LEGAL ENFORCEMENT, PUBLIC SUPPLY OF LIQUIDITY AND SOVEREIGN RISK

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Introduction

- Sovereign debt crises in emerging markets are usually associated with liquidity crises and banking crises within the economy. A clear example is the Argentine default in 2001-2002.

- Conventional view: domestic financial turmoil is the result of foreign creditors’ retaliation. Empirical evidence on “classic” penalties is subject to debate (e.g., trade sanctions or exclusion from international capital markets).

- I propose a novel mechanism linking sovereign defaults and liquidity and banking crises without any intervention of foreign creditors.

- The model considers a standard unwillingness-to-pay problem assuming that:
  
  (i) the enforcement of private contracts is limited and, as a result, public debt represents a source of liquidity (Holmstrom and Tirole 1998);
  
  (ii) the government cannot discriminate between domestic and foreign agents (Broner and Ventura 2006).

- I present cross-country, cross-industry empirical evidence that is suggestive of the mechanism emphasized by my model.
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OUTLINE

1. A Simple Model of Public Debt as a Source of Liquidity

2. Sovereign Risk and Liquidity Crises

3. Institutional and Policy Reforms

4. Final Remarks and Empirical Evidence
Technology

- Small open economy. Three periods: $t = 0, 1, 2$. Two goods: private good (consumption and investment) and public good (consumption).

- Private Technology:
  - Investment $k$ in project $j \in [0, 1]$ at date 0 delivers a final output $f_{s,j}(k)$ at date 2.
  - Investment returns are subject to two independent shocks observed at date 1:
    - an aggregate shock, $\theta_s$, which I call “productivity” shock;
    - an idiosyncratic shock, $A_j$, which I call “expenditure” shock.

- Public Technology:
  - Investment $g$ in a public project at date 0 delivers a public good at date 2, from which domestic agents get utility $\nu(g)$, where $\nu'(g) > 0$ and $\nu''(g) < 0$. 
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Production function
**Agents**

- Two private domestic agents:
  - **Entrepreneurs**, with zero endowment at date 0 and access to the private technology.
  - **Workers**, with zero endowment at date 0 and income $w$ at date 1.

Both types include a continuum of competitive and risk neutral individuals, with mass one and consuming only in period $t = 2$. Preferences:

$$U = c + v(g).$$

- A benevolent government, which:
  - maximizes the average utility of domestic agents;
  - can issue non-contingent bonds (short or long term) and collect lump-sum taxes.

- International financial market (**IFM**), competitive and risk neutral, deep pocketed and with storage technology with rate of return $r = 1$. 
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**FINANCIAL FRICTIONS**

- Limited enforcement within the small open economy:
  
  \textbf{(A1)} \textit{Domestic entrepreneurs can pledge as collateral only a fraction} $\gamma$ \textit{of projects’ output, while workers cannot pledge their future labor income.}

- No private insurance provision:
  
  \textbf{(A2)} \textit{Domestic entrepreneurs cannot enter into contracts that are contingent on the expenditure shock.}

- No redistribution schemes:
  
  \textbf{(A3)} \textit{The government cannot make positive transfers between domestic agents.}
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Benchmark Case

- **Equilibrium concept**: competitive equilibrium with fully rational agents and no asymmetric information.

- **Benchmark case**: the government has good reputation.
  
  \[(A4)\] The government can credibly commit to fulfill its debt obligations.
EQUILIBRIUM WITH SOVEREIGN COMMITMENT (I)

The representative entrepreneur chooses \( \{k, b, f, i\} \) to solve:

\[
\Pi = \max_{k, b, f, i} \sum_{\theta_s \in \{\theta, \bar{\theta}\}} \pi(\theta_s) \left[ \frac{y_l(\theta_s) - r_l(\theta_s)(k + b + f)}{2} + \frac{y_u(\theta_s) - r_u(\theta_s)(k + b + f)}{2} \right]
\]

s.t.

