Public credit and the financial cycle

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Public credit matters!

- By digging into central banks’ archives, this article puts together the first long-run dataset on total state loans to firms and households (i.e. public credit). The dataset covers a sample of 13 major economies (both developed and emerging), at quarterly frequency, over the 1950-2020 period.

- Three main results stand out:
  - Public credit generally accounts for a large share of total credit (22% on average).
  - Local Projections reveal that public credit markets are immune to foreign monetary shocks.
  - In financially developed economies, public credit is strongly countercyclical: it expands during busts and contracts during booms. Consequently, the decline in total credit and output during a bust is lower when the ex-ante share of public credit in total credit is higher. This result does not hold in countries with extensive state control of the financial sector.
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Related literature

- My results speak to the burgeoning literature on the negative real effects of credit cycles (Schularick and Taylor 2012, Gourinchas and Obstfeld 2012, Mian and Sufi 2017).

- A second finding of this literature is that credit cycles have a strong international component (Rey 2013, Obstfeld et al. 2019, Miranda-Agrippino and Rico 2021).

- Studying the properties of public credit is particularly relevant for this literature because: (1) public credit accounts for a large share of total credit, and (2) it can be used to finance borrowers who are below or close to the credit constraint. These borrowers play a disproportionate role in the transmission of credit shocks to the real economy (Mian and Sufi 2014).

- My findings also inform the long-standing debate on government ownership of credit institutions: Stiglitz (1993) vs La Porta et al. (2002).
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What is public credit?

◊ Public credit is granted through a large variety of institutions: government agencies, public funds, specialized credit institutes, development banks...
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- These institutions share some common characteristics:
  - A mandate from the state to fulfill certain public policy objectives (i.e. not-for-profit institutions).
  - A focus on long-term loans to economically or politically vulnerable sectors like housing, agriculture, export industries, SMEs, local administrations...
  - The provision of cheap loans (at below market interest rates).
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◊ In "financially repressed" economies, public credit institutions are mostly funded through special financial circuits (long-term loans from the central bank, postal savings, fiscal receipts...). Following financial liberalization, public credit institutions turned to the market for funds, by issuing long-term state-guaranteed bonds (Monnet 2018, Musacchio 2017).
## Public credit institutions

<table>
<thead>
<tr>
<th>Country</th>
<th>Type of institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Special credit institutions</td>
</tr>
<tr>
<td>France</td>
<td>Non-bank financial institutions (later named “institutions financières spécialisées”)</td>
</tr>
<tr>
<td>Germany</td>
<td>Banks with special, development and other central support tasks</td>
</tr>
<tr>
<td>Greece</td>
<td>Specialized credit institutions</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Central bank</td>
</tr>
<tr>
<td></td>
<td>State banks</td>
</tr>
<tr>
<td></td>
<td>Regional development banks</td>
</tr>
<tr>
<td>Italy</td>
<td>Istituti di credito speciale</td>
</tr>
<tr>
<td>Japan</td>
<td>Fiscal Loan Fund</td>
</tr>
<tr>
<td></td>
<td>Government financial institutions</td>
</tr>
<tr>
<td>Mexico</td>
<td>Development banks</td>
</tr>
<tr>
<td></td>
<td>Development funds (“fondos de fomento”)</td>
</tr>
<tr>
<td>Norway</td>
<td>State lending institutions</td>
</tr>
<tr>
<td>US</td>
<td>Government (federal, state, and local)</td>
</tr>
<tr>
<td>South-Korea</td>
<td>Government (central)</td>
</tr>
<tr>
<td></td>
<td>Specialized banks</td>
</tr>
<tr>
<td></td>
<td>Development institutions</td>
</tr>
<tr>
<td>Spain</td>
<td>Instituto de Crédito Oficial</td>
</tr>
<tr>
<td>Thailand</td>
<td>Specialized financial institutions</td>
</tr>
</tbody>
</table>
Public credit and private credit

- No available series of public credit (some estimates by Verdier (2000) and Xu et al (2020)).
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◊ Existing long-run series of credit do not include public credit: Dembiermont et al. (2012), Jorda et al. (2017), Monnet & Puy (2020), Muller and Verner (2021).
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- Both the IMF (Monnet & Puy) and the BIS (Dembiermont et al.) report data on loans by domestic banks: that is, by institutions with short-term deposits on their liability side. **This effectively excludes most public intermediaries!**
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- To collect public credit data I relied on central bank archives and statistical reports. Importantly, public financial intermediaries are always clearly identified in these sources (i.e.: data on public credit is presented separately from private credit data), and nationalized commercial banks are excluded!
Figure 1: Public credit in % of total credit, Developed economies

