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Bank liquidity creation and real economic output[☆]

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ABSTRACT

We find that bank liquidity creation (*LC*) is statistically and economically significantly positively related to real economic output (*GDP*). This is robust to using instrumental variables and many robustness checks. *LC* also beats bank assets in "horse races." *On-balance sheet LC* matters more for small banks and *off-balance sheet LC* matters more for large banks. Small bank *LC* generates more *GDP* per dollar than large bank *LC*, but large bank *LC* matters more overall because large banks provide much more *LC* than small banks. The *LC*-output relation is strongest in bank-dependent industries, consistent with the hypothesized transmission mechanism.

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1. Introduction

A large literature over the last quarter century links finance to the real economy, usually focusing on international comparisons (e.g., Greenwood and Jovanovic, 1990; King and Levine, 1993; Levine, 1997; Demirgüç-Kunt and Maksimovic, 1998; Levine and Zervos, 1998; Bekaert et al., 2005; Demirgüç-Kunt and Levine, 2008; Arcand et al., 2015). A number of studies also focus on the role of banks. They find, for example, that U.S. bank deregulation results in increases in entrepreneurship, more small businesses, and improved economic growth (e.g., Jayaratne and Strahan, 1996; Black and Strahan, 2002; Cetorelli and Strahan, 2006; Rice and Strahan, 2010; Krishnan et al., 2015). In this paper, we address *how* banks improve the real economy by focusing on bank liquidity creation (*LC*). *LC* is a comprehensive measure of bank output that includes all assets, liabilities, equity, and off-balance sheet guarantees and derivatives, each with different theoretically-driven weights. As shown below, *LC* beats measures of bank assets in "horse races" predicting real economic output, and the driving force is *off-balance sheet LC*, which is not included in the asset measures.

LC is one of the most important roles that banks play and its components are theoretically linked to the economy. Bank loans, particularly those to bank-dependent customers without capital market opportunities, are often thought to be primary engines of economic growth (e.g., Smith, 1776; Levine and Zervos, 1998). These loans also play an important role in affecting output through the bank lending channel of monetary policy (e.g., Bernanke and Blinder, 1998), particularly for small banks that tend to cater to small, bank-dependent firms (Kashyap and Stein, 2000; Berger and Bouwman, 2017). Transactions deposits, another key component of *LC*, provide liquidity and payments services which are essential to a well-functioning economy (Kashyap et al., 2002). Off-balance sheet guarantees like loan commitments and standby letters of credit allow customers to expand their economic activities because they are able to plan their investments and other expenditures, knowing that the funds to finance these expenditures will be forthcoming in the future when needed (e.g., Boot et al., 1993). Moreover, these guarantees are often used as backups for other capital market financing, such as commercial paper and municipal revenue bonds, and in this way assist the capital markets in financing

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economic growth. Similarly, derivatives, the other main type of bank off-balance sheet activity, aid real economic activity by allowing firms to hedge risks related to future changes in interest rates, foreign exchange rates, and other market prices (e.g., Stulz, 2003).

Despite the theoretical links between *LC* and the economy, the empirical literature until now is missing comprehensive tests of whether *LC* affects real economic output, measurement of how large such an effect may be, the extent to which the effect derives from small versus large banks and from on- or off-balance sheet activities, and whether this effect is stronger than that of more traditional measures of bank output, total assets (*TA*) or gross total assets (*GTA*), discussed further below.[1] Note that this study is distinguished from studies that examine the determinants of *LC* (e.g., Jiang et al., 2016) and the effects of *LC* on bank failure (e.g., Fungacova et al., 2015). Our work is also related to the research noted above that links banks to real output (e.g., King and Levine, 1993; Levine and Zervos, 1998). However, this literature has not focused on *LC*, which includes different weights on all of the bank assets, and also includes liabilities and off-balance sheet activities.

The goal of this paper is to fill these gaps in the literature. Specifically, we test if real economic output is higher in U.S. states in which *LC* is relatively high after controlling for other determinants of real output. In addition, we measure how large this effect of *LC* on real economic output is. We also test whether *LC* is better than the asset measures *TA* and *GTA* in predicting real economic output. In addition, we distinguish between *small-bank* and *large-bank LC* and between *on-* and *off-balance sheet LC*. Finally, we hypothesize that the primary transmission mechanism through which *LC* impacts *GDP* is through bank-dependent industries. Our results support this view.