\[
y_l(\theta_s) = \theta_s Ak + b + f; \quad y_u(\theta_s) = \theta_s \left(ak + (A - a)i\right) + b + f - i; \quad i \leq k \quad \text{(Technology)}
\]

\[
i \leq b + f; \quad b \geq 0; \quad f \geq 0 \quad \text{(Ex-post fin.)}
\]

\[
\gamma y_l(\theta_s); \quad r_u(\theta_s)(k + b + f) \leq \gamma y_u(\theta_s) \quad \text{(Ex-ante fin.)}
\]

\[
\frac{r_l(\theta_s) + r_u(\theta_s)}{2} \geq 1 \quad \text{(IFM)}
\]
The government chooses \( \{g, b, b^*, \tau\} \) to solve:

\[
W = \max_{g, b, b^*, \tau} \Pi + w + v(g) - \tau
\]

s.t.

\[
g = b + b^* \quad \text{and} \quad \tau = b + b^* \quad (\text{Gov’t BC})
\]
**Equilibrium with Sovereign Commitment (III)**

- **Technical assumption 1:**
  
  \[ (i) \quad \gamma > \frac{1}{A + a}, \]
  \[ (ii) \quad \bar{\theta} < \frac{1}{\gamma (A - a)}, \]
  \[ (iii) \quad \gamma < \frac{A + a}{2} + \frac{1}{2}[1 + (A - a)]. \]

- **Efficient Initial Investment**: \( (i) \gamma > \frac{1}{A + a}, \)
- **Liquidity Needs**: \( (ii) \bar{\theta} < \frac{1}{\gamma (A - a)}, \)
- **Insufficient Liquidity**: \( (iii) \gamma < \frac{A + a}{2} + \frac{1}{2}[1 + (A - a)]. \)

- **Equilibrium conditions:**
  
  - optimal investment and saving decisions of the entrepreneur,
  \[
  k = \bar{k} \quad \text{and} \quad b + f = \frac{\gamma \frac{A + a}{2} - 1}{1 - \gamma \frac{1}{2}[1 + (A - a)]} \bar{k} \leq \bar{k}.
  \]
  
  - optimal government policy,
  \[
  v'(g) = 1 \quad \text{and} \quad g = \tau = b + b^*.
  \]

- **Two alternative equilibrium outcomes:**
  
  - \( g \leq b + f \Rightarrow \exists \) at least one equilibrium where \( b = g \) and \( b^* = 0; \)
  
  - \( g > b + f \Rightarrow \) in equilibrium \( b \geq 0 \) and \( b^* > 0. \)
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- **Equilibrium conditions:**
  
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    \[ k = \bar{k} \quad \text{and} \quad b + f = \frac{\gamma}{1 - \gamma\frac{1}{2}[1 + (A - a)]} \bar{k} \leq \bar{k}. \]

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Implications

  - Government debt enhances private liquidity provision:
    - the lack of private collateral restricts both firms’ access to credit and ability to save (under-supply of financial assets);
    - a credible government can expand the supply of liquidity (e.g. easily tradable financial securities) above collateral limits thanks to its assumed ability to commit workers’ future income through taxation.

- In the previous setup (small open economy and government commitment), government does not enhance private liquidity provision:
  - the interest rate on government bonds is set by the world interest rate ⇒ entrepreneurs are indifferent between $b$ and $f$;
  - when sovereign commitment is relaxed, government debt becomes an imperfectly substitutable source of liquidity.
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4. Final Remarks and Empirical Evidence
In the same setup as before, I consider a classic unwillingness-to-pay problem.

\[(A4-A)\] The government cannot commit to service its debt and creditors cannot enforce the government repayment.

\[(A4-B)\] The government cannot discriminate between domestic and foreign bond holders (as in Broner and Ventura 2006).

