country variations in bank liquidity creation virtually unexplored, and does not address any impact from country-level formal and informal institutions. This paper aims to fill this gap and add to the literature by 1) developing a cross-country database of bank liquidity creation, and 2) exploring the role of a key informal institution in liquidity creation around the world, namely, national culture.

Our main hypothesis is that national culture can affect bank liquidity creation in many crucial ways. We expect the effect to materialize directly or indirectly. Indeed, culture, defined as "the collective programming of the mind" (Hofstede and Bond, 1988), has been shown to guide the decisions and behavior of economic agents. Compelling evidence exists that national culture affects various country- and firm-level

outcomes, including governance and resource allocation.[2] Since these factors themselves determine liquidity creation, we expect that culture, in addition to second-order effects at the country- and firm-level, will also have a first-order effect. In other words, we should observe a culture impact even after controlling for these potential indirect effects or determinants of liquidity creation.

To test our hypothesis, we use Hofstede's (1983) framework. We first focus on the individualism/collectivism dimension of culture, although we also consider the other three dimensions: uncertainty avoidance, power distance, and masculinity. To contextualize our analysis, note that individualist societies emphasize individual achievements, self-orientation, and independence. Collectivist societies emphasize group embeddedness, harmony, and interdependence. Interestingly, our theoretical arguments do not allow us to derive a clear prediction about the effect of individualism on bank liquidity creation, as it can go either way. On the one hand, we expect banks in individualist societies to exhibit more risk-taking and an overconfidence bias, thus leading to more liquidity creation. On the other hand, we expect banks in collectivist societies to have stronger social connections and better access to soft information, which should also facilitate liquidity creation. We extensively discuss these predictions in the next section.

We build on Berger and Bouwman's (2009) measure of bank liquidity creation to conduct our empirical tests in a cross-country setting. Our sample consists of 132,832 bank-year observations covering 66 countries and 13,550 banks over the 2001–2014 period. Using the full sample, our results show that individualism is significantly associated with higher bank liquidity creation. A 1-point higher individualism score (ranging from 0 to 100) leads to a 0.7% increase in bank liquidity creation at the sample mean level. We observe heterogeneous effects across bank size and find that the effect of individualism is stronger for larger banks. A potential explanation is that small banks are more likely to engage in relationship lending, which relies more heavily on soft information. In contrast, large banks depend more extensively on hard, verifiable information to conduct transaction-based lending.

Using subcomponents of bank liquidity creation measurement and detailed items from banks' balance sheets, we find consistent support for the effect of individualism on bank liquidity creation. The effect is robust to adopting an instrumental variables approach, using alternative measurements of individualism, and introducing additional controls. After splitting the sample into developed and developing countries, we find that individualism is positively (negatively) associated with bank liquidity creation in developed (developing) countries. In other words, the positive effect of individualism on bank liquidity creation in developed countries confirms the risk-taking and overconfidence bias explanations. However, at the same time, the result of the positive effect of collectivism on bank liquidity creation in developing countries lends some weight to the alternative explanations of social connections and access to soft information. Mechanisms that compensate for weaker legal institutions and creditor rights enforcement in these countries thus allow for greater bank liquidity creation.

Turning to Hofstede's (1983) other dimensions of national culture, we explore the impact of uncertainty avoidance, power distance, and masculinity/femininity. We expect that banks in countries with high uncertainty avoidance scores will prefer lower risk, and thus create less liquidity. The stronger hierarchy in high power distance countries may reduce the transmission of soft information—so important to bank agents who require information about borrowers—which is detrimental to liquidity creation. Note that the masculinity dimension emphasizes ambition, success, and personal ability. Thus, bank agents in countries with high masculinity scores may create more liquidity in the pursuit of higher profits. Our empirical results show that, as expected, uncertainty avoidance and power distance are associated with lower bank liquidity creation. The effect on masculinity is ambiguous. These results confirm the evidence of the impact of individualism on bank liquidity creation.

Our paper adds to the limited literature on international bank liquidity creation (e.g., Berger et al., 2021a, 2021b; Li, 2021) by exploring the role of informal institutions (such as national culture) on cross-country differences. To this end, we extend single-country studies on the determinants of liquidity creation (e.g., Berger and Bouwman, 2009; Horváth et al., 2014; Díaz and Huang, 2017; Huang et al., 2018). We use a newly constructed international database on worldwide bank liquidity creation that is the largest and most diverse to date. Our results show that national culture is an important determinant of cross-country differences in liquidity creation after controlling for an extensive set of factors related to economic, political, financial, and bank-specific characteristics. Our evidence contributes to the more general discussions on the determinants of bank stability by demonstrating that culture, which affects human behavior, has a direct impact on bank performance. Relatedly, given the importance of financial stability to economic growth, we add to the literature on national culture by identifying bank liquidity creation as a channel by which culture can affect economic growth.

The remainder of this paper is organized as follows. Section 2 provides a literature review on bank liquidity creation and national culture. It also develops our hypotheses. Section 3 describes our data and methods, while Section 4 presents the empirical analysis. Section 5 describes our robustness tests. Section 6 concludes.

2. Literature review and hypotheses

2.1. Background on bank liquidity creation

Modern financial intermediation theory (e.g., Bryant, 1980; Diamond and Dybvig, 1983; Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986; Bhattacharya and Thakor, 1993) describes liquidity creation by banks as follows. On the asset side of the balance sheet, banks collect short-term funds from depositors and convert them to long-term loans, thus creating liquidity for the non-bank public. On the liability side, they provide liquidity to businesses and customers in order to meet their transactions' needs. Moreover, banks create off–balance sheet liquidity in the form of loan commitments and similar financial guarantees (e.g., Boot et al., 1993; Holmström and Tirole, 1998; Kashyap et al., 2002; Berger and Bouwman, 2009). These provide businesses with better access to funds. Through these processes, bank liquidity creation increases aggregate investment and facilitates economic growth. Berger and Sedunov (2017) provide evidence for this conjecture by showing that bank liquidity creation contributes to economic growth. In contrast, excessive bank liquidity creation may lead to greater risk, which can degrade national financial stability (Berger et al., 2019) and damage the economy (Arcand et al., 2015). High liquidity creation may also be a predictor of financial crises (Berger and Bouwman, 2017). In this paper, we focus on the determinants of bank liquidity creation, rather than its consequences, and focus on the specific impact of culture.

In recent years, a large strand of the literature has explored the determinants of bank liquidity creation, mostly in single-country settings such as the U.S. (Berger and Bouwman, 2009; Cornett et al., 2011; Díaz and Huang, 2017; Huang et al., 2018) and the Czech Republic (Horváth

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[2] In particular, national culture affects economic outcomes such as country-level economic growth (Gorodnichenko and Roland, 2011), financial system structures (Kwok and Tadesse, 2006), legal institutions (Licht et al., 2007), and exchange rate regimes (e.g., Cao et al., 2020). Culture similarly affects firm-level decisions, including corporate governance (Griffin et al., 2017), board structures (Li and Harrison, 2008), risk-taking (Mihet, 2013), hedging (Lievenbrück and Schmid, 2014), investments (Shao et al., 2013), financing (Zheng et al., 2012; El Ghoul et al., 2018), cash holdings (Chen et al., 2015a), and trade credit provisions (El Ghoul and Zheng, 2016). Notwithstanding the impact on country- and firm-level outcomes, culture is also a significant determinant of individual-level activities, such as savings and insurance spending.

et al., 2014). These studies have highlighted the impact of bank size, better internal governance, and more optimistic CEOs on liquidity creation.

However, several studies also focus on the potential effect of government interventions and regulation. Berger et al. (2016) explore how regulatory interventions and capital support (bailouts) affect liquidity creation among banks in Germany. They find that more extensive regulation tends to reduce liquidity creation. Jiang et al. (2019) also show that regulatory-induced competition (bank deregulation) reduces liquidity creation in the U.S. Similarly, Nguyen et al. (2020) determine that banks in the U.S. reduce liquidity creation, especially on the asset side, to avoid failing Federal Reserve stress tests. Berger et al. (2022b) find that an increase in home-country government guarantees decreases subsidiary bank liquidity creation.

