

Online Appendix for

State-run Banks, Money Growth, and the Real Economy

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A1. Expanded description of construction of variables

Table 1A in the paper was shortened to reduce the length of the article. The following is the longer, more complete version.

Table A1. Descriptions and Construction of Variables

Panel A: Variables reflecting state control over banks

State-run bank indicator Bank-year annual panel dummy (1 if bank has state organ as ultimate controlling shareholder; 0 otherwise). This variable is from Morck et al. (2011) for years covered in that study, which expands a cross-section of data from Caprio et al. (2007) for publicly listed banks to include every country's ten largest banks, listed or unlisted, ranked by 2001 assets in The Banker (2002), with ownership available in BankScope or other sources. The same source is used to extend the data to cover additional years.

Fraction of banking system state-run Economy-level annual panel of the lagged credit-weighted fractions of banks with a state organ as ultimate controlling shareholder. Ultimate control is as in the definition of the bank-level indicator *state-run*.

Panel B: Main monetary policy and outcome measures

Growth in capital spending Economy-year panel of annual real growth rate of gross fixed capital spending, $(capex_{t+1} - capex_t)/capex_t$ Gross fixed capital spending total value of producers' acquisitions, less disposals, of fixed assets plus certain additions to the value of non-produced assets (e.g. subsoil assets or major improvements in the quantity, quality, or productivity of land), deflated by the producer price index. Source: IMF International Financial Statistics (IFS) Database: National Accounts and Population, Gross Fixed Capital Spending (line 93e).

Growth in lending (economy-level) Economy-year panel of real growth rates of domestic credit provided by banking sector. Aggregate loans are defined as domestic credit provided by banking sector over GDP from WDI times GDP in current local currency. Each country's CPI index is used to deflate nominal aggregates. The growth

rate is winsorized at 10% level within the entire panel. Source: WDI.

Growth in lending (bank-level) Bank-year panel of real growth rates in gross loans, i.e. $(gross\ loans_{t+1} - gross\ loans_t) / gross\ loans_t$, deflated using the consumer price index and winsorized at 10% within the entire panel. If gross loans are missing net loans are used. Source: BankScope.

Money growth Economy-year panel of nominal monetary base growth during the last 12 months of the prior year, $(monetary\ base_t - monetary\ base_{t-1}) / monetary\ base_t$ winsorized at the 10% level within entire panel. We values from either the reporting country or the IMF, if available; and otherwise run a rolling regression for 5 prior years of money growth on quarter dummies to calculate seasonal adjusted values. Euro-zone countries are considered one economy in calculating this variable after adoption of the euro. In bank-level regressions, this variable is measured over each bank's prior fiscal year and uses seasonally adjusted values. Source: IMF International Financial Statistics (IFS) Database, Central Bank Survey, section 10, country table line 14.

Panel C: Other variables

Central bank independence Crowe and Meade's (2008) independence index reflecting appointment procedures for head of central bank, resolution of conflict between central bank and executive branch, existence of explicit policy target, and rules limiting lending to government. The index is cross-sectional.

Exchange rate depreciation Percent change in the exchange rate measured as local currency in US dollar, over the prior 12 months. A more positive value implies more local currency depreciation against the U.S. dollar. Source: IMF IFS.

Fiscal stimulus Economy-level changes in fiscal balance during the prior 12 month, as a fraction of the prior years' year-end nominal GDP. Sources: Government surplus or deficit data are from DataStream (DS Mnemonic =.govbala), and supplemented with IMF GFS data. These variables are calculated on accounting or cash bases and for the overall government, or listed as central government, or as budgetary central government. Net operating balances are revenue (a1) less expenses (a2). Revenues includes taxes, social contributions, grants and other revenues; expenses include compensation of

employees, use of goods and services, consumption of fixed capital, interest, subsidies, grants, social benefits and other expenses (GFSM manual 2001).

GDP Growth GDP growth in constant local currency lagged by one year. GDP growth is calculated as $[\text{GDP}(t) - \text{GDP}(t-1)] / \text{GDP}(t-1)$. Source: World Bank national accounts, OECD National Accounts.

State-directed investment Economy-level panel data of lagged annual government investment as a share of total investment. Source Economic Freedom of the World Index.

State-controlled firms Economy-level cross sectional variable measuring percent of firms that are state-owned enterprises. Source: Obtained from Faccio and Lang (2002), Claessens, Djankov and Lang (2000) and La Porta, Lopez-de-Silanes and Shleifer (1999) in the same order.

Bank liquidity Bank-year panel variable equal to the bank's previous year-end ratio of government securities plus cash and amounts due from banks to total assets. Source: BankScope.

Output gap Potential GDP less actual GDP, as a percent of potential GDP, all lagged one year. Potential GDP is estimated using the filter developed by Hodrick and Prescott (1997) using past annual GDP growth, with the smoothing parameter of 6.25 they suggest for annual GDP data.

Bank size Bank-year panel variable equal to prior fiscal year-end log total assets in USD. Source: BankScope

Transfers and subsidies Economy-level panel data of lagged annual measure of general government transfers and subsidies as a share of GDP. Source Economic Freedom of the World Index.