Note: Total credit is calculated as the sum of public and private credit. Private credit data are drawn from Monnet and Puy (2019).
Figure 2: Public credit in % of total credit, Emerging economies

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1) Public credit and the Global Financial Cycle

- I compare the reaction of public and private credit to foreign policy shocks, using Local Projections (Jorda 2005).
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- As in Jorda et al. (2019), I restrict my sample to the sub-population of open pegs (countries with relatively open capital accounts and fixed exchange rates). This effectively excludes periods of intense financial repression (Germany in the 1950s, Japan before 1985...).
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- I use two different measures of foreign policy shocks:
  - The residual from a simple regression of the first difference in the country’s three-month interest rate on a broad set of domestic macroeconomic controls (as in Jordal et al. 2019).
## The sample

<table>
<thead>
<tr>
<th>Country</th>
<th>Open-peg dates</th>
<th>Average share of public credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1962Q1-1968Q4, 1970Q1-2020Q4</td>
<td>5%</td>
</tr>
<tr>
<td>France</td>
<td>1956Q3-2020Q4</td>
<td>21%</td>
</tr>
<tr>
<td>Germany</td>
<td>1954Q2-1972Q4</td>
<td>13%</td>
</tr>
<tr>
<td>Greece</td>
<td>1962Q1-1981Q2, 1984Q3-2020Q4</td>
<td>18%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1978Q4-1997Q2, 2007Q3-2010Q4</td>
<td>37%</td>
</tr>
<tr>
<td>Italy</td>
<td>1956Q1-1975Q3, 1983Q1-2020Q4</td>
<td>24%</td>
</tr>
<tr>
<td>Japan</td>
<td>1960Q1-1977Q3</td>
<td>29%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1950Q1-1981Q4, 1989Q1-1994Q4</td>
<td>41%</td>
</tr>
<tr>
<td>Norway</td>
<td>None</td>
<td>.</td>
</tr>
<tr>
<td>US</td>
<td>None</td>
<td>.</td>
</tr>
<tr>
<td>South-Korea</td>
<td>1981Q2-1997Q3</td>
<td>35%</td>
</tr>
<tr>
<td>Spain</td>
<td>1963Q1-2020Q4</td>
<td>7%</td>
</tr>
</tbody>
</table>
I run the following sequence of quarterly regressions at horizons $h \in [0; 8]$ quarters, where $Credit_{i,t+h}$ is the growth rate of a real credit aggregate (private, public or total) between $t - 1$ and $t + h$, and $R_{b(i,t)}$ denotes unpredictable movements in country $i$’s base country $b$ short-term interest rate at time $t$:

$$Credit_{i,t+h} = \alpha_h + \beta_h R_{b(i,t)} + \theta_h (L) X_{i,t} + trend_t + D_i + \varepsilon_{i,t+h}$$

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\]  

1

- $\beta_h$ thus traces out the impulse response function of foreign interest rate shocks on subsequent real credit growth (private, public, or total).

- $\alpha_h$ is a constant and captures the mean of $\text{Credit}_{i, t+h}$ for country $i$ at horizon $h$, $L$ is a lag polynomial for the control variables captured in $X_{i,t}$, $D_i$ represents country fixed-effects, and $\varepsilon_{i,t+h}$ is the projection’s residual.
Figure 3: Foreign policy shocks $\rightarrow$ Growth rate of real credit aggregates (relatively open economies)

(a) Private credit

(b) Public credit
Figure 3: Foreign policy shocks → Growth rate of real credit aggregates (relatively open economies)

(a) Private credit

(b) Public credit

(c) Total credit
Figure 4: Foreign policy shocks \(\rightarrow\) Growth rate of real credit aggregates (open economies)

(a) Private credit

(b) Public credit
Figure 4: Foreign policy shocks → Growth rate of real credit aggregates (open economies)

(a) Private credit
(b) Public credit
(c) Total credit
Why is public credit immune to US policy shocks?