Despite this rich line of research, cross-country studies remain scarce. Using a multinational sample, Berger et al. (2019) find a significant difference in liquidity creation between Islamic banks and conventional banks. Like religion, national culture is embedded in society and profoundly affects people's behavior. We add to this multinational cross-country approach to bank liquidity by focusing on the role of national culture. We posit that culture plays a critical role in determining bank liquidity creation, as discussed below.

2.2. Fundamental role of national culture

As defined by Hofstede and Bond (1988), culture is "the collective programming of the mind," which shapes individual behaviors and perception. Culture has been found to influence a wide swath of society, from individual-level life insurance consumption (Chui and Kwok, 2008) to country-level economic growth (Gorodnichenko and Roland, 2011).

We use Williamson (2000) framework to discuss the fundamental role of national culture in shaping different economic outcomes. This framework comprises four levels, where each level imposes constraints on the subsequent level. Top-level institutions (Level 1) constitute the social embeddedness level, which includes informal institutions, such as norms, customs, mores, and traditions, as well as national culture. Constrained by Level 1, Level 2 includes the formal rules of society, such as the "executive, legislative, judicial, and bureaucratic functions of the government." Property rights, contract laws, and bank regulations, such as deposit insurance and capital requirements, belong in Level 2. Constrained further by these formal rules, Level 3 is composed of governance (e.g., the "play of the game"), especially of contractual relations. Thus, bank structures such as bank holding company status, wholesale or retail orientation, and M&A activities, belong to Level 3. Lastly, Level 4 represents the continuous adjustments of allocation and the employment of resources, such as prices, outputs, incentive alignments, and risk-bearing. Bank lending activities are located at this level.

National culture (Level 1), as an informal institution, constrains formal institutions (Level 2), governance (Level 3), and individuals' and firms' resource allocations and employment (Level 4). In light of this framework, a vast literature shows the fundamental impact of national culture on economic outcomes at various levels. In Level 2, national culture has a significant effect on financial system structures (Kwok and Tadesse, 2006), legal institutions (Licht et al., 2007; Alesina and Giuliano, 2015), exchange rate regimes (Cao et al., 2020), and economic growth (Gorodnichenko and Roland, 2011). In Level 3, national culture is a crucial determinant of corporate governance (Griffin et al., 2017), corporate ownership (Chakrabarty, 2009; Boubakri et al., 2016), disclosure policies (Hope, 2003), and M&A performance (Chakrabarti et al., 2009). In Level 4, national culture affects firm-level activities, such as bank risk-taking (Ashraf et al., 2016, 2021b), hedging (Lievenbrück and Schmid, 2014), short- vs. long-term financing (Zheng et al., 2012), cash holdings (Chen et al., 2015a), and trade credit provisions (El Ghoul and Zheng, 2016). Culture also affects individual-level activities such as saving (Guiso et al., 2006) and insurance consumption (Chui and

Kwok, 2008). In this paper, we examine the impact of national culture (Level 1) on bank liquidity creation (Level 4).

2.3. National culture and bank liquidity creation

In our discussion of culture, we focus primarily on Hofstede's (1983) dimension of individualism/collectivism, although we provide additional analyses later in the text using the other three dimensions (uncertainty avoidance, power distance, and masculinity). The *individualism/collectivism* dimension of culture focuses on the relationship between "I" and "we" (Hofstede, 1983). Individualist societies emphasize individual achievements, self-orientation, and independence, while collectivist societies emphasize group embeddedness, harmony, and interdependence. In the culture literature, the individualism/collectivism dimension, among Hofstede's (1983) four dimensions of national culture, has been shown to have the most pronounced power to explain economic outcomes (Triandis, 2001). In the following sections, we derive a hypothesis of the expected effect of individualism/collectivism (Level 1) on bank liquidity creation (Level 4).

As mentioned above, people in individualist societies are more independent and often exhibit higher risk tolerance levels (Hofstede, 2001). Prior literature (Kanagaretnam et al., 2013; Ashraf et al., 2016) shows that individualism is positively associated with bank risk-taking. This is because managers in individualist societies tend to be more self-regulating, and often have less concern for other stakeholders' welfare. From this standpoint, bank liquidity creation is risky. Banks use liquid liability to fund relatively illiquid assets. They risk incurring losses from disposing of those assets to meet customers' liquidity demands. For all these reasons, banks in individualist societies may thus be willing to create higher liquidity for a given level of risk.[3]

People in individualist societies often exhibit an overconfidence bias as they pursue individual gains and achievements (Markus and Kitayama, 1991; Hofstede, 2001; Kanagaretnam et al., 2013). Previous studies document that optimistic CEOs tend to overestimate returns and underestimate risks in the decision-making process, leading optimistic banks' CEOs to create more liquidity (Huang et al., 2018). Ceteris paribus, banks in individualist countries may be overconfident of their ability to bear risk, which is likely to result in more liquidity creation.

In addition to the above *direct* effects related to risk-taking and overconfidence, individualism may also affect bank liquidity creation *indirectly* through other potential mechanisms, such as governance, bank lending, and ownership structure. First, investors in individualist societies may allow managers to make full use of their expertise while relying on monitoring and incentive mechanisms. This should result in more effective governance. Individualism is indeed shown to be positively associated with better corporate governance (Griffin et al., 2017). Therefore, in individualist societies, with presumably better corporate governance that restrains excessive risk and reduces the risk of insolvency, banks (especially large ones) can create more liquidity (Díaz and Huang, 2017).

Second, the existing literature shows that individualist societies encourage independence, and rely more on transparent rules and litigation to deal with economic conflicts. This leads to better legal institutions and law enforcement (Licht et al., 2007; Alesina and Giuliano, 2015). These traits are associated with more bank lending, a major part of liquidity creation (Beck et al., 2003; Djankov et al., 2007), because banks can easily force repayment and access collateral. Similarly, El Ghoul et al. (2016) and Zheng et al. (2013) find that individualism is associated with less bank corruption, which is known to negatively affect bank lending (Weill, 2011). We thus expect this to impact liquidity

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[3] Berger and Bouwman (2009) note that, for a given amount of risk transformed, the amount of liquidity created can vary considerably. Culture may play an important role here.

Table 1
Variable Definitions.

Variable	Description	Source
LC(Total)/GTA	Total bank liquidity creation as the percentage of gross total assets.*	BankScope and authors' calculations
LC(Asset)/GTA	Asset components of bank liquidity creation as the percentage of gross total assets.*	Same as above
LC(Liability)/GTA	Liability components of bank liquidity creation as the percentage of gross total assets.*	Same as above
LC(Off)/GTA	Off-balance sheet components of bank liquidity creation as the percentage of gross total assets.*	Same as above
Loans/GTA	Total loans as the percentage of gross total assets.*	Same as above
Security/GTA	Securities as the percentage of gross total assets.*	Same as above
Cash/GTA	Cash and balances due from other depository institutions as the percentage of gross total assets.*	Same as above
Deposit/GTA	Total deposits as the percentage of gross total assets.*	Same as above
Equity/GTA	Total equity as the percentage of gross total assets.*	Same as above
Commitment/GTA	Loan commitments as the percentage of gross total assets.*	Same as above
Individualism	Ranges from 0 to 100.	Hofstede (2001)
Power Distance	Ranges from 0 to 100.	Same as above
Masculinity	Ranges from 0 to 100.	Same as above
Uncertainty Avoidance	Ranges from 0 to 100.	Same as above
Capita	Natural logarithm of GDP per capita.*	World Development Indicators (WDI)
Growth	Real GDP percentage change.*	Same as above
Law & Order	Measures the strength and impartiality of the legal system and enforcement.*	International Country Risk Guide (ICRG)
Corruption	Measures the corruption within the political system. A higher score represents less corruption.	Same as above
Interest	Lending interest rate (%).*	World Development Indicators (WDI)
Inflation	Percentage change in GDP deflator in local currency.*	Same as above
Deposit	Dummy that equals 1 if an explicit deposit insurance policy exists and if depositors were fully compensated the last time a bank failed, and 0 otherwise.	The World Bank Financial Structure Database
Lerner	Lerner index of the bank market.*	Global Financial Development Database
Stock	Stock market turnover ratio.*	Same as above
Bond	Corporate bond issuance volume as the percentage of GDP.*	Same as above
Total Asset	Natural logarithm of bank gross total assets.*	BankScope and authors' calculations
Capital	Total capital as the percentage of gross total assets.*	Same as above
Overhead	Overhead cost as the percentage of gross total assets.*	Same as above

This table reports the definitions and sources of variables. * indicates the variable is winsorized at the 1% level due to outliers.

creation.