Election years Dummy variable set to one if the country will hold a free election the next year and to zero otherwise. Election dates (presidential elections for presidential systems and parliamentary elections for parliamentary and assembly-elected presidential systems are from the International Institute for Democracy and Electoral Assistance (IDEA) database. The system in effect in each country each year is from the World Bank Database of Political Institutions (Beck *et al.*, 2001). The variable is zero for elections (or countries) classified as "not free" by Freedom House.

Change in capital regulatory index Change in bank capital requirement stringency index, as provided by Barth, Caprio and Levine (2013) over the prior twelve months. Increases in the index indicate increased capital requirements.

Private sector loan growth Growth in real domestic lending to the private sector is growth in domestic credit to private sector by banks (obtained from WDI as percent of GDP and multiplied by current LCU GDP), deflated by the economy's consumer price index and winsorized at 10%.

Private sector investment growth Real gross fixed capital formation growth by the private sector is annual growth rate in gross fixed capital formation, private sector (current LCU), from WDI. deflated by the economy's producer price index and winsorized at 10%

A2. Table of simple correlations of key variables

Table A2. Simple correlations

Sample for Panel A is annual data for the 40 economies listed in Table 1 from 2001 to 2011. However, the sample changes with the availability of variables. For example, correlations with growth in capital spending are calculated for the 30 countries for which this variable is available. Sample for Panel B is annual data from the largest banks in each of the 40 economies over the same years. Numbers in the second row are p -levels adjusted for clustering at the economy-level in Panel A and the bank-level in Panel B. Boldface indicates significance at 10% or better. Variables are defined in Table 1.

Panel A. Country-level variables

	<i>Growth in lending</i>	<i>Growth in capital spending</i>	<i>Money growth</i>	<i>Fraction of banking system state-run</i>
<i>Growth in capital spending</i>	0.16 (0.09)			
<i>Money growth</i>	0.05 (0.47)	-0.03 (0.78)		
<i>Fraction of banking system state-run</i>	-0.12 (0.29)	0.25 (0.00)	0.02 (0.72)	
<i>Interest rate drop</i>	0.01 (0.83)	-0.24 (0.01)	0.02 (0.81)	-0.19 (0.00)
<i>Private sector loan growth</i>	0.73 (0.00)	0.44 (0.00)	-0.01 (0.84)	0.08 (0.45)
<i>Private sector investment growth</i>	0.26 (0.01)	0.79 (0.00)	-0.18 (0.04)	0.29 (0.00)
<i>Central bank independence</i>	-0.04 (0.72)	0.10 (0.26)	0.23 (0.00)	-0.25 (0.14)
<i>Change in regulatory index</i>	-0.05 (0.48)	0.03 (0.68)	-0.08 (0.24)	0.09 (0.12)
<i>Fiscal stimulus</i>	0.03 (0.67)	0.09 (0.35)	-0.17 (0.11)	-0.01 (0.80)
<i>Exchange rate depreciation</i>	-0.13 (0.00)	0.07 (0.37)	0.26 (0.00)	0.06 (0.23)
<i>Output gap</i>	-0.02 (0.80)	-0.38 (0.00)	0.16 (0.03)	-0.12 (0.12)
<i>Transfers & subsidies</i>	-0.01 (0.93)	-0.19 (0.01)	-0.17 (0.04)	-0.42 (0.00)
<i>State-directed investment</i>	0.07 (0.56)	0.15 (0.11)	-0.11 (0.11)	0.26 (0.16)
<i>State-controlled firms</i>	-0.03 (0.71)	0.04 (0.68)	-0.05 (0.52)	0.40 (0.00)

Panel B. Bank-level variables

	<i>Growth in lending</i>	<i>Money growth</i>	<i>State Run</i>	<i>Bank size</i>
<i>Money growth</i>	0.07 (0.05)			
<i>State run bank indicator</i>	0.04 (0.37)	0.13 (0.00)		
<i>Bank size</i>	-0.08 (0.02)	-0.05 (0.16)	-0.20 (0.00)	
<i>Bank liquidity</i>	0.24 (0.00)	0.26 (0.00)	0.36 (0.00)	-0.19 (0.00)

A3. Expanded discussion of regression specifications

A3.1 Notation

This section spells out the structures of the regressions used in each table. The variables common to all of these specifications are:

Money growth is $\Delta M_{i,j,t} \equiv (M_{i,j,t} - M_{i,j,t-1})/M_{i,j,t-1}$, where M is monthly base money growth. In economy-level regressions, $\Delta M_{i,j,t}$ is defined over calendar years. In bank-level regressions, $\Delta M_{i,j,t}$ is defined over bank i 's fiscal year t where bank i is in economy j .

Economy-level **credit growth** is $\Delta credit_{j,t+1} \equiv (credit_{j,t+1} - credit_{j,t})/credit_{j,t}$, where $credit_{j,t}$ refers to credit in economy j in year t . Credit is defined as domestic credit extended by the banking sector divided by GDP.

Bank-level **credit growth** is $\Delta credit_{i,j,t+1} \equiv (credit_{i,j,t+1} - credit_{i,j,t})/credit_{i,j,t}$, where $credit_{i,j,t}$ refers to lending by bank i in economy j , in fiscal year t .

Capital formation growth is $\Delta capex_{j,t+1} \equiv (capex_{j,t+1} - capex_{j,t})/capex_{j,t}$, where $capex_{j,t}$ refers to deflated capital spending in economy j in year t .