◊ The interest rate channel:
  - The interest rates on public loans are generally more stable than private interest rates.

◊ The credit channel:
  - An increase in the Fed's rate causes a deterioration of borrowers' financial position, and leads to a contraction of credit (Bernanke & Gertler 1989).
  - Public credit is designed to assist borrowers with inadequate collateral and low net worth (e.g., manufacturing industries, farmers, low-income households, students...).

◊ The risk-taking channel:
  - Monetary policy affects the willingness of market participants to take on risk exposures (Borio & Zhu 2012).
  - Public intermediaries do not face the same set of incentives as private intermediaries. Their losses are absorbed by the state, and they are not rewarded for extending more loans.
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2) Public credit and domestic credit cycles

- Credit booms often have large negative real effects. Many end in financial crisis. What is the behavior of public credit during booms and busts of private credit? Can public credit help mitigate the impact of the bust?

To identify credit booms, I use the method introduced in Richter et al. (2021). I extract the cyclical component of credit by regressing, for each country, the log of real (private or public) credit $y_t$ on its past values $y_{t-h}$ where $h \in \{3; 6\}$ years (or, equivalently, $h = \{12, 16, 20, 24\}$ with quarterly data like mine).

\[ y_t = \beta_0 + \beta_1 y_{t-3} + \beta_1 y_{t-4} + \beta_1 y_{t-5} + \beta_1 y_{t-6} + \epsilon_t \] (2)

The cyclical component of credit is the residual of Equation 2 $\epsilon_t$. A boom occurs when the log of real credit exceeds expectations by more than a specific amount, which is defined in terms of the country specific standard deviation of $\epsilon_t$. 
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## Table 1: Public and private booms - Descriptive stats

<table>
<thead>
<tr>
<th>Country</th>
<th>Nb of private booms</th>
<th>Nb of public booms</th>
<th>Avg length private boom</th>
<th>Avg length public boom</th>
<th>Nb of “bad” private booms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>6</td>
<td>4</td>
<td>3.25 years</td>
<td>2.75 years</td>
<td>3 (50%)</td>
</tr>
<tr>
<td>France</td>
<td>8</td>
<td>5</td>
<td>2.25 years</td>
<td>3 years</td>
<td>5 (63%)</td>
</tr>
<tr>
<td>Germany</td>
<td>4</td>
<td>4</td>
<td>2.5 years</td>
<td>2 years</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>Greece</td>
<td>4</td>
<td>5</td>
<td>5 years</td>
<td>2.5 years</td>
<td>1 (25%)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4</td>
<td>5</td>
<td>1.75 years</td>
<td>2 years</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>Italy</td>
<td>6</td>
<td>5</td>
<td>3 years</td>
<td>2 years</td>
<td>5 (83%)</td>
</tr>
<tr>
<td>Japan</td>
<td>6</td>
<td>6</td>
<td>2 years</td>
<td>1.75 years</td>
<td>3 (50%)</td>
</tr>
<tr>
<td>Mexico</td>
<td>5</td>
<td>6</td>
<td>2.25 years</td>
<td>2.25 years</td>
<td>5 (100%)</td>
</tr>
<tr>
<td>Norway</td>
<td>8</td>
<td>7</td>
<td>1.5 years</td>
<td>2 years</td>
<td>6 (75%)</td>
</tr>
<tr>
<td>US</td>
<td>9</td>
<td>7</td>
<td>2 years</td>
<td>1.75 years</td>
<td>6 (66%)</td>
</tr>
<tr>
<td>South-Korea</td>
<td>3</td>
<td>9</td>
<td>4.5 years</td>
<td>1.5 years</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Spain</td>
<td>7</td>
<td>7</td>
<td>2.5 years</td>
<td>2.25 years</td>
<td>3 (43%)</td>
</tr>
<tr>
<td>Thailand</td>
<td>7</td>
<td>3</td>
<td>2.5 years</td>
<td>4 years</td>
<td>3 (43%)</td>
</tr>
<tr>
<td><strong>Total nb &amp; avg length</strong></td>
<td><strong>77</strong></td>
<td><strong>73</strong></td>
<td><strong>2.75 years</strong></td>
<td><strong>2.25 years</strong></td>
<td><strong>47 (61%)</strong></td>
</tr>
</tbody>
</table>
Note: To construct this figure, I start with the residual of Equation 2 $\varepsilon_t$. I scale $\varepsilon_t$ by its country-specific standard deviation $\sigma(\varepsilon_t)$. I then average out the result across the sample, for event-3, event-2, ..., event+3 (where “event” indicates the date of the peak of the private boom).
Figure 6: Public credit and private cycles

(a) Germany

(b) Greece

(c) Indonesia

Note: The red and blue lines show the cyclical component of private and public credit respectively. The cyclical component is generated with a Christiano and Fitzgerald (2003) filter.
An econometric test (1/2)

- Is this pattern similar across my sample?