As a consequence of \((A4-A)\) and \((A4-B)\), it is possible to study the connection between sovereign defaults and liquidity crises.
**EQUILIBRIUM WITH SOVEREIGN RISK - DATE 1**

- The government behaves strategically:
  - it chooses repayment/default to maximize domestic agents’ consumption.
  - it repays if entrepreneurs’ benefits (LHS) exceed workers’ costs (RHS),
    \[
    (1 - \gamma) \left[ 1 + \frac{1}{2} \left( \theta_s (A - a) - 1 \right) \right] b \geq b^* + b.
    \]

- Suppose \( b^* \in [\tilde{b}^*(b), \bar{b}^*(b)] \), where
  \[
  \begin{align*}
  \tilde{b}^*(b) & \equiv \left[ (1 - \gamma) \left( 1 + \frac{1}{2} (\theta(A - a) - 1) \right) - 1 \right] b, \\
  \bar{b}^*(b) & \equiv \left[ (1 - \gamma) \left( 1 + \frac{1}{2} (\bar{\theta}(A - a) - 1) \right) - 1 \right] b.
  \end{align*}
  \]

- Then, the government repays/defaults in the good/bad time, i.e.
  \[
e = \begin{cases} 
  1 & \text{if } \theta_s = \bar{\theta} \\
  0 & \text{if } \theta_s = \theta
  \end{cases}.
  \]
  and the bond yields \( \rho = \frac{1}{\pi(\theta)} \).
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- Suppose \( b^* \in [\underline{b}^*(b), \overline{b}^*(b)] \), where
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  and the bond yields \( \rho = \frac{1}{\pi(\bar{\theta})} \).
EQUILIBRIUM WITH SOVEREIGN RISK - DATE 0 (I)

The representative entrepreneur chooses \( \{k, b, f, i\} \) to solve:

\[
\Pi(e) = \max_{k, b, f, i} \sum_{\theta_s \in \{\theta, \bar{\theta}\}} \pi(\theta_s) \left[ \frac{y_l(\theta_s, e) - r_l(\theta_s, e)(k + b + f)}{2} + \frac{y_u(\theta_s, e) - r_u(\theta_s, e)(k + b + f)}{2} \right]
\]

s.t.

\[
y_l(\theta_s, e) = \theta_s Ak + e \rho b + f; \quad y_u(\theta_s, e) = \theta_s \left( ak + (A - a)i(e) \right) + e \rho b + f - i(e);
\]

(Thumbology)

\[
i(e) \leq k
\]

(Ex-post fin.)

\[
i(e) \leq e \rho b + f; \quad b \geq 0; \quad f \geq 0
\]

(Ex-ante fin.)

\[
r_l(\theta_s, e)(k + b + f) \leq \gamma y_l(\theta_s, e); \quad r_u(\theta_s, e)(k + b + f) \leq \gamma y_u(\theta_s, e)
\]

(IFM)
The government chooses \( \{g, b, b^*, \tau(e)\} \) to solve:

\[
W(e) = \max_{g, b, b^*, \tau} \Pi(e) + w + v(g) - \tau(e)
\]

s.t.

\[
g = b + b^* \quad \text{and} \quad \tau(e) = \pi(\tilde{\theta}) \rho(b + b^*) \quad \text{(Gov’t BC)}
\]

\[
g \leq b + \bar{b}^*(b) \quad \text{(Ex-post Repayment)}
\]
Equilibrium with Sovereign Risk - date 0 (III)

- Technical assumption 2:
  \[(iv) \quad \gamma < \frac{1+\pi}{\frac{A+a}{2} + \pi \frac{1}{2} [1+\bar{\phi}(A-a)]} \cdot \]
  Insufficient Liquidity

- Equilibrium conditions:
  - optimal investment and saving decisions of the entrepreneur,
    \[k = \bar{k}, \quad b = \frac{\gamma \frac{A+a}{2} - 1}{1 - \gamma \frac{1}{2} [1+\bar{\phi}(A-a)]} \bar{k} \leq \bar{k} \quad \text{and} \quad f = 0.\]
  - optimal government policy,
    \[g = b + \bar{b}^*(b) \quad \text{and} \quad \tau(e) = \pi(\bar{\phi}) \rho \left( b + \bar{b}^*(b) \right) \]
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**Implications**

- Government debt is an imperfectly substitutable source of liquidity.

- External debt emerges in absence of “classic” penalties or reputational costs.
  - The government repays its debt to avoid a disruption of private investment, as a result of the drying up of domestic liquidity.