A3.2 Baseline economy-level regressions

Our economy-level baseline regressions of credit growth and capital spending growth are:

$$[A1a] \quad \Delta credit_{j,t+1} = a + b \Delta M_{j,t} + controls + e_{j,t},$$

$$[A1b] \quad \Delta capex_{j,t+1} = a + b \Delta M_{j,t} + controls + e_{j,t},$$

with $f_{j,t}$ the state-run fraction of country j 's banking system in year t . Our research objective is to explore how $f_{j,t}$ modulates the relationships between $\Delta M_{j,t}$ and $\Delta credit_{j,t+1}$ as well as between $\Delta M_{j,t}$ and $\Delta capex_{j,t+1}$. They therefore incorporate $f_{j,t}$ into the varying coefficient b as

$$[A2] \quad b(f_{j,t}) \equiv b_0 + b_1 f_{j,t}$$

Then, substituting [A2] into [A1], and controlling for economy fixed-effects, λ_j , we obtain the following *baseline economy-level regression* specifications

$$[1a] \quad \Delta credit_{j,t+1} = a_1 f_{j,t} + (b_0 + b_1 f_{j,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t},$$

$$[1b] \quad \Delta capex_{j,t+1} = a_1 f_{j,t} + (b_0 + b_1 f_{j,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t},$$

in which the economy fixed-effects subsume a , the intercept in [A1].

A3.3 Baseline Bank-level regressions

Our bank-level tests, which parallel the economy-level relationship [A1], have the form:

$$[A3] \quad \Delta credit_{i,j,t+1} = a + b \Delta M_{i,j,t} + controls + e_{i,j,t},$$

with i , j and t indexing banks, countries, and bank fiscal years, respectively. All bank-level regressions cluster by economy, with the Eurozone one cluster after the euro introduction.

The proportionality relationship [A2] is now a dichotomy at the bank-level. Let the state-run bank indicator variable be

$$[A4] \quad \delta_{i,j,t} = \begin{cases} 1 & \text{bank } i \text{ in economy } j \text{ is state-run in year } t \\ 0 & \text{otherwise} \end{cases}$$

Analogously to [A2], the fixed parameter b is replaced by

$$[A5] \quad b(\delta_{i,j,t}) \equiv b_0 + b_1 \delta_{i,j,t}$$

Substituting [A5] into [A4], and controlling for the main-effect of the state-run bank indicator and bank fixed-effects, λ_i , yields the bank-level specification

$$[A6a] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t}) \Delta M_{i,j,t} + \sum_i d_i \lambda_i + e_{i,j,t}.$$

This firm-level regression essentially tests for differences between state-run and private-sector banks in how changes in lending track changes in money growth. Fixed effects subsume the intercept a in [A4]. Including year fixed-effects, denoted λ_t in [A6b] or economy-year fixed-effects, denoted $\lambda_{j,t}$ in [A6c] yields the bank-level difference-in-difference specifications

$$[A6b] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t}) \Delta M_{i,j,t} + \sum_i d_i \lambda_i + \sum_t d_t \lambda_t + e_{i,j,t}$$

$$[A6c] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t}) \Delta M_{i,j,t} + \sum_i d_i \lambda_i + \sum_{j,t} d_{j,t} \lambda_{j,t} + e_{i,j,t},$$

Economy fixed-effects subsume omitted time-invariant economy characteristics; as do bank fixed-effects. Equation 6c imposes the strongest restrictions by including bank and economy-year fixed-effects.

Prior work (Kashyap and Stein 2000) motivates us to accommodate time-varying bank-level heterogeneity in liquidity and size in the baseline bank-level regressions. We modify [A6] to let bank size and bank liquidity, denoted $x_{k,i,j,t}$ for $k \in \{size, liquidity\}$ join the state-run bank indicator in modulating how between differences in money growth presage differences in bank-credit growth. This is operationalized by replacing b in [A4] with

$$[A7] \quad b(\delta_{i,j}, \{x_{k,i,j,t}\}) \equiv b_0 + b_1 \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t},$$

rather than with the expression in [A5]. This yields another set of bank-level difference-in-difference regressions, which we refer to below as our *baseline bank-level regressions*,

$$[2a] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} + \sum_k c_k x_{k,i,j,t} + \sum_i d_i \lambda_i + \sum_t d_t \lambda_t + e_{i,j,t}.$$

$$[2b] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} + \sum_k c_k x_{k,i,j,t} + \sum_i d_i \lambda_i + \sum_{j,t} d_{j,t} \lambda_{j,t} + e_{i,j,t}.$$

Regressions [1], [A6] and [2] are reported in Table 2 of the text. Subsequent tables expand upon

specifications [1] and [2].

A3.4 Letting other variables interact with state control of banks

Differences in state-run banks' lending might be tracking changes in some other time-varying economic policy or economy characteristic, $p_{j,t}$, rather than changes in money growth. For such a variables rather than money growth, to explain our baseline bank-level findings, it must be correlated with money growth and must lead to different behaviour changes in state-run versus private-sector banks. One way this might arise is if state-run banks' borrowers respond differently to some variable that correlates with money growth. This is testable by letting such variables interact directly with the state-run bank variables. If they were proxying for money growth, the magnitude and significance of the interactions of money growth with the state-run bank variables would fade.