Third, individualism (collectivism) is also associated with lower (higher) levels of state ownership of firms (Chakrabarty, 2009; Boubakri et al., 2016). Governments in collectivist societies are likely to retain higher levels of state ownership in order to fulfill their duties and obligations to the public. As shown in previous studies, this argument applies to government-controlled banks that operate under political pressure to fulfill political goals at the expense of economic gains, which tend to perform worse (Bonin et al., 2005a, 2005b; Boubakri et al., 2005; Micco et al., 2007). The implication is that banks in individualist societies, which are insulated from this conundrum, should perform better,

and have a higher propensity to create more liquidity.

To summarize the above discussion on the *direct* and *indirect* ways in which individualism may positively affect bank liquidity creation, we derive the following hypothesis:

Hypothesis. *1A: Banks in individualist societies create more liquidity,* ceteris paribus.

However, we also note other arguments that support the opposite prediction: Banks in collectivist societies may also be likely to create more liquidity. This counterargument stems from better access to soft information and social connections. In general, banks can create liquidity through 1) transaction-based lending, which relies on hard information, such as financial statements, asset values, and credit-scoring models, and 2) relationship lending, which relies on soft information gathered from a firm, its owners, and other members of the local community (Diamond and Rajan, 2001; Berger et al., 2005). Therefore, better access to soft information significantly increases bank lending (D'Aurizio et al., 2015), and significantly improves the power of default prediction models (Chen et al., 2015b).

To place these findings in a cultural context, people in collectivist societies tend to maintain good relationships with their group members (Hofstede, 2001). We therefore expect bank officers to have easier access to better soft information about their borrowers. In other words, banks in collectivist societies may create more liquidity because bank agents have better access to critical soft information, such as borrower attributes, which can be otherwise hard to document.

Given that information is critical to both loan screening and monitoring (Diamond, 1984; Ramakrishnan and Thakor, 1984; Diamond and Rajan, 2001), banks in this setting become more likely to create liquidity when they commit to monitoring borrowers to collect loans (Diamond, 1991; Diamond and Rajan, 2001; Berger and Bouwman, 2009).

Additionally, given stronger social connections in collectivist societies, borrowers may face stronger reputational costs and collective punishments if their loans (Zheng et al., 2013) or trade credits (El Ghoul and Zheng, 2016) default. This makes it easier for banks to monitor borrowers and decrease default risk, even in environments with weaker legal institutions and law enforcement. This in turn facilitates bank liquidity creation.

Note that banks in collectivist societies tend to hold more deposits for firms, and hence create more liquidity. According to Chen et al. (2015a), this occurs because CEOs of firms in individualist societies tend to be overconfident about future earnings and are thus more likely to spend rather than hold cash.

Finally, as previously mentioned, collectivism is positively related to state ownership, which in turn is significantly and positively associated with the use of bank debt financing (Boubakri and Saffar, 2019). As a result, banks in collectivist societies are likely to issue more loans (i.e., more liquidity) to state-owned firms, without considering expected return or default risk.

Some evidence also suggests that countries with more democratic political systems, and a lower level of state ownership of banks, generally choose more stringent capital regulations (Kara, 2016). This results in banks retaining more equity, thereby reducing bank liquidity creation, especially on the liability side. This is found primarily for individualist countries. Indeed, we note that collectivist societies typically have fewer democratic institutions and greater state ownership, leading to *less* strict capital regulations and greater liquidity creation.

To summarize, we derive the following hypothesis:

Hypothesis. *1B: Banks in collectivist societies create more liquidity,* ceteris paribus.

In sum, given Hypotheses 1A and 1B, the impact of individualism on bank liquidity creation can go either way. We cannot theoretically determine which hypothesis dominates. We aim to determine that with the following empirical analysis.

Table 2
Sample Distribution.

Panel A: Sample Distribution by Country					
Country Name	N	Banks	Country Name	N	Banks
Argentina	749	74	Latvia	71	20
Australia	249	36	Lithuania	20	10
Austria	736	84	Luxembourg	922	105
Belgium	325	39	Malaysia	350	43
Brazil	1189	157	Netherlands	156	30
Bulgaria	52	23	New Zealand	100	13
Canada	167	22	Nigeria	30	18
Chile	170	30	Norway	176	27
China	1188	183	Pakistan	117	25
Colombia	164	23	Panama	98	68
Costa Rica	60	17	Peru	123	16
Croatia	318	42	Philippines	256	34
Czech Republic	181	24	Poland	392	61
Denmark	422	59	Portugal	244	32
Egypt	23	23	Russian Federation	8325	1077
Estonia	20	6	Singapore	122	20
Finland	65	12	Slovak Republic	60	15
France	1100	144	Slovenia	34	14
Germany	1446	177	South Africa	243	34
Greece	126	20	Spain	579	85
Hong Kong	112	20	Sri Lanka	12	12
Hungary	122	28	Sweden	247	31
Iceland	17	6	Switzerland	1801	208
India	808	77	Thailand	280	27
Indonesia	677	86	Trinidad and Tobago	10	6
Ireland	40	10	Turkey	136	33
Israel	82	15	Ukraine	348	63
Italy	1318	180	United Kingdom	882	135
Jamaica	26	6	United States	102,240	9327
Japan	1916	188	Uruguay	17	17
Jordan	3	3	Venezuela, RB	183	43
Kenya	21	21	Vietnam	157	40
Korea	204	23	Total	132,832	13,550
Kuwait	5	3	This table reports the distribution of the main sample.		

Panel B: Sample Distribution by Year	
Year	N
2001	9539
2002	9625
2003	9743
2004	9632
2005	9981
2006	9987
2007	10,141
2008	9972
2009	9760
2010	9551
2011	9327
2012	8970
2013	8667
2014	7937
Total	132,832

This table reports the distribution of the main sample.

3. Data and methods

3.1. Data and sample

To test the effect of national culture on bank liquidity creation, we compile our sample as follows. First, we follow Berger and Bouwman's (2009) "cat fat" liquidity creation measurements to construct an international bank liquidity creation measure. These measurements are derived from the BankScope database using a three-step method. Step 1 classifies all bank activities on the asset and liability side of the balance sheet, as well as off–balance sheet, into three categories: liquid, semi-liquid, and illiquid. Step 2 assigns different weights to bank activities according to whether they provide liquidity to the non-bank public. For example, on the asset side, issuing more business loans (securities) increases (decreases) bank liquidity creation. On the liability side, holding more liquid deposits (illiquid equity) creates more (less)

Table 3
Summary Statistics.

Variables	N	Mean	S.D.	Min	Max
Dependent Variables					
LC(Total)/GTA	132,832	51.864	26.988	-60.000	122.922
LC(Asset)/GTA	132,832	16.779	17.152	-36.906	47.529
LC(Liability)/GTA	132,832	28.947	18.443	-49.991	45.099
LC(Off)/GTA	132,832	5.702	8.878	0.000	79.980
Loans/GTA	132,832	60.488	19.698	0.000	94.271
Security/GTA	132,832	21.653	16.402	0.000	77.863
Cash/GTA	132,832	5.675	6.622	0.000	40.485
Deposit/GTA	131,806	73.830	23.524	0.000	93.750
Equity/GTA	132,828	12.809	12.268	-971.420	100.000
Commitment/GTA	132,832	8.515	9.315	0.000	59.579
Culture Dimensions					
Individualism	132,832	81.189	20.184	11.000	91.000
Power Distance	132,832	52.422	15.938	8.000	100.000
Masculinity	132,832	45.735	15.712	11.000	100.000
Uncertainty Avoidance	132,832	59.685	10.175	5.000	100.000
Institutional Collectivism	129,568	4.247	0.197	3.410	5.260
In-Group Collectivism	129,568	4.424	0.512	3.460	6.140
Harmony	131,410	3.598	0.288	3.280	4.620
Country- and Bank-level Controls					
L. Capita	132,832	10.428	0.741	6.208	11.109
L. Growth	132,832	2.251	2.364	-5.567	10.000
L. Law & Order	132,832	4.979	0.730	1.000	6.000
L. Corruption	132,832	3.874	0.809	0.750	6.000
L. Interest	132,832	6.220	4.414	1.475	40.517
L. Inflation	132,832	3.065	3.563	-1.363	21.261
L. Deposit	132,832	0.978	0.146	0.000	1.000
L. Lerner	132,832	0.257	0.075	0.000	0.440
L. Stock	132,832	158.573	70.325	1.270	292.620
L. Bond	132,832	3.038	1.107	0.140	4.880
L. Total Asset	132,832	5.310	1.808	1.875	11.335
L. Capital	132,832	0.130	0.117	0.024	0.858
L. Overhead	132,832	0.044	0.068	0.000	0.504

This table reports the summary statistics for our main sample.

liquidity. The off–balance sheet items are treated in a similar way as the assets. Step 3 combines steps 1 and 2.