- Alternative mechanism with respect to previous studies:
  - The government repays its debt to avoid a redistribution of resources among domestic agents (Broner and Ventura 2006).
  - The government repays its debt to avoid an information disclosure about the state of the economy, which might ultimately lead to a disruption of private investment (Sandleris 2004).

- Twin-crises (sovereign defaults and liquidity crises) are more likely in economies with volatile business cycles.

- Crises resolution policies:
  - The source of dead-weight losses is the internal liquidity crisis and not foreign penalties ⇒ the paper provides theoretical underpinning for crises resolution policies that refuse to sacrifice domestic claims in order to service external debt.
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4. Final Remarks and Empirical Evidence
• Previous results depend crucially on the interaction between:
  - private capital markets imperfections (limited enforcement);
  - sovereign debt markets imperfections (sovereign risk).

• More specifically,
  (i) the lack of firms’ collateral, as in (A1);
  (ii) the missing market for private insurance, as in (A2);
  (iii) the unwillingness-to-pay problem, as in (A4-A) and (A4-B).
**Endogenous Insurance Provision**

- Substitute Assumption (A2), i.e. the missing market for private insurance, with:

  \[ (A2-A) \text{ A fraction } \lambda \text{ of domestic firms (good firms) can enter into state-contingent contracts with the IFM. The remaining fraction of domestic firms (bad firms) cannot enter into state-contingent contracts. The government can costlessly increase the fraction } \lambda \text{ by improving domestic regulation.} \]

- Consider only the idiosyncratic expenditure shock. The difference between good and bad firms is independent on the aggregate shock.

- Findings:
  - private insurance provision is *positively* related to the returns on *private* investment and *negatively* to the returns on *public* investment.
CONCLUSION

- This paper analyzes the connection between sovereign defaults and liquidity crises without considering foreign intervention.

- The model assumes:
  - a lack of private collateral and, as a result, public debt represents a source of liquidity;
  - non-discrimination in sovereign default.

- The model predicts:
  - government debt is an imperfectly substitutable source of liquidity;
  - external debt emerges in absence of classic penalties;
  - sovereign defaults occur in bad states and trigger liquidity crises.

- Policy implications:
  - Crises resolution policies, institutional and policy reforms.

- Suggestive Evidence:
  - Financially dependent sectors experience sharper slowdowns in the event of sovereign defaults.
**SOVEREIGN DEFAULTS AND BANKING CRISSES: EVIDENCE**

Borezstein and Panizza 2008 show that sovereign defaults often predict a banking crisis in the economy.

- Using the same methodology of Kaminsky and Reinhart 1999, these authors show that:
  
  (i) the probability of a *banking crisis* conditional on a *sovereign default* in the same year or in the year before is 14 percent, and is statistically different to the unconditional probability which is 2 percent.
  
  (ii) the probability of a *sovereign default* conditional on a *banking crisis* is not statistically different from the unconditional probability.

- Then, sovereign default might lead to a banking crisis while the contrary is in general not true.
Empirical evidence on foreign penalties is under debate (Sturzenegger and Zettelmeyer 2006, Borenzstein, Levy-Yeyati and Panizza 2007).

**Trade channel:**

- **No official trade restrictions after default** (Martinez and Sandleris 2006). Alternative channels: Unofficial ("sub rosa") restrictions or trade credit.

- **No disproportional contraction in bilateral trade between a debtor country and its creditor countries** when a country default on its debt, after controlling for the decline in overall trade (Rose 2005 and Martinez and Sandleris 2006).

- **Export-oriented industries experience sharper growth slowdown during default episodes** (Borenzstein and Panizza 2006 and Lanau 2008). Lanau 2008 controls for additional industry characteristics and argues that the underperformance of export-oriented industries is related to the dry up of trade finance.
Foreign credit channel:

- **Market access**: average time from default to regain access in international capital markets was **four years** in the 1980s and **less than one year** in the 1990s (Gelos *et al.* 2004).

- **Borrowing costs**: The impact of default on borrowing costs can be identified using **indirect** and **direct** measures.