- I start off with the cyclical component of public and private credit aggregates, identified with a Christiano and Fitzgerald (2003) filter (see FIGURE 6).

- I generate a variable $\text{Sync}_{i,t}$ which takes on two different values: 1 if private and credit cycles are on the same phase, and -1 if private and credit cycles are on the opposite phase (for country $i$ at time $t$).

- I then take the expected value of $\text{Sync}_{i,t}$ across the sample.

To estimate the average value of $\text{Sync}_{i,t}$, I run the following panel regression:

$$\text{Sync}_{i,t} = \beta_0 + \epsilon_{i,t} \quad (3)$$

The OLS estimate of $\beta_0$ is the sample mean of phase synchronization $E[\text{Sync}_{i,t}] = \frac{1}{i \times t} \sum \text{Sync}_{i,t}$. 
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- I generate a variable $\text{Sync}_{i,t}$ which takes on two different values: 1 if private and credit cycles are on the same phase, and -1 if private and credit cycles are on the opposite phase (for country $i$ at time $t$).
- I then take the expected value of $\text{Sync}_{i,t}$ across the sample. To estimate the average value of $\text{Sync}_{i,t}$, I run the following panel regression:

$$\text{Sync}_{i,t} = \beta_0 + \varepsilon_{i,t} \quad (3)$$

The OLS estimate of $\beta_0$ is the sample mean of phase synchronization $\mathbb{E}[\text{Sync}_{i,t}] = \frac{1}{i \times t} \sum \text{Sync}_{i,t}$. 
An econometric test (2/2)

Table 2: Public and private credit cycles synchronization

<table>
<thead>
<tr>
<th></th>
<th>Low liberalization</th>
<th>High liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>0.440***</td>
<td>-0.225***</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Observations</td>
<td>1911</td>
<td>1210</td>
</tr>
<tr>
<td>No. of countries</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

* $p<0.1$ ** $p<0.05$ *** $p<0.01$

Notes: Newey–West standard errors are given in brackets. I allow two lags to be considered in the auto-correlation structure. The low liberalization sub-sample (column 1) groups all the observations associated with a financial reform indicator below its sample mean. The high liberalization sub-sample (column 1) groups all the observations with a financial reform indicator above its sample mean. I use the indicator from Abiad et al. (2010) (as in Figure 6).
How can we explain this pattern?

Before financial liberalization, private and public credit are complements: public loans are long-term while private loans are short-term. The removal of restrictions on commercial banks and private financial markets frees up alternative sources of long-term finance. Public and private loans become substitutes (i.e. public loans are available to borrowers who are denied access to private finance).

During a private boom (bust), the financial constraint loosens (tightens) and demand for public loans dries out (increases).

Do political institutions play a role? (Herrera et al. 2020)
Public credit and financial liberalization

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Do political institutions play a role? (Herrera et al. 2020)
Can public credit mitigates the decline in total credit and output during private busts?
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I start with the sample of private credit booms. For each boom, I calculate the total credit (output) loss during the subsequent bust as the difference between the cumulative real growth rate of total credit (GDP) over the 5 years following the end of the boom, and the country mean growth rate of total credit (GDP).
Public credit and the real effect of private busts 1/2

- Can public credit mitigates the decline in total credit and output during private busts?
- I start with the sample of private credit booms. For each boom, I calculate the total credit (output) loss during the subsequent bust as the difference between the cumulative real growth rate of total credit (GDP) over the 5 years following the end of the boom, and the country mean growth rate of total credit (GDP).
- I then estimate the following regression over the sample of credit booms:

\[ \text{Loss}_i = \beta_0 + \beta_1 \text{Share}_i + \varepsilon_i \]  \hspace{1cm} (4)