Following previous literature (Berger et al., 2020, 2021a, 2021b; Li, 2021), we normalize liquidity creation in dollars by a bank's gross total assets, and construct four measures: *LC(Total)/GTA*, total bank liquidity creation normalized by corresponding gross total assets; *LC(Asset)/GTA*, asset components of bank liquidity creation normalized by corresponding gross total assets; *LC(Liability)/GTA*, liability and equity components of bank liquidity creation normalized by corresponding gross total assets; and *LC(Off)/GTA*, off–balance sheet components of bank liquidity creation normalized by the corresponding gross total assets. The normalization avoids giving undue weight to the largest banks. Similarly, we collect and calculate bank-level controls from the BankScope database.

Second, we use Hofstede's (2001) cultural indices of individualism, uncertainty avoidance, power distance, and masculinity. These indices range from 0 to 100. A higher score indicates that society exhibits characteristics in line with that dimension (i.e., a more individualist society has a higher individualism score). For example, the U.S., typically an individualist society, has an individualism score of 92. China, typically a collectivist society, has an individualism score of 20.

Third, we use country-level controls from International Financial Statistics, World Development Indicators, the Global Financial Development Database, the International Country Risk Guide, and the World Bank. Detailed variable definitions and sources are in Table 1.

The final sample of our main specification contains 132,832 bank-year observations for 66 countries, covering 13,550 banks from 2001 through 2014. Table 2 describes the sample distribution of the main specification by country and year. Table 3 reports the summary statistics of the variables. Appendix Table 2 reports the Pearson correlation matrix.

Table 4
Individualism and Bank Liquidity Creation.

Variables	(1) *LC (total)/GTA*	(2) *LC (total)/GTA*	(3) *LC (total)/GTA*
Individualism	0.390 * *	0.350 * **	0.365 * **
	(2.504)	(3.513)	(3.936)
Economic Factors			
L. Capita		-10.238 * **	-8.744 * **
		(−4.741)	(−4.097)
L. Growth		-0.717 *	-0.787 * *
		(−1.927)	(−2.304)
Political Factors			
L. Law & Order		0.286	-0.797
		(0.119)	(−0.444)
L. Corruption		4.175 *	3.102 * *
		(1.735)	(2.058)
Financial Factors			
L. Interest		-0.377	-0.264
		(−1.421)	(−0.888)
L. Inflation		-1.097 * **	-0.514 * *
		(−3.984)	(−2.068)
L. Deposit		-5.046	-2.714
		(−0.807)	(−0.516)
L. Lerner		54.278 * **	39.696 * **
		(5.870)	(4.732)
L. Stock		0.031	0.024
		(1.297)	(1.263)
L. Bond		-1.993	-1.084
		(−1.621)	(−1.217)
Bank-Specific Factors			
L. Total Asset			1.255 * *
			(2.002)
L. Capital			-92.696 * **
			(−9.202)
L. Overhead			-9.892
			(−1.338)
Year Fixed Effects	Yes	Yes	Yes
Observations	132,832	132,832	132,832
Number of Countries	66	66	66

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. The dependent variable is LC (Total)/GTA, which is total bank liquidity creation normalized by corresponding gross total assets. All controls are lagged one year. All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * * , and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5
National Culture on Bank Liquidity Creation – All Culture Dimensions.

Variables	(1) *LC (total)/GTA*	(2) *LC (total)/GTA*	(3) *LC (total)/GTA*	(4) *LC (total)/GTA*
Individualism				0.303 * **
				(2.826)
Uncertainty Avoidance	-0.212 * *			-0.059
	(−2.186)			(−0.682)
Power Distance		-0.263 * *		-0.139
		(−2.122)		(−1.448)
Masculinity			-0.024	-0.096
			(−0.222)	(−1.255)
Controls	Yes	Yes	Yes	Yes
Observations	132,832	132,832	132,832	132,832
Number of Countries	66	66	66	66

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. The dependent variable is LC (Total)/GTA, which is total bank liquidity creation normalized by corresponding gross total assets. All controls are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * * , and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6
Bank Liquidity Creation Component and Heterogeneous Effect across Bank Size.

Panel A: Whole Sample				
Variables	(1) *LC (total)/ GTA*	(2) *LC (asset)/ GTA*	(3) *LC (liability)/ GTA*	(4) *LC (off)/ GTA*
Individualism	0.365 ***	0.099	0.128 *	0.125 ***
	(3.936)	(1.557)	(1.806)	(2.907)
Controls	Yes	Yes	Yes	Yes
Observations	132,832	132,832	132,832	132,832
Number of Countries	66	66	66	66
Panel B: Large Banks				
Variables	(1) ***LC(total)/ GTA***	(2) ***LC(asset)/ GTA***	(3) ***LC(liability)/ GTA***	(4) ***LC(off)/ GTA***
Individualism	0.392 ***	0.096 *	0.095	0.178 ***
	(4.364)	(1.738)	(1.294)	(3.715)
Controls	Yes	Yes	Yes	Yes
Observations	67,906	67,906	67,906	67,906
Number of Countries	66	66	66	66
Panel C: Small Banks				
Variables	(1) ***LC(total)/ GTA***	(2) ***LC(asset)/ GTA***	(3) ***LC(liability)/ GTA***	(4) ***LC(off)/ GTA***
Individualism	0.333 ***	0.079	0.195 **	0.054
	(3.066)	(0.991)	(2.525)	(1.433)
Controls	Yes	Yes	Yes	Yes
Observations	64,926	64,926	64,926	64,926
Number of Countries	66	66	66	66

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. The dependent variables in Columns (1), (2), (3), and (4) are LC(Total)/GTA, LC(Asset)/GTA, LC(Liability)/ GTA, and LC(Off)/GTA, respectively. In Panel B, we calculate the mean of the total asset of each bank within the sample period. A bank belongs to the Large Banks subsample if its sample mean of the total asset is greater than the median bank within the country, and vice versa in Panel C. All controls are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * * , and * indicate significance at the 1%, 5%, and 10% levels, respectively.

3.2. Empirical method

To test the effect of national culture on bank liquidity creation, we estimate ordinary least squares regressions using the following specification:

$$
\begin{aligned}
Liquidity\ Creation_{b,i,t} =\ & \alpha + \beta_1 Culture_i + \beta_2 L.Capita_{i,t} + \beta_3 L.Growth_{i,t} \\
& + \beta_4 L.Law\ \&\ Order_{i,t}\ + \beta_5 L.Corruption_{i,t} \\
& + \beta_6 L.Interest_{i,t} + \beta_7 L.Inflation_{i,t} + \beta_8 L.Deposit_{i,t} \\
& + \beta_9 L.\ Lerner_{i,t} + \beta_{10} L.Stock_{i,t} + \beta_{11} L.Bond_{\ i,t} \\
& + \beta_{12} L.Total\ \ Asset_{b,i,t} + \beta_{13} L.Capital_{b,i,t} \\
& + \beta_{14} L.Overhead_{\ b,i,t} + Year\ Fixed\ \ Effects + \varepsilon_{it}
\end{aligned}
$$

where *Liquidity Creation* is one of the bank liquidity creation measures mentioned in the previous section: *LC(Total)/GTA, LC(Asset)/GTA, LC (Liability)/GTA,* or *LC(Off)/GTA* for bank b from country *i* at time *t*. The key independent variable is *Culture*, measured by Hofstede's individualism/collectivism dimension.[4]

The regression also controls for a set of country- and bank-level variables. Following prior literature (Berger and Bouwman, 2009; Berger et al., 2016, 2019, 2021b; Jiang et al., 2019), we lag the other controls by one year to mitigate potential endogeneity problems

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[4] We explore the other three cultural dimensions later in Section 4.2.