  - **Indirect measures**: default history has a negative effect on a country’s credit rating (Cantor and Packer 1996 and Reinhart *et al.* 2003). Yet, this effect is short-lived. Borenzstein and Panizza (2008) show that only defaults in the 1995-2002 period are significantly correlated with credit ratings over the 1999-2002 period.

  - **Direct measures**: effects of default on borrowing costs (measured by sovereign spreads). Brief taxonomy of past work:

    - no effects of default on borrowing costs (Lindert and Morton 1989, Chowdry 1991 and Ades *et al.* 2000);
    - long-lasting but small effects (Eichengreen and Portes 1995 and Dell’Ariccia *et al.* 2002);
**Production Function**

- Production function features stepwise decreasing returns to scale:

\[ f_{s,j}(k) = \begin{cases} 
\theta_s A_j k & \text{if } k \leq \bar{k} \\
\theta_s A_j \bar{k} & \text{if } k > \bar{k}
\end{cases} \]

- Idiosyncratic and aggregate shocks are observed at date 1:

\[ t = 0 \quad t = 1 \quad \text{LUCKY} \quad t = 2 \]

- Investment

\[ k \]

- Idiosyncratic Shock

\[ \left( \text{prob. } \frac{1}{2} \right) \]

- Output

\[ \theta_s Ak \]

- Re-investment

\[ i \]

\[ (i \leq k) \]

\[ \theta_s = \begin{cases} 
\bar{\theta} > 1 & \text{prob. } \pi(\bar{\theta}) \quad \text{(GOOD STATE)} \\
\bar{\theta} < 1 & \text{prob. } 1 - \pi(\bar{\theta}) \quad \text{(BAD STATE)}
\end{cases} \]

with \( \sum_{\theta_s \in \{\bar{\theta}, \theta\}} \pi(\theta_s) \theta_s = 1 \) and \( \theta(A - a) > 1. \)
**PRODUCTION FUNCTION**

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\text{with } \sum_{\theta_s \in \{\bar{\theta}, \theta\}} \pi(\theta_s) \theta_s &= 1 \quad \text{and} \quad \theta(A - a) > 1.
\end{align*}
\]
Liquidity Needs

Initial investment is profitable for both entrepreneurs and external investors:

\[
\frac{A + a}{2} > 1 \quad \text{and} \quad \gamma > \gamma \equiv \frac{2}{(A + a)}.
\]

Additional investment is profitable for entrepreneurs but not for external investors.

\[
\theta(A - a) > 1 \quad \text{and} \quad \gamma < \tilde{\gamma} \equiv \frac{1}{\theta(A - a)}.
\]
Precautionary savings

\[ t = 0 \quad \text{Investment} \quad k + b + f \]

\[ t = 1 \quad \text{Idiosyncratic Shock} \quad \left( \text{prob. } \frac{1}{2} \right) \]

\[ \text{LUCKY} \quad \text{Output} \quad \theta_s A k + b + f \]

\[ t = 2 \quad \text{UNLUCKY} \quad \text{Output} \quad \theta_s a k + \theta_s (A - a) i + (b + f - i) \]

\[ t = 0 \quad \text{Re-investment} \quad i \quad (i \leq k) \]

\[ (i \leq b + f) \]
**Procylical payouts**

Rearranging,

\[
\sum_{\theta_s \in \{\bar{\theta}, \theta\}} \pi(\theta_s) \left[ \frac{y_l(\theta_s, e) - r_l(\theta_s, e)(k + b + f)}{2} + \frac{y_u(\theta_s, e) - r_u(\theta_s, e)(k + b + f)}{2} \right] = \\
= \frac{1}{2} \left[ Ak + b + f \right] + \frac{1}{2} \left[ ak + \bar{\theta}(A - a)b + (A - a)f \right] - (k + b + f).
\]

Due to procyclical payouts,

(i) the entrepreneur’s objective function is shifted upward;

(ii) the borrowing constraint is looser.
**Equilibrium with Sovereign Risk and Endogenous Insurance**

- **Bad firms** save in government bonds and get a revenue,

\[
\Pi_B = (1 - \gamma) \frac{A + a}{2} - \delta(A - a) \frac{\bar{k}}{1 - \gamma \delta(A - a)},
\]

where \(\delta = \frac{1}{2} \left(1 + \frac{1}{A - a}\right) < 1\) as \((A - a) > 1\).