To test for this, we consider economy-level regressions of the following form:

$$[A9a] \Delta credit_{j,t+1} = a_1 f_{j,t} + (\beta_0 + \beta_1 f_{j,t}) p_{j,t} + (b_0 + b_1 f_{j,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t},$$

$$[A9b] \Delta capex_{j,t+1} = a_1 f_{j,t} + (\beta_0 + \beta_1 f_{j,t}) p_{j,t} + (b_0 + b_1 f_{j,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t},$$

and bank-level regressions of the form

$$[A10a] \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (\beta_0 + \beta_1 \delta_{i,j,t}) p_{j,t} + (b_0 + b_1 \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} + \sum_k c_k x_{k,i,j,t} + \sum_i d_i \lambda_i + \sum_t d_t \lambda_t + e_{i,j,t}.$$

$$[A10b] \Delta credit_{i,j,t+1} = a_1 \delta_{i,t} + (\beta_0 + \beta_1 \delta_{i,j,t}) p_{j,t} + (b_1 \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} + \sum_k c_k x_{k,i,t} + \sum_i d_i \lambda_i + \sum_{j,t} d_{j,t} \lambda_{j,t} + e_{i,j,t}.$$

These regressions essentially run horse-races to see which best explains the left-hand side variables: interactions of state-run banking with money growth or interactions of state-run banking with the suspected omitted variable, $p_{j,t}$. If including these additional terms in [A9] and [A10]

leaves b_1 insignificant – or even just substantially reduced in magnitude – the alternative explanation merits attention.

We include as candidates for $p_{j,t}$ the following:

Fiscal stimulus – If state-run banks’ borrowers were more sensitive than private-sector banks’ borrowers to a fiscal stimulus, like infrastructure spending, demand for credit from state-run banks could rise faster after a fiscal stimulus than does demand for credit from private-sector banks. If the central bank accommodated this by letting money growth rise, letting actual lending subsequently rise, our baseline results could ensue, but increased borrowing from state-run banks by their borrowers would be causing money growth, rather than the converse.

Currency depreciation – Exchange rate drops can accompany changes in money growth (Fleming 1962; Mundell 1963). An exchange rate drop can spur both exports and inward foreign direct investment, and might thus spur lending associated with either or both. A lower exchange rate could spur demand for export-related loans and if state-run banks disproportionately provided these, their lending might rise disproportionately as the exchange rate falls. If money growth rises as the currency drops, our baseline results might ensue.

Output gap – A third possibility is that state-run banks’ borrowers might be less sensitive than private-sector banks’ borrowers to the business cycle. For example, if state-run banks’ clients were disproportionately regulated utilities or other recession-proof industries, credit demand at state-run banks might be substantially less procyclical than at private-sector banks. If activist monetary authorities ran countercyclical monetary policies, increased money growth might spuriously predict state-run banks’ lending rising above private-sector banks’ lending. We proxy for output

gap using the economy's prior year's potential GDP, estimated using the filter developed by Hodrick and Prescott (1997), minus its actual GDP, all as a fraction of the former. Output gap growing larger when the economy is deeper in recession and smaller when the economy is more prosperous.

Stringency of banking regulations – Another possibility is that state-run and private-sector banks' lending might differentially track changes in the *stringency of banking regulations*. If politicians or central bankers loosen banking regulations, this creates scope for banks to lend more. If political pressure then leads state-run banks to actually boost lending, the central bank might prepare for this by boosting money growth. We capture *Change in Capital Regulatory Index* as annual changes in each country's capital regulatory index from Barth, Caprio and Levine (2013).

Regression specifications [A9] and [A10] associated with the various $p_{j,t}$ above are reported in Table 3 of the text.

A3.5 Letting other variable modulate the interaction of money growth with state-control

State-run banks might be more prevalent where state power is broader and deeper in general. A highly interventionist government might direct its ministries, nonfinancial state-owned enterprises or politically-dependent private-sector firms to borrow and invest more, its state-run banks to lend more, which the central bank might then accommodate. If so, state-run banks are only one cog in a far-reaching apparatus of state intervention; and our baseline results in Table 2 regarding state-run banks should be more pronounced in economies where the overall apparatus is larger.

To explore this, we augment the baseline regressions in yet another way. We let a measure of the reach of the state, here denoted $q_{j,t}$, and modulate the link between differences in money

growth and differences in bank-credit growth. In the economy-level regressions, this entails replacing the parameter b in [A2] with the expression

$$[A11] \quad b(f_{j,t}) \equiv b_0 + b_1 f_{j,t} + b_2 q_{j,t} + b_3 q_{j,t} f_{j,t}$$