Table 7
Channels.

Panel A: Items on Balance Sheet, Adjusted by Total Asset						
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Loans/GTA*	*Security/GTA*	*Cash/GTA*	*Deposit/GTA*	*Equity/GTA*	*Commitment/GTA*
Individualism	0.154 *	0.082	-0.033 *	0.300 ***	0.003	0.173 ***
	(1.881)	(1.507)	(−1.904)	(2.822)	(0.385)	(3.582)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	132,832	132,832	132,833	131,806	132,828	132,833
Number of Countries	66	66	66	66	66	66
Panel B: Large Banks						
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Loans/GTA*	*Security/GTA*	*Cash/GTA*	*Deposit/GTA*	*Equity/GTA*	*Commitment/GTA*
Individualism	0.137 *	0.062	-0.033 *	0.276 * **	0.022 **	0.201 ***
	(1.728)	(1.215)	(−1.791)	(2.706)	(2.438)	(3.549)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,906	67,906	67,906	67,494	67,905	67,906
Number of Countries	66	66	66	66	66	66
Panel C: Small Banks						
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Loans/GTA*	*Security/GTA*	*Cash/GTA*	*Deposit/GTA*	*Equity/GTA*	*Commitment/GTA*
Individualism	0.125	0.133 **	-0.039 *	0.344 ***	-0.011	0.111 ***
	(1.356)	(2.188)	(−1.721)	(2.869)	(−0.844)	(3.216)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64,926	64,926	64,926	64,312	64,923	64,926
Number of Countries	66	66	66	66	66	66

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. All controls are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * *, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

(denoted by L.).[5] We also mitigate the omitted variable bias by including year fixed effects, and we introduce a rich set of country- and bank-level variables that may affect bank liquidity creation and are correlated with culture.

Economic factors include *Capita* and *Growth*. *Capita* is the log of real GDP per capita. *Growth* captures the percentage change in real GDP. Political factors include *Law & Order*, which measures the strength and impartiality of the legal system and enforcement. *Corruption* captures the degree of corruption of the political system. A higher score represents less corruption. Financial factors include *Interest, Inflation, Deposit, Lerner, Stock,* and *Bond*. *Interest* measures the lending interest rate. *Inflation* is the percentage change in the GDP deflator index. *Deposit* is a dummy that equals 1 if there is a deposit insurance scheme. *Lerner* captures market power in the banking market, which also measures competition. *Stock* is the stock market turnover ratio. *Bond* is the corporate bond issuance volume as a percentage of GDP. *Stock* and *Bond* capture the development of stock and bond markets.

At the bank level, we control for bank size, *Total Asset*, which is the natural logarithm of bank total assets. *Capital* is bank capital ratio, measured by a bank's total equity divided by total assets. *Overhead* is the overhead ratio, which is the overhead cost divided by total assets, and indicates management efficiency. All regressions also control for year fixed effects to capture other time-variant unobserved factors, and use robust standard errors clustered at the country level.

4. Empirical results

4.1. Culture and liquidity creation: the role of individualism/collectivism

Before estimating the specification described in Section 3, we first estimate the regression on total liquidity created by a bank (*LC(Total)/ GTA*), with just individualism and year fixed effects on the right-hand side. The results reported in Table 4 show that individualism is positively associated with bank liquidity creation. We further add country-

level controls. As shown in Table 4, Column (2), the coefficient changes only slightly, and its level of significance improves. Furthermore, when we add country- and bank-level controls, the result of our main specification, shown in Table 4, Column (3), remains consistent.[6]

These results support our first Hypothesis (H1A), that banks in individualist societies, which tend to be characterized by more risk-taking and overconfidence, create more liquidity. This effect is statistically significant and exhibits a significant economic impact. Using the result in the main specification, a 1-point increase in the individualism score (which ranges from 0 to 100) leads to a 0.7% increase in bank liquidity creation at the sample mean level.

Several other control variables also significantly affect bank liquidity creation: Income level, economic growth, and inflation have negative effects on bank liquidity creation. As mentioned earlier, corruption may lead to higher bank risk at the expense of profitability (Zheng et al., 2013), and may reduce a bank's ability to create liquidity (Weill, 2011). The coefficient of *Corruption* confirms our expectation.[7] The *Lerner index*, which measures the competition level in the banking industry, shows a positive effect on bank liquidity creation, in line with previous literature (e.g., Jiang et al., 2019). As expected, the positive effect of *Total Asset* indicates that large banks create more liquidity, which is consistent with Berger and Bouwman (2009), Berger et al. (2022a), and Li (2021), among others. However, a higher capital ratio reduces liquidity creation. This result supports the "financial fragility–crowding out" effect (Berger and Bouwman, 2009) which argues that banks with low capital ratios (fragile capital structures) monitor borrowers and extend loans. Therefore, capital may "crowd out" deposits, and reduce liquidity creation.

4.2. Culture and liquidity creation: the role of uncertainty avoidance, power distance, and masculinity

In addition to individualism/collectivism, we are interested in

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[6] The Variance Inflation Factor (VIF) test suggests that multicollinearity is not driving our findings.
[7] The sign is positive because Corruption in ICRG is reverse coded. A higher score means a less corrupt political system.

Table 8

IV Approach.

Variables	(1) Individualism	(3) LC (total)/GTA
Disease 9	-16.012 * **	
	(−3.989)	
Predicted Individualism		0.391 *
		(1.872)
Economic Factors		
L. Capita	-8.954 * **	5.129
	(−3.740)	(1.303)
L. Growth	-0.769 *	-0.399
	(−1.854)	(−1.016)
Political Factors		
L. Law & Order	-0.852	0.072
	(−0.451)	(0.030)
L.Corruption	2.972	2.844
	(1.595)	(1.370)
Financial Factors		
L. Interest	-0.271	0.466 * *
	(−0.881)	(2.447)
L. Inflation	-0.523 * *	-0.218
	(−2.028)	(−0.972)
L. Deposit	-2.887	2.955
	(−0.564)	(0.389)
L. Lerner	40.016 * **	3.489
	(4.829)	(0.225)
L. Stock	0.020	0.139 * **
	(0.500)	(8.300)
L. Bond	-1.163	1.263
	(−1.220)	(1.214)
Bank-Specific Factors		
L. Total Asset	1.280 * *	-0.292
	(2.016)	(−1.027)
L. Capital	-92.583 * **	-2.675
	(−9.371)	(−1.115)
L. Overhead	-9.763	-6.433
	(−1.322)	(−1.049)
Year Fixed Effects	Yes	Yes
F Test Statistics	15.91	
Prob > F	0.000	
Observations	132,832	132,832
Number of Countries	66	66

This table reports the results of IV estimation. Column (1) reports the first-stage result using the Pathogen Prevalence Index (Fincher et al., 2008) as the instrument. The F-statistic reports the Windmeijer multivariate F-test of excluded instruments. All controls are based on our main specification (Table 4, Column (3)). All columns include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * *, * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 9

Alternative Measures of Individualism - GLOBE and Schwartz.

Variables	(1) LC (total)/GTA	(2) LC (total)/GTA	(3) LC (total)/GTA
Institutional Collectivism	-15.944 * **		
	(−5.584)		
In-Group Collectivism		-8.622 *	
		(−1.731)	
Harmony			-13.791 * **
			(−2.877)
Controls	Yes	Yes	Yes
Observations	129,734	129,734	131,443
Number of Countries	45	45	55

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. The dependent variable is LC (Total)/GTA, which is total bank liquidity creation normalized by corresponding gross total assets. All controls are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * *, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Hofstede's (1983) other three cultural dimensions: 1) The uncertainty avoidance dimension measures a society's tolerance for uncertainty and ambiguity (Hofstede, 2001). We expect banks in high uncertainty avoidance societies to prefer lower risk. As argued in H1A, liquidity creation is risky. These banks may create less liquidity even when facing the same levels of risk. 2) Power distance captures the extent to which people expect and accept that power is distributed unequally among a group's members (Hofstede, 1983). Berger et al. (2005) state that information is critical in lending, and soft information can be difficult to convey to bank agents' superiors. Soft information is more likely to be credibly transmitted in decentralized firms than in hierarchical firms (Stein, 2002). Thus, the stronger hierarchy in high power distance societies may be detrimental to soft information transmission and reduce bank liquidity creation. 3) The masculinity dimension measures the degree to which "male assertiveness" is a more dominant value than "female nurturance" (Hofstede, 2001). Societies with high masculinity scores emphasize ambition, success, and personal ability. To pursue profit, banks in high masculinity societies are likely to bear higher risk and create more liquidity.