Until recently, *LC* was mostly relegated to a theoretical concept and was not often used in empirical studies. Berger and Bouwman (2009) provide the first comprehensive measure of *LC* that takes into account the contributions of all bank assets, liabilities, equity, and off-balance sheet activities. To summarize briefly, measured *LC* is the weighted sum of all assets, liabilities, equity, and off-balance sheet activities, where the weights are based on the liquidity and the location on or off of the balance sheet of each item. Since liquidity is created when banks transform illiquid assets into liquid liabilities, positive weights are given to both illiquid assets and liquid liabilities (e.g., Bryant, 1980; Diamond and Dybvig, 1983). Banks in this situation are taking something illiquid from the public and giving it something liquid. Similarly, negative weights are given to liquid assets, illiquid liabilities, and equity because banks destroy liquidity when they transform liquid assets into illiquid liabilities or equity. In these cases, banks are taking something liquid from the public and giving it something illiquid. Off-balance sheet activities are assigned weights consistent with those assigned to functionally similar on-balance sheet activities. For example, unused loan commitments are assigned a positive weight because they provide liquidity to the public similar to that of transactions deposits (e.g., Boot et al., 1993; Holmstrom and Tirole, 1998; Kashyap et al., 2002). See Berger and Bouwman (2009) for more details.

LC is also a measure of the output of a bank. According to the modern theory of financial intermediation, banks' two major roles in the economy are liquidity creation and risk transformation. According to the risk transformation theories, banks transform risk by issuing riskless deposits to finance risky loans (e.g., Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986). While *LC* is only one of the two major functions of a bank, the two roles often coincide, given that both riskless deposits and risky loans contribute positively to *LC*. It is therefore expected that the output of *LC* is highly correlated with the output of risk transformation. Since there is not as yet any empirical measure of risk transformation, *LC* may be viewed as the best available measure of total bank output.

The vast majority of empirical studies in banking use one of two measures of bank assets, total assets (*TA*) or gross total assets (*GTA*), as their main measure of bank output. *GTA* equals *TA* plus allowances for loan and lease losses and the allocated transfer risk reserve. *GTA* may be considered to be a superior measure of the size of the balance sheet to *TA* because *GTA* includes all of the items that are part of the balance sheet that must be financed. The empirical research includes studies of the effects of bank output or size on corporate governance (e.g., Laeven and Levine, 2009), small business lending (e.g., Berger et al., 2005), the effects of government interventions and bailouts (e.g., Duchin and Sosyura, 2014), and many other topics. The measures of bank assets are also used as a size cutoff to determine which banks are classified as community banks (e.g., DeYoung et al., 2004), and which banks are subject to different regulatory treatment, such as extra supervision as Systemically Important Financial Institutions (SIFIs), stress tests, and consumer protections.[2]

We argue that *LC* is a superior measure of bank output to *TA* or *GTA* because *LC* takes into account off-balance sheet guarantees and derivatives, deposits and other liabilities, and equity in addition to assets, and because it weights various asset categories differently. As noted above, off-balance sheet guarantees allow customers to expand their economic activities by helping them plan expenditures and are often used as backups for other capital market financing. Similarly, off-balance sheet derivatives allow customers to engage in economic activities without facing significant price risks. *TA* and *GTA* do not include off-balance sheet activities. Off-balance sheet activities make up about half of all *LC* in the U.S. (Berger and Bouwman, 2016), so neglecting off-balance sheet activities fails to take into account a major part of bank output. By including transactions deposits with positive weights, *LC* also helps capture the value to the economy of both the liquidity provided by these deposits and the payments services associated with them. Deposits are not included in the asset measures. Another potentially important difference is that *TA* and *GTA* both weight all assets equally and positively, whereas *LC* applies positive, negative, and zero weights to different assets. To illustrate, marketable securities held by a bank increase measured bank output when *TA* or *GTA* are used, but they decrease measured output when *LC* is used. We argue that the negative weight is more appropriate, since holding such securities takes something liquid away from the public and provides no direct benefit to bank customers.[3] As a result of all of these differences, we expect that *LC* to be more strongly related to economic output than *TA* or *GTA*.

As indicated above, we test if real economic output is higher in states in which *LC* is relatively high, measure the size of this effect, and test whether *LC* dominates *TA* and *GTA* in predicting real economic output. We specifically regress *GDP per capita* on *LC per capita*, both measured in real 2010 dollars, in all 50 U.S. states annually from 1984 to 2010, controlling for a number of state conditioning variables, as well as state and year fixed effects. We normalize both *GDP* and *LC* by state population because oth-

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[1] We acknowledge the contribution of Fidrmuc, Fungacova, and Weill (2015), which examines the effects of *on-balance sheet LC* on real economic output. However, it does not consider *off-balance sheet LC* (which we find to be most important), or the effects of small versus large banks. It also focuses on Russia, where many of the banks are state-owned, and may have very different economic objectives.

[2] For a list of studies using assets to measure bank output or size, as well as regulatory treatments that are based on assets, see Berger and Bouwman (2016, pp. 48-49, Box 5.1).

[3] This is not to suggest that holding securities is not valuable to the bank in terms of reducing liquidity risk, but rather that there is no direct benefit to the customers of the bank.

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