The second and third terms on the right-hand side of [A11] let the strength of the link between money growth and either aggregate credit or capital spending growth vary with the importance of state-run banking, $f_{j,t}$, and with the reach of the state, $q_{j,t}$. The final term lets the link between money growth and aggregate credit or capital spending growth vary more strongly with the importance of state-run banks if the reach of the state is greater too. Including economy fixed-effects and the main-effect of $q_{j,t}$ yields the augmented economy-level specification

$$[A12a] \quad \Delta credit_{j,t+1} = a_1 f_{j,t} + a_2 q_{j,t} + (b_0 + b_1 f_{j,t} + b_2 q_{j,t} + b_3 q_{j,t} f_{j,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t}$$

$$[A12b] \quad \Delta capex_{j,t+1} = a_1 f_{j,t} + a_2 q_{j,t} + (b_0 + b_1 f_{i,t} + b_2 q_{j,t} + b_3 q_{j,t} f_{i,t}) \Delta M_{j,t} + \sum_i d_j \lambda_j + e_{j,t}$$

In the bank-level regressions, the analogous exercise replaces b in [A4] with the expression

$$[A13] \quad b(\delta_{i,j,t}, \{x_{k,i,j,t}\}, q_{j,t}) \equiv b_0 + b_1 \delta_{i,j,t} + b_2 q_{j,t} + b_3 q_{j,t} \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t},$$

Substituting [A13] into [A4] and including the same controls as in [A6a], along with the main-effect of $p_{j,t}$ yields the augmented bank-level regressions

$$[A14a] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_0 + b_1 \delta_{i,j,t} + b_2 q_{j,t} + b_3 q_{j,t} \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} \\ + \sum_k c_k x_{k,i,j,t} + \sum_i d_i \lambda_i + \sum_t d_t \lambda_t + e_{i,j,t}$$

$$[A14b] \quad \Delta credit_{i,j,t+1} = a_1 \delta_{i,j,t} + (b_1 \delta_{i,t} + b_2 q_{j,t} + b_3 q_{j,t} \delta_{i,j,t} + \sum_k \gamma_k x_{k,i,j,t}) \Delta M_{i,j,t} \\ + \sum_k c_k x_{k,i,j,t} + \sum_i d_i \lambda_i + \sum_{j,t} d_{j,t} \lambda_{j,t} + e_{i,j,t}$$

Collecting terms and simplifying [A12] and [A14] reveals triple interaction terms: b_3 being the coefficient of $q_{j,t} \times f_{j,t} \times \Delta M_{j,t}$ in the economy-level regressions and of $q \times \delta_{i,j,t} \times \Delta M_{i,j,t}$ in the bank-level regressions. A significantly positive b_2 suggests that the general reach of the

state matters; and a significantly positive b_3 suggests that state control over banks matters more where the general reach of the state is greater. Critically, a significant b_1 suggests that, after money growth rises, state-run banks' lending rises by more than private-sector banks' lending does after controlling for the reach of the state.

We set $q_{j,t}$ to each of a set of measures of the reach of state power in turn. The first, *transfers and subsidies* as a fraction of GDP, plausibly proxies for the size and importance of state intervention in the economy. The second, *state-directed investment*, defined as government investment as a share of total investment, plausibly proxies for the state's scope for directing its agencies, including state-owned enterprises, to demand more credit and to invest more. The third, simple percentage of *state-controlled firms*, measures the importance of state ownership of business in general. This variable merges data from Faccio and Lang (2002), Claessens, Djankov and Lang (2000) and La Porta, Lopez-de-Silanes and Shleifer (1999).

Additionally, we add as a candidate of $q_{j,t}$, *politically connected firms*, which is the fraction of large businesses, by total market capitalization, run by people with personal connections to top government officials, as calculated by Faccio (2006). These politically connected private-sector firms might be especially responsive to government directives to borrow and invest more while getting help from politicians in obtaining credits from state run banks. These regressions are not reported in Table 4.

A4. Expanded discussion of robustness checks

The discussion of robustness check in the paper is abbreviated to save space. This section revisits these tests providing more detailed descriptions.

One robustness check replaces base money growth by *interest rate drop*. This approach rises a number of problems. US Federal Reserve monetary policy used a policy rate, the federal

funds rate, until 2012, when it switched to inflation targeting. Other central banks target inflation, money growth, or other variables, and so have no explicit policy rate. Consequently, the IMF IFS dataset provides a “monetary policy related interest rate” for only 22 economies for which we have bank ownership data. Interest rates tend to move together, so if no policy rate is available, we take the “discount rate”, “lending rate” or “money market rate”, in that order, as available in the IFS dataset. We define interest rate drop as minus one times the change in this rate over the prior 12 months.

This gives us interest rate drops for 38 economies – still short of the 40 for which money growth is available and the use of different interest rates in different economies potentially adds error in variables problems. Because of these issues, we use money growth as our primary measure and interest rate drop as a robustness test.

Table A3 presents these robustness checks. The results are qualitatively similar to those in Table 2. By this we mean that the coefficients on the interactions of money growth with the state control over bank variables – the continuous measure in the economy-level regressions and the indicator variable in the bank-level regressions – enter with the same pattern of signs and significance and with coefficients of comparable economic significance. Interest rate drops predict larger increases in lending and investment where banking systems are more fully state-run; individual state-run banks boost lending after policy rate drops while otherwise similar individual private sector banks in the same economies at the same time do not. The sole difference is that the main effect coefficient on interest rate drop in the economy-level regression explaining investment growth is insignificant – though the point estimate remains negative.