Table 5 reports the regression that replicates our main specification, using each dimension separately or pooled. Consistent with the discussion above, uncertainty avoidance is negatively associated with bank liquidity creation, which may signal the crucial role of risk preference. Moreover, the significantly negative coefficient of power distance may indicate that soft information is difficult to relay within a strong hierarchy. The sign of masculinity does not follow our expectation, but it is not statistically significant. We note that, among the four culture dimensions, individualism exhibits the most consistent explanatory power. Thus, throughout the rest of the paper, we investigate the mechanism and robustness of the effect of individualism on bank liquidity creation.

4.3. Additional analysis: components of liquidity creation

Investigating the subcomponents of bank liquidity creation (i.e., the asset *(LC(Asset)/GTA)*, liability plus equity *(LC(Liability)/GTA)*, and off–balance sheet components *(LC(Off)/GTA)* may provide further insight into the role of individualism. According to Berger and Bouwman's (2009) classification, the asset component increases when a bank makes illiquid loans and decreases when holding more liquid cash and securities. The liabilities plus equity component increases when liquid deposits are used and decreases when the bank holds more illiquid equity. Lastly, the off–balance sheet component increases when the bank issues guarantees such as loan commitments and letters of credit.

Table 6, Panel A, shows the impact of individualism on the three subcomponents of liquidity creation. The coefficients are all positive, but significant only for liabilities and off–balance sheet components.[8] These results imply that banks in individualist societies tend to hold more liquid deposits than illiquid equity and provide more liquidity in the form of guarantees. As mentioned earlier, individualism is associated with a propensity for higher risk-taking and overconfidence leading to higher issuance of risky loans and more guarantees. Individualism is similarly associated with better corporate governance, which requires banks to manage risk level. Banks may be able to achieve this by holding more liquid deposits. In other words, the effect on the off–balance sheet component is similar to that on loans: Banks in individualist societies issue more guarantees because of risk-taking and overconfidence.

4.4. Additional analysis: large vs. small banks

Small organizations have a comparative advantage over large ones

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[8] The coefficient of the asset component is not significant in the full sample. This may be because of the heterogeneous effects across bank and country groups. We explore heterogeneous effects in Sections 4.4 and 5.4.

Table 10
Additional Controls.

Variables	(1) LC (total)/GTA	(2) LC (total)/GTA	(3) LC (total)/GTA	(4) LC (total)/GTA	(5) LC (total)/GTA	(6) LC (total)/GTA	(7) LC (total)/GTA
Individualism	0.336 * ** (3.711)	0.362 * ** (3.931)	0.367 * ** (4.047)	0.366 * ** (3.947)	0.272 * ** (3.124)	0.332 * ** (3.594)	0.348 * ** (3.881)
L. External Audit	-0.267 (−0.232)						
L. Z-score		-1.543 * ** (−3.750)					
L. Cost-Income Ratio			0.057 * ** (3.227)				
L. ROA				-0.127 * * (−2.182)			
L. State Ownership					-0.306 * ** (−2.759)		
L. Creditor Rights						-3.372 * (−1.900)	
L. Information							16.746 * ** (5.104)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131,369	113,079	132,179	132,831	129,252	131,863	131,863
Number of Countries	64	66	66	66	63	62	62
Individualism	0.234 * * (2.045)	0.330 * ** (3.714)	0.429 * ** (4.608)	0.384 * ** (4.106)	0.367 * ** (3.666)	0.359 * ** (3.883)	0.390 * ** (4.507)
L. Political Right	-3.510 * ** (−3.272)						
L. Agriculture		1.152 * (1.790)					
L. Industry		-0.084 (−0.330)					
L. Life Expectancy			1.167 * * (2.644)				
L. Tax				0.114 (0.371)			
L. Openness					0.002 (0.118)		
L. Unemployment						0.127 (0.319)	
L. CBI							14.285 * * (2.193)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	132,720	132,827	132,832	131,761	132,822	132,832	116,125
Number of Countries	65	65	66	59	65	66	65

This table reports regression results using ordinary least squares analysis. Each column represents a separate regression result. The dependent variable is LC(Total), which is total bank liquidity creation normalized by corresponding gross total assets. All control variables are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * *, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

because they can use soft information due to incomplete contracts (Stein, 2002). Small banks tend to depend more on relationship lending, which is particularly reliant on soft information for monitoring and screening (Berger et al., 2005; Berger and Bouwman, 2009). Meanwhile, large banks typically provide loans to large firms with more verifiable information, such as accounting records and credit ratings. In Section 2.3, we argue that, because banks in collectivist societies have better access to soft information (H1B), we expect them to create more liquidity. This effect should be more pronounced among small banks for the reasons discussed above. We expect the effect of individualism on liquidity creation to be more prominent among larger than smaller banks.

To test this empirically, we first define a dummy variable, Large Bank. Using the average total assets within our sample, we split banks into two subsamples of large vs. small and replicate the analysis. The results, shown in Table 6, Panels B and C, indicate that individualism has a significantly positive effect on total liquidity creation for both large and small banks. The coefficient is larger among large banks, in line with our expectation.

Furthermore, the liquidity subcomponent analysis for large banks shows that individualism is significantly and positively related to asset side and off–balance sheet liquidity creation. These results support our conjecture that, since large banks rely less on soft information, the effect

of individualism is more pronounced. For small banks, individualism is associated with greater liquidity creation on the liability side. A tentative explanation stems from the positive relation between individualism and corporate governance (Griffin et al., 2017), which forces banks to manage their risk from asset-side activities. Small banks are likely to raise more funds from liquid deposits, while large banks are likely to raise more funds from *both* liquid deposits and equity. Since the latter contribute to liquidity creation in opposite directions, this explains why we do not observe the significant effect from the liability side for large banks. More details are discussed below with Table 7.

4.5. Disaggregation of the liquidity creation components

Using the rich BankScope data, we can further investigate the effect of individualism on bank liquidity creation through detailed items on banks' balance sheets. These include total loan amounts, securities, cash, deposits, equity, and other commitments, all adjusted by gross total assets. According to the definition of bank liquidity creation, a larger amount of loans, deposits, and commitments will increase it, while holding more securities, cash, and equity will reduce it. We estimate similar regressions as the main specification using these items as independent variables, with all controls and fixed effects. Table 7, Panel A, reports the results.

Table 11
Subsample Test.

Panel A: Developed Countries				
	(1)	(2)	(3)	(4)
Variables	*LC (total)/ GTA*	*LC (asset)/ GTA*	*LC (liability)/ GTA*	*LC (off)/ GTA*
Individualism	0.326 * *	0.198 * *	0.025	0.117 * **
	(2.530)	(2.634)	(0.426)	(3.268)
Controls	Yes	Yes	Yes	Yes
Observations	116,936	116,936	116,936	116,936
Number of Countries	36	36	36	36
Panel B: Developing Countries				
	(1)	(2)	(3)	(4)
Variables	*LC(total)/ GTA*	*LC(asset)/ GTA*	*LC(liability)/ GTA*	*LC(off)/ GTA*
Individualism	-0.279 * *	-0.120	-0.189 *	-0.013
	(−2.752)	(−1.497)	(−2.015)	(−0.134)
Controls	Yes	Yes	Yes	Yes
Observations	15,896	15,896	15,896	15,896
Number of Countries	30	30	30	30

This table reports results from regressions analyzing the effects of national culture on bank liquidity creation using ordinary least squares analysis. The dependent variable in Column (1) is LC(total)/GTA, which is total bank liquidity creation normalized by corresponding gross total assets. The dependent variable in Column (2) is LC(asset)/GTA, which is asset components of bank liquidity creation normalized by corresponding gross total assets. The dependent variable in Column (3) is LC(liability)/GTA, which is the liability and equity components of bank liquidity creation normalized by corresponding gross total assets. The dependent variable in Column (4) is LC(off)/GTA, which is off-balance sheet components of bank liquidity creation normalized by corresponding gross total assets. In Panel A, developed countries belong to the high-income group by World Bank classification. In Panel B, all other countries are classified as developing countries. All controls are based on our main specification (Table 4, Column (3)). All columns include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * * , * indicate significance at 1%, 5%, and 10% levels, respectively.