Where \( \text{Loss} \) represents total credit (or output) loss following boom \( i \), and \( \text{Share} \) is the ex-ante share of public credit (calculated as the % share of public credit in total credit at the end of boom \( i \)).
Table 3: Public credit and private busts

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-ante share of</td>
<td>1.587**</td>
<td>0.398</td>
<td>0.619***</td>
<td>0.519***</td>
<td>0.286</td>
<td>0.147</td>
</tr>
<tr>
<td>public credit</td>
<td>(0.698)</td>
<td>(0.998)</td>
<td>(0.167)</td>
<td>(0.167)</td>
<td>(0.186)</td>
<td>(0.158)</td>
</tr>
<tr>
<td></td>
<td>(11.262)</td>
<td>(28.392)</td>
<td>(2.703)</td>
<td>(2.674)</td>
<td>(5.446)</td>
<td>(4.383)</td>
</tr>
<tr>
<td>Observations</td>
<td>23</td>
<td>25</td>
<td>23</td>
<td>30</td>
<td>24</td>
<td>31</td>
</tr>
</tbody>
</table>

* p<0.1  ** p<0.05  *** p<0.01

Notes: The dependent variable is the cumulative credit loss after a credit boom in specifications (1) to (3), and the cumulative output loss in specifications (4) to (6). The cumulative credit (output) loss is calculated as the difference between the growth rate of real total credit (output) over the 5 years following a credit boom, and the country mean growth rate of real total credit (output) over 5 years. A positive (negative) loss thus indicates that the growth rate of real total credit over the 5 years following a credit boom is above (below) the growth rate in “normal” times. Specifications (1), (3) and (4) are estimated over the post-liberalization sub-sample, while specifications (2), (5) and (6) are estimated over the pre-liberalization sub-sample. In specifications (1), (2), (3), and (5) I focus on bad credit booms, while specifications (4) and (6) extend the sample to all booms (i.e. both good and bad booms).
Policy implications and conclusion

- Limited monetary policy independence is possible, even in fixed exchange rate regimes with open capital accounts. Public credit can be used to shelter selected groups of borrowers from the Global Financial Cycle.

What next?
Policy implications and conclusion

- Limited monetary policy independence is possible, even in fixed exchange rate regimes with open capital accounts. Public credit can be used to shelter selected groups of borrowers from the Global Financial Cycle.

- By targeting borrowers with no (or limited) access to private finance, public credit can help reduce the real effect of credit busts. These borrowers play a disproportionate role in the transmission of credit shocks to the real economy (Eggertson and Krugman 2012, Guerrieri and Lorenzoni 2017, Mian and Sufi 2014).
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◊ What next?
Appendix 1#: Data Sources (1/2)

- Austria: Annual Reports and Statistische Monatshefte of the OeNB.
- Germany: time-series database of the Bundesbank.
- Italy: Bollettino Economico (Bank of Italy).
- Japan: Flow of Funds Statistics (Bank of Japan database).
- United States: Fed online database.
Appendix 1#: Data Sources (2/2)


- Mexico: Informe Annual of the Banco de Mexico.


- Thailand: Annual Reports of the Bank of Thailand.
Appendix 2#: Public credit institutions (1/2)

- Austria: loans by the sonderkreditunternehmungen (special credit institutions) to domestic non-banks.
- Germany: loans by Banks with Special, Development and other Central Support tasks.
- Greece: loans by specialized credit institutions.
- Italy: loans by the Istituti Speciali di Credito.
- Japan: loans by the Government Financial Institutions, and direct loans from the Treasury (Fiscal Loan Fund).
- Norway: loans by State Banks.
- US: direct loans by the Federal Government and by the State and Local Governments.
- Spain: loans of the Instituto de Credito Oficial (ICO).
Appendix 2#: Public credit institutions (2/2)

- Indonesia: loans by state banks and regional development banks, and direct loans by Bank Indonesia.

- Mexico: loans by the development banks and by the “fondos de fomento” (development funds).

- South-Korea: loans by specialized banks, development institutions, and government loans.

- Thailand: loans by specialized financial institutions.
Public credit and the interest rate channel

Figure 7: France

Figure 8: US
Public credit and the interest rate channel 2

Figure 9: Norway

- **10Y bonds**
- **Discount rate**
- **Public rate**
- **Private rate**