Table A3. Interest rate drops rather than money growth

Re-estimation of Table 2 regressions using interest rate drops to measure monetary policy. Interest rate drop is drop

over the prior 12 months in key policy interest rate or benchmark interest rate if no key policy rate exists. Economy-level panel and bank-level panels are as in Table 2. Money growth rate is change in monetary base over beginning of period monetary base, measured over the prior 12 months. Numbers in parentheses are p-values with coefficients significant at 10% or better in boldface, using economy-level clustering, euro-zone economies considered one cluster after the introduction of the euro.

Sample	all	all	all	all	all	all	all	all
Aggregation level	economy	economy	bank	bank	bank	bank	bank	bank
Explained variable:		<i>capital</i>						
<i>growth in</i>	<i>lending</i>	<i>spending</i>	<i>lending</i>	<i>lending</i>	<i>lending</i>	<i>lending</i>	<i>lending</i>	<i>lending</i>
Regression	A3.1	A3.2	A3.3	A3.4	A3.5	A3.6	A3.7	A3.8
<i>Interest rate drop</i>	-0.44 (0.21)	-0.59 (0.36)	-1.01 (0.03)	0.04 (0.91)		-1.67 (0.38)	-0.66 (0.74)	
<i>Fraction of banking system state-run x interest rate drop</i>	1.40 (0.09)	3.41 (0.06)						
<i>State-run bank indicator x money growth</i>			1.74 (0.01)	1.30 (0.01)	0.92 (0.09)	1.42 (0.01)	1.33 (0.01)	0.96 (0.10)
<i>Fraction of banking system state-run</i>	-0.04 (0.36)	0.17 (0.01)						
<i>State-run bank indicator</i>			0.03 (0.27)	0.03 (0.21)	0.03 (0.39)	0.02 (0.40)	0.02 (0.44)	0.03 (0.45)
<i>Bank size x money growth</i>						-0.02 (0.89)	0.02 (0.93)	0.08 (0.63)
<i>Bank liquidity x money growth</i>						4.82 (0.03)	2.35 (0.32)	-0.57 (0.85)
<i>Bank size</i>						-0.03 (0.19)	-0.04 (0.32)	-0.02 (0.71)
<i>Bank liquidity</i>						0.06 (0.37)	0.01 (0.87)	-0.04 (0.49)
Fixed-effects	economy	economy	bank	bank & year	bank & economy ⊗ year	bank	bank & year	bank & economy ⊗ year
Adjusted R^2	0.21	0.16	0.23	0.31	0.51	0.27	0.34	0.52
Observations	238	167	1125	1125	1125	992	992	992

A second set of robustness checks uses an alternative economy-level bank credit growth measure made by summing the gross credit extended by all banks in BankScope dataset in each economy each year, and constructing a real growth rate in this aggregate. This measure can be criticized for relying on the incomplete or time varying coverage of banks in BankScope and for omitting non-bank financial institutions of many sorts. Repeating our tests with this alternative measure of economy-level bank credit growth also generates qualitatively similar results.

We also check the robustness of our classification of commercial banks as private-sector or state-run. The variable used in the tables infers state control if a bank's largest ultimate controlling shareholder is one or more state entities and their combined control block is at least 10%. Banks tend to be controlled with stakes substantially higher than this if the state owns any nontrivial stake. Rerunning the classification algorithm using a 5% threshold generates precisely the same classification as using the 10% threshold. Using a 20% threshold moves only one state-run bank to the private sector list. Rerunning the baseline regressions generates results virtually identical to those in the table.

Our bank-level data include only commercial banks, which take deposits and lend out money because these are the institutions through which monetary policy is thought to operate. The data exclude state-run development banks such as Brazil's BNDES, which lend directly from government coffers to selected businesses because their responses to money growth may not be comparable to that of commercial banks. Nonetheless, we expand the samples to include these institutions as a robustness check. We start with banks that BankScope flags as "specialized governmental credit institution" larger than the smallest commercial bank in the same country in the beginning of our sample period. The size filter maintains comparability with our original sample. Export banks, central banks and reserve banks are excluded. The remaining banks are

merged into our bank-level data and our economy-level variables are recalculated using the expanded sample. In most countries, the fraction of the banking system that is state-run changes little. The major exception is Brazil, where the mean fraction state-run rises from 43% to 65%. Our baseline results all continue to hold. These tests are displayed in Table A4.

Table A4. Sample Including Specialized Governmental Credit Institutions

We start with all banks that are categorized as “specialized governmental credit institution” by the Bankscope dataset. We require these institutions to be larger than the smallest commercial bank in the same country in the beginning of our sample period to maintain the same size filter as in our original sample. We go over the final list and eliminate export banks, central banks and federal reserve banks. Remaining banks are included as state run banks in both bank and country level regressions. Money growth rate is change in monetary base over beginning of period monetary base, measured over the prior 12 months. Variables are as in Table 1. Numbers in parentheses are p-values with coefficients significant at 10% or better in boldface, using economy-level clustering, euro-zone economies considered one cluster after the introduction of the euro. Lending, capital spending and money growth are winsorized at 10%.