Consistent with our expectations, individualism is positively associated with loans, deposits, and commitments, and negatively associated with cash. Turning to differences across bank size, we replicate the above estimation by dividing the sample into large and small banks. As shown in Table 7, Panel B, individualism is associated with more loans, deposits, equity, commitments, and less cash for large banks. Thus, large banks in individualist societies create more liquidity by providing more loans and commitments and holding less cash. The significant effects on deposits and equity are reconciled. In the subsample of small banks, individualism is positively associated with holding more securities, deposits, and loan commitments, but less cash (Panel C of Table 7).

5. Robustness tests

5.1. Robustness test: IV approach

One issue in our analysis is endogeneity. To address this concern, an ideal approach would be to investigate the effect of exogenous culture shocks on banks' behavior. However, it is difficult to feasibly conduct these tests or a case study because culture is relatively stable within a country and consistent over a long period (Williamson, 2000). For example, the dissolution of the Soviet Union, the reunification of East and West Germany, and the reunification of Hong Kong and mainland China created strong shocks. However, these shocks were caused primarily by regime changes, not by culture.

Nevertheless, and although it is not a perfect approach, we use the instrumental variables method to confront possible endogenous concerns. Following prior literature (e.g., Zheng et al., 2013; Gorodnichenko and Roland, 2017; Cao et al., 2020), we adopt the Pathogen Prevalence Index (Fincher et al., 2008) as the instrument. This index was constructed with historical infectious disease data before the

epidemiological revolution. Pathogenic diseases have a strong correlation with culture, especially with individualism/collectivism. But the historical disease record is unlikely to affect current bank liquidity creation directly, other than through individualism. Thus, this Index should satisfy the exclusion restriction of the IV approach.

Table 8, Column (1), reports the first-stage result, which shows a strong correlation between individualism and the instrument. The instrument also passes the weak IV test. Column (2) reports the results of the two-stage least squares model (where t-statistics in parentheses are calculated by means of joint standard errors). It shows that individualism has a consistently positive effect on bank liquidity creation.

5.2. Robustness test: alternative measures of individualism

Following prior literature (e.g., Zheng et al., 2012; Cao et al., 2020; Berger et al., 2021b), we use the GLOBE study (House et al., 2004) and Schwartz's (1994) culture dimensions as alternative measurements of individualism. These measurements are constructed using more recent data than Hofstede's culture dimensions. First, *institutional collectivism*, from the GLOBE study, emphasizes a more equalized distribution of resources within a society. Second, *in-group collectivism*, also from the GLOBE study, measures "the degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families" (House et al., 2004, p. 30). Third, Schwartz's (1994) *harmony* dimension evaluates the extent to which people emphasize the group over the individual. The definitions of these three measurements are close to those of Hofstede's (1983) individualism/collectivism. They are also negatively correlated with the individualism score. Thus, we should expect negative coefficients.

Table 9 shows the results of replicating the main specification with all controls and fixed effects. The alternative measures of institutional collectivism, in-group collectivism, and harmony all significantly reduce bank liquidity creation.[9] These results support our main findings.

5.3. Robustness test: additional controls

To mitigate the omitted variables bias, we add several control variables to our main specification, including bank, political, and economic factors. Due to data limitations, controlling for all of these variables would reduce our sample and country coverage. Therefore, we do not include them in our main specification. Among bank factors, *External Audit* captures the strength of external auditing and measures bank governance. Banks with better governance tend to create more liquidity (e.g., Díaz and Huang, 2017). The *Z-score* captures the probability of default of a bank. It is calculated as (ROA+equity/assets)/sd(ROA); where sd(ROA) is the standard deviation of ROA. *Cost-Income Ratio* measures a bank's profitability and is calculated as the cost of running operations as the percentage of a bank's operating income. *ROA* is the return on average assets. These variables measure the efficiency and profitability of banks. More efficient banks may have a better ability to create liquidity (e.g., Duan et al., 2021). *State Ownership* is percentage ownership by the government.

We also control for additional political factors. *Creditor Rights* measures the degree of legal creditor rights protection. Better creditor rights force repayment and collateral, which may facilitate bank liquidity creation. *Information* is a dummy variable that equals 1 if there is a public or private registry that facilitates information-sharing. As argued in the previous section, information is critical for loan screening and monitoring, which should increase liquidity creation. *Political Right* measures a country's political freedom. Individualism is positively associated with democratic institutions, which may affect bank liquidity creation.

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[9] The coefficients are larger than those of individualism because the alternative culture measures have a smaller scale.

Next, we control for more economic factors, including *Agriculture* and *Industry* (economic composition[10]), *Life Expectancy, Tax* (tax revenue as a percentage of GDP), *Openness* (sum of imports and exports as the percentage of GDP), *Unemployment* (total unemployment rate), and *CBI* (central bank independent score).[11] Table 10 reports the results after sequentially introducing additional controls to the baseline specification shown in Table 4, Column (3).[12] The coefficients of individualism remain significantly positive, which supports our main findings.[13]

5.4. Robustness test: subsample tests

Developed and developing countries exhibit systematic differences in terms of financial development, institutional quality, and other factors affecting behavior. In the tests above, we are already controlling for various financial and institutional factors. To further investigate these heterogeneous effects, we replicate the subcomponents analysis in Section 4.3 by using developed and developing subsamples. High-income countries, according to the World Bank classification, belong to the developed country subsample. The remainder belong to the developing country subsample.

Table 11, Panel A, shows that individualism in developed countries is positively and significantly associated with total liquidity creation, as well as with asset side and off–balance sheet components. However, in developing countries, as shown in Panel B, individualism is significantly associated with less total and liability liquidity creation. On the liability side, collectivism is correlated with lower equity/asset ratio in these countries,[14] and thus to higher liquidity creation, as argued in H1B. These results suggest that banks in collectivist societies from developing countries can create more liquidity because of 1) better access to soft information, and 2) stronger social connections that play an informal law enforcement function. In other words, the effect of collectivism (H1B) is stronger in developing countries, where mechanisms of social connections and access to soft information compensate for less stringent legal institutions and weaker creditor rights' enforcement.

The heterogeneous effects of individualism/collectivism across developed and developing countries demonstrate that arguments leading to both H1A and H1B may be supported. However, their magnitude may be affected by the level of development of formal institutions and the economy.

6. Conclusion

In this paper, we examine the relation between national culture and bank liquidity creation. We posit that banks in individualist societies create more liquidity because of risk-taking and the overconfidence bias; banks in collectivist societies create more liquidity because of better access to soft information and stronger social connections.

To investigate the effect of national culture on bank liquidity creation, we use data covering 66 countries and 13,550 banks, from 2001 through 2014. With the full sample, we find that individualism is significantly associated with greater bank liquidity creation, especially in the form of off–balance sheet guarantees. The effect is economically significant: A 1-point higher individualism score leads to a 0.7% increase in total bank liquidity creation. We also show that individualism has

diverse effects depending on bank size: Individualism is positively associated with bank liquidity creation in both small and large banks, but the effect is larger for the latter.

Using components of bank liquidity creation and detailed items of bank balance sheets, we confirm our main findings. The impact of individualism on bank liquidity creation is robust to a variety of approaches. We also find heterogeneous effects after splitting the sample into developed and developing countries. In developed (developing) countries, individualism is associated with more (less) liquidity creation, suggesting that tension created by culture can run in both directions. We also provide some evidence that uncertainty avoidance and power distance reduce bank liquidity creation.

Our findings add to the literature on both bank liquidity creation and national culture. To date, there have been few cross-country studies on bank liquidity creation. We fill this gap by exploring the role of national culture in explaining cross-country variation in bank liquidity creation. We also contribute to the banking literature by showing another outcome of culture on the banking industry: how informal institutions may substitute for weak formal institutions to determine bank-level liquidity creation in developing countries. Finally, we add to the culture literature by identifying a mechanism through which culture can affect economic growth.

Appendix

See Appendix Tables A1–A3.

Table A1
Variable Definitions.

Variable	Description	Source
External Audit	Effectiveness of external bank audits.	Bank Regulation and Supervision Survey
Z-score	Probability of default of a bank, calculated as (ROA+equity/assets)/sd(ROA); where sd(ROA) is the standard deviation of ROA.	BankScope and authors' calculations
Cost-Income Ratio	The cost of running operations as the percentage of a bank's operating income.	Same as above
ROA	Return on average assets.	Same as above
State Ownership	Government ownership (percentage).	The World Bank Financial Structure Database
Creditor Rights	Measures the degree of legal creditor rights protection.	Djankov et al. (2007)
Information	Dummy variable that equals 1 if there is a public or private registry that facilitates information-sharing.	Same as above
Political Right	Ranges from 1 to 7, 1 meaning highest degree of freedom.	Freedom House
Agriculture	Agriculture, forestry, and fishing, value added, as the percentage of GDP.	World Development Indicators (WDI)
Industry	Industry (including construction), value added, as the percentage of GDP.	Same as above
Life Expectancy	Life expectancy at birth, total (years).	Same as above
Tax	Tax revenue as the percentage of GDP.	Same as above
Openness	Sum of imports and exports as the percentage of GDP.	Same as above
Unemployment	Annual total unemployment rate.	Same as above
CBI	Ranges from 0 to 1, a higher score represents greater central bank independence.	Garriga (2016)

This table reports the definition and the source of variables.

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[10] Service is omitted to avoid multicollinearity.

[11] Variable sources and definitions are listed in Appendix Table 1.

[12] In untabulated results, we continue to find supportive evidence when we include all significant controls together.

[13] We thank the reviewer for pointing out the potential role of the central bank's independence, corporate governance, and political freedom in determining bank liquidity creation. The effect of individualism remains consistent after controlling for these three factors together.

[14] We replicate the estimation in Section 4.5 using subsamples of developed and developing countries. The results are in Appendix Table 3.

Table A2

Pearson Correlation Matrix.

Variables	LC (Total)	LC (Asset)	LC (Liability)	LC (Off)	Individualism	Power Distance	Masculinity
LC(Total)	1						
LC(Asset)	0.6483 *	1					
LC(Liability)	0.6481 *	0.0324 *	1				
LC(Off)	0.4352 *	0.0640 *	-0.0126 *	1			
Individualism	0.2941 *	-0.0254 *	0.4576 *	0.0012	1		
Power Distance	-0.3097 *	0.0858 *	-0.5122 *	-0.0437 *	-0.8196 *	1	
Masculinity	0.2266 *	-0.1046 *	0.4234 *	0.0071	0.4710 *	-0.5754 *	1
Uncertainty Avoidance	-0.3204 *	0.0756 *	-0.5081 *	-0.0700 *	-0.7135 *	0.7063 *	-0.4106 *
L. Capita	0.1982 *	-0.0466 *	0.3592 *	-0.0459 *	0.8167 *	-0.7778 *	0.4504 *
L. Growth	-0.0725 *	0.0281 *	-0.1534 *	0.0434 *	-0.3607 *	0.3577 *	-0.2198 *
L. Law & Order	0.2015 *	-0.0676 *	0.3617 *	-0.0013	0.6459 *	-0.6537 *	0.3265 *
L. Corruption	0.2647 *	-0.0655 *	0.4245 *	0.0516 *	0.7146 *	-0.8230 *	0.4163 *
L. Interest	-0.1805 *	0.0589 *	-0.3369 *	0.0287 *	-0.4708 *	0.4565 *	-0.3702 *
L. Inflation	-0.2754 *	0.1050 *	-0.4735 *	-0.0526 *	-0.5998 *	0.7126 *	-0.5914 *
L. Deposit	0.0154 *	0.0198 *	0.0181 *	-0.0248 *	0.3608 *	-0.2294 *	0.0605 *
L. Lerner	0.2042 *	-0.0581 *	0.3426 *	0.0278 *	0.2534 *	-0.2666 *	0.2767 *
L. Stock	0.2336 *	-0.0203 *	0.3832 *	-0.0404 *	0.6358 *	-0.5000 *	0.3751 *
L. Bond	0.1431 *	-0.0849 *	0.3135 *	-0.0436 *	0.6266 *	-0.4663 *	0.2343 *
L. Total Asset	0.1315 *	0.0497 *	0.0405 *	0.2249 *	-0.3296 *	0.1115 *	0.0550 *
L. Capital	-0.4931 *	-0.1701 *	-0.6535 *	0.0161 *	-0.1574 *	0.1685 *	-0.1517 *
L. Overhead	-0.3421 *	0.0181 *	-0.5687 *	-0.0135 *	-0.2650 *	0.3805 *	-0.3090 *

Variables	Uncertainty Avoidance	L. Capita	L. Growth	L. Law & Order	L. Corruption	L. Interest	L. Inflation
Uncertainty Avoidance	1						
L. Capita	-0.4612 *	1					
L. Growth	0.1367 *	-0.4530 *	1				
L. Law & Order	-0.4817 *	0.6262 *	-0.2101 *	1			
L. Corruption	-0.5992 *	0.7443 *	-0.2297 *	0.6454 *	1		
L. Interest	0.3580 *	-0.5920 *	0.2449 *	-0.5075 *	-0.4545 *	1	
L. Inflation	0.5664 *	-0.6395 *	0.4914 *	-0.5439 *	-0.6087 *	0.5205 *	1
L. Deposit	0.0430 *	0.4169 *	-0.2656 *	0.2329 *	0.2815 *	-0.1006 *	-0.1197 *
L. Lerner	-0.4001 *	0.1929 *	0.0948 *	0.1269 *	0.2255 *	-0.3573 *	-0.2390 *
L. Stock	-0.5583 *	0.5306 *	-0.4251 *	0.3187 *	0.3394 *	-0.3566 *	-0.4692 *
L. Bond	-0.5206 *	0.5955 *	-0.3507 *	0.4839 *	0.3537 *	-0.4309 *	-0.4615 *
L. Total Asset	0.1757 *	-0.1764 *	0.0299 *	-0.1594 *	-0.0994 *	0.0033	-0.0667 *
L. Capital	0.1612 *	-0.1292 *	0.0486 *	-0.1489 *	-0.1445 *	0.1388 *	0.1785 *
L. Overhead	0.3535 *	-0.2019 *	-0.0173 *	-0.2355 *	-0.3219 *	0.2174 *	0.3047 *

Variables	L. Deposit	L. Lerner	L. Stock	L. Bond	L. Total Asset	L. Capital	L. Overhead
L. Deposit	1						
L. Lerner	-0.0365 *	1					
L. Stock	0.1338 *	0.1849 *	1				
L. Bond	0.2048 *	0.3370 *	0.4138 *	1			
L. Total Asset	-0.1985 *	-0.0190 *	-0.1793 *	-0.2360 *	1		
L. Capital	-0.0069	-0.1254 *	-0.1334 *	-0.1093 *	-0.2518 *	1	
L. Overhead	0.0435 *	-0.2828 *	-0.2012 *	-0.1505 *	-0.1946 *	0.4341 *	1

This table reports the Pearson correlation matrix of the variables. * denotes significance at the 1% level.

Table A 3

Channels.

Panel A: Developed Countries						
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Loans/GTA*	*Security/GTA*	*Cash/GTA*	*Deposit/GTA*	*Equity/GTA*	*Commitment/GTA*
Individualism	0.215 *	0.001	-0.041 * *	0.100	0.009	0.219 * **
	(1.791)	(0.021)	(−2.363)	(1.105)	(0.650)	(4.439)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	116,936	116,936	116,937	116,165	116,936	116,937
Number of Countries	36	36	36	36	36	36
Panel B: Developing Countries						
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	*Loans/GTA*	*Security/GTA*	*Cash/GTA*	*Deposit/GTA*	*Equity/GTA*	*Commitment/GTA*
Individualism	-0.104	0.163 * *	-0.011	-0.155	0.019	-0.086 *
	(−1.123)	(2.415)	(−0.276)	(−1.149)	(1.266)	(−1.987)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15896	15,896	15,896	15,641	15,893	15,896
Number of Countries	30	30	30	30	30	30

All controls are based on our main specification (Table 4, Column (3)). All regressions include year fixed effects. Standard errors are clustered at the country level. t-statistics are in parentheses. * ** , * *, * indicate significance at 1%, 5%, and 10% levels, respectively.

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