Aggregation level	economy	economy	bank	bank
LHS variable: growth in	lending	capital spending	lending	lending
Regression	A4.1	A4.2	A4.3	A4.4
Money growth	-0.07 (0.11)	-0.29 (0.00)	0.03 (0.93)	
State-run* x money growth	0.25 (0.02)	0.75 (0.00)	0.34 (0.00)	0.31 (0.00)
Bank size x money growth			-0.01 (0.67)	-0.04 (0.0.8)
Bank liquidity x money growth			-0.31 (0.41)	-0.63 (0.11)
State-run*	0.01 (0.53)	0.13 (0.04)	-0.02 (0.55)	-0.01 (0.90)
Bank size			-0.04 (0.15)	-0.02 (0.48)
Bank liquidity			0.12 (0.07)	0.13 (0.09)
Fixed effects	economy	economy	bank & year	bank & economy ⊗ year
Adjusted R^2	0.23	0.22	0.36	0.52
Observations	246	183	1363	1363

*State-run is the fraction of the banking system under state control in economy-level regressions and the state-run bank dummy in bank-level regressions.

Some studies (Caprio *et al.* 2007; Laeven and Levine 2009; Morck *et al.* 2011) partition private-sector banks into those that are *widely held* and those that have a *controlling shareholder*. To explore this, we define controlling shareholder banks as private-sector banks with a natural person or family as an ultimate controlling shareholder and widely held private-sector banks as those with no ultimate controlling shareholder. Rerunning the baseline regressions partitioning banks into state-run, *widely held*, and controlling shareholder banks generates results qualitatively similar to the tables. Higher money growth presages faster growth in state-run bank lending, but not in lending by either type of private-sector bank. Higher money growth presages increased growth in aggregate lending and investment in economies where state-run banks are more predominant, but not where either class of private-sector bank is more predominant.

Our data contain no foreign subsidiaries of other countries' state-run banks, but some private-sector banks in some economies are subsidiaries of foreign banks. These may have better access to international money markets than do purely domestic banks, and thus might potentially be less affected by a domestic money growth. Also, the importance of foreign banks might correlate with overall openness. Using our data on controlling owners for each bank each year, we set a new *foreign control indicator variable* to one if the bank is foreign-controlled that year and to zero otherwise. We then recalculate a new set of credit-weighted economy-level bank governance variables denoting the importance of state-run banks, domestic private-sector banks, and *foreign-controlled banks*. We rerun the baseline bank-level regressions, first dropping all foreign-controlled banks, and then controlling for the foreign-controlled bank dummy's interaction with money growth. We rerun the baseline economy-level regressions analogously – first using the revised importance of state-run banks measure and then controlling for the main-effect and interaction with money growth of the foreign-controlled bank importance measure. These

exercises generate results qualitatively similar to the baseline regressions, and the coefficients on the foreign-bank main-effects and interactions are uniformly insignificant.

Another possibility is that domestic banks may be global banks that have subsidiaries abroad and as a result their loan growth may be less affected by domestic money growth. This is especially a concern given that we use consolidated financial statements; however, as mentioned above using unconsolidated statements yield similar results. Regardless, we identified banks that control other banks in other countries and labelled them as global banks. Dropping these banks yields similar results in baseline regressions. Keeping these banks but recalculating our main variables denoting the importance of state-run banks, domestic private-sector banks, and global banks also yields qualitatively similar results to the baseline regressions.

Money growth and bank-level loan growth are winsorized at 10%, and observations with absolute value of loan growth above 50% are dropped. Winsorizing at 5%, not winsorizing, and retaining the extreme values all yield qualitatively similar results. Cook's D statistics show no economy consistently over the $4/n$ threshold in any regressions. In the economy-level lending growth regressions, only Venezuela has several high values, and dropping that economy does not alter the baseline results. In the capital spending growth regressions, only the United Kingdom has three high values and dropping that economy improves the regression fit slightly without altering the signs, significance patterns and approximate point estimates. In the bank-level regressions, no country stands out for having a high incidence of high Cook's D statistics.

Economy-level and bank-level panel regressions cluster by economy, with Euro-zone countries as one cluster. Petersen (2009) recommends this as a conservative approach using panel data of this sort, two-way clustering, by economy and by year, yields qualitatively similar results. Not clustering or clustering only by year yields uniformly better p-levels. Dropping all fixed-

effects yields qualitatively similar results with lower p-levels, as does rerunning the bank-level regressions with economy fixed-effects instead of bank fixed-effects.

We use consolidated data for banks that report both consolidated and unconsolidated figures. Using unconsolidated data yields qualitatively similar results.

Bank-level characteristics other than size and liquidity might also interact with money growth in bank lending decisions. We therefore consider two other key bank balance sheet variables: *total deposits* and *total equity*, both scaled by total assets and lagged one year. Rerunning our baseline bank-level regressions including these variables and their interactions with money growth (not shown) does not affect our main results. The coefficients of the interaction of these additional variables with money growth are uniformly insignificant and the interaction of money growth with the state-run bank indicator always attracts a positive significant coefficient.

We check the acceptability of the linearity assumptions in our baseline regressions. Nonlinearity arises as a possible explanation of the negative main effect on money growth in the baseline regression 2.2 in Table 2, which shows faster money growth predicting more negative capital spending growth in economies whose banking systems are fully private-sector, so we pay special attention to that specification. The point estimates in that regression combine in [A2] to imply that a unit increase in money growth boosts aggregate real capital spending growth by $b(f_{j,t}) = -0.27 + 0.79f_{j,t}$, where $f_{j,t}$ is the fraction of the banking system state-run. This implies that a unit boost to money growth actually decreases real capital spending growth if state-run banks constitute less than $0.27/0.79$ ($= 34\%$) of the banking system. However, [A2] imposes the linear specification $b(f_{j,t}) \equiv b_0 + b_1f_{j,t}$ on how this coefficient can vary with the importance of state-run banks. This might drive the intercept b_0 into negative territory artificially if the positive slope

estimate b_1 is primarily driven by observations where $f_{j,t}$ is relatively high. If so, a nonlinear variant of [A2] is required.

Replacing the dependent variables and money growth with their logarithms in all the baseline regressions generates similar patterns of signs and significance levels and does not significantly improve the regression fits. Because these variables can be negative, their logarithmic transforms are calculated by adding one and taking natural logarithms. Appendix Table A5 shows variants of regression 2.2, all of which preserve the significant negative coefficient on *money growth*.

Table A5. Log transformations of key variables in regression 2.2

<i>Variables transformed</i>	<i>Money growth</i>			
<i>X transformed to log(1+X)</i>	<i>Fraction state</i>	<i>All variables</i>	<i>Fraction State</i>	<i>Capital spending</i>
<i>LHS variable</i>	<i>capital spending</i>	<i>capital spending</i>	<i>capital spending</i>	<i>capital spending</i>
Money growth	-0.29 (0.00)	-0.33 (0.00)	-0.33 (0.00)	-0.27 (0.00)
Fraction of banking system state-run	-0.89 (0.01)	0.16 (0.07)	0.18 (0.06)	0.15 (0.04)
Fraction of banking system state-run x money growth	1.07 (0.00)	1.21 (0.00)	1.21 (0.00)	0.79 (0.00)
Fixed Effects	economy	economy	economy	economy
Observations	183	183	183	183
Adj. R-sq	0.21	0.20	0.21	0.21

To explore this further, we conduct additional nonlinearity robustness checks. Rerunning [2] adding a quadratic term $b_2 f_{j,t}^2$ leaves only the linear terms significant and does not improve the fit. Rerunning [A2] with the piecewise linear specification – that is, letting $b(f_{j,t}) \equiv b_0 + b_1 f_{j,t}^L + b_2 f_{j,t}^H$ – allows different coefficient on money growth where the state-run fraction of the banking

system state-run is higher versus lower than a breakpoint. This defines $f_{j,t}^L \equiv f_{j,t}$ if $f_{j,t} < f^*$ and $f_{j,t}^L \equiv f^*$ if $f_{j,t} \geq f^*$ and define $f_{j,t}^H \equiv 0$ if $f_{j,t} < f^*$ and $f_{j,t}^H \equiv f_{j,t} - f^*$ if $f_{j,t} \geq f^*$, repeating this exercise for breakpoints $f^* = 1\%, 5\%, 10\%, 15\%, \dots$ to 50%.

Regardless of the breakpoint used, the intercept remains significantly negative, its point estimate changes little, and the piecewise linear specifications do not detectably improve the regression's fit. Nonlinearity is only evident if the breakpoint is very low, and far lower than 34%. Where state-run banks constitute 5% or less of the banking system, the importance of state-run banks no longer significantly alters the correlation between prior money growth and capital spending growth. We conclude that the linearity in [A2] does not artificially generate the negative main effect on money growth in 2.2. Repeating all these tests for regression 2.1, which explains economy-level lending growth, reveals no nonlinearity issues.

The difference between state-run and private sector banks might be different during periods of monetary expansion versus contraction. State-run banks are thought to induce an inflationary bias because their political pressure limits their ability to cut lending (Novaes and Werlang 1995). If so, political pressure might cause state-run banks to boost lending enthusiastically after money growth rises but sluggish in cutting lending amid monetary contractions. To explore this, we consider tests (not shown) using a range of definitions of monetary expansion and contraction. One set of tests estimates a money growth trend for each economy each year by fitting a moving average process to lagged money growth data. Lags range from four months to six quarters are used. We infer monetary policy to be expansionary or contractionary to the extent that the accumulated differences between the observed and the trend in a year is positive or negative, respectively, to form a regime indicator dummy. We then run regressions to see if the cross-terms of the dummy indicator with money growth and with the interaction between money growth and

state run bank presence, are significant. They turn out to be quite insignificant individually and jointly, regardless of the lags we used to estimate trend money growth. These results fail to reject the hypothesis of symmetric responses in contractions and expansions. We conclude that the baseline findings reflect state-run banks both expanding their lending following expansionary monetary policy and cutting their lending following contractionary monetary policy, while private sector banks seemingly do neither, or do so significantly more reservedly.

Finally, we explore whether the effects we study differ between developed and emerging economies. To do this, we run tests to see if the coefficients on the interactions of money growth with the state-run importance or indicator variable are different for developed versus developing economies. Tests (not shown) using a developing versus developed indicator variable to form cross-terms with money growth and with the interaction between money growth and state run bank presence fail to reject the null hypothesis of equal coefficients across developed and developing economies. Additional tests (not shown) using the continuous development measure *log per capita GDP* at purchasing power parity (PPP) exchange rates again fails to detect any significant difference in the coefficient associated with development.