- **Good firms** buy a contingent security from IFM and get a revenue,

\[
\Pi_G = (1 - \gamma) \frac{A + a}{2} - (A - a) \frac{\bar{k}}{1 - \gamma (A - a)}.
\]

As \(\gamma > \frac{1}{A + a}\), it is possible to show that \(\Pi_G > \Pi_B\).

- The **government** chooses \(\{\lambda, g, b, b^*, \tau\}\) to solve,

\[
W = \lambda \Pi_G + (1 - \lambda) \Pi_B + w + \nu(g) - \tau,
\]

s.t.

\[
g = (1 - \lambda)b + b^* \quad \text{and} \quad \tau(e) = \pi(\overline{\theta}) \rho \left((1 - \lambda)b + b^*\right)
\]

\[
g \leq (1 - \lambda)b + \bar{b}^* (1 - \lambda)b
\]

\[
\bar{b}^* (1 - \lambda)b \equiv \left[(1 - \gamma) \frac{1}{2} (1 + (A - a)) - 1\right] (1 - \lambda)b
\]
**Equilibrium with Sovereign Risk and Endogenous Insurance**

- **Bad firms** save in government bonds and get a revenue,\[\Pi_B = (1 - \gamma) \frac{A + a}{2} - \delta (A - a) \bar{k},\]

  where \(\delta = \frac{1}{2} \left(1 + \frac{1}{A - a}\right) < 1\) as \((A - a) > 1\).

- **Good firms** buy a contingent security from IFM and get a revenue,\[\Pi_G = (1 - \gamma) \frac{A + a}{2} - (A - a) \bar{k}.\]

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- The government chooses \(\{\lambda, g, b, b^*, \tau\}\) to solve,

  \[W = \lambda \Pi_G + (1 - \lambda) \Pi_B + w + v(g) - \tau,\]

  s.t.
  \[g = (1 - \lambda) b + b^* \quad \text{and} \quad \tau(e) = \pi(\bar{\theta}) \rho \left((1 - \lambda) b + b^*\right),\]

  \[g \leq (1 - \lambda) b + \bar{b}^* \left((1 - \lambda) b\right)\]

  \[\bar{b}^* \left((1 - \lambda) b\right) \equiv \left[(1 - \gamma) \frac{1}{2} \left(1 + (A - a)\right) - 1\right] (1 - \lambda) b\]
EQUILIBRIUM WITH SOVEREIGN RISK AND ENDOWENOUS INSURANCE

• Optimal government policy implies

\[ \lambda = 1 - \Lambda^{-1} \nu^{-1} \left( \Lambda + (\Pi_G - \Pi_B) \right) \]

where \( \Lambda = (1 - \gamma) \delta \hat{b}_g > 0 \).

• As the function \( \nu(\cdot) \) is strictly increasing and concave,

\[ \begin{cases} 
\frac{A+a}{2} \uparrow & \Rightarrow & \lambda \uparrow \\
\nu(g) \uparrow & \Rightarrow & \lambda \downarrow 
\end{cases} \]

• Alternative explanation for cross-country and cross-time variation in legal institutions with respect to studies stressing political economy issues (Rajan and Zingales 2003).
Sovereign Defaults and Liquidity Crises

- In the model, sovereign default disrupts firms’ reinvestment and final output. The model takes a representative agent perspective, but it is natural to think that industries with larger liquidity needs will experience sharper consequences in the event of default.

- Suggestive cross-country, cross-industry evidence:
  - sectors that rely extensively on external finance experience sharper output contractions in the event of default.

- Important caveat ⇒ omitted variable problem:
  - Sovereign default might have a disproportionate effect on financial dependent sectors through alternative channels (e.g. foreign lending restrictions);
**Baseline Specification**

I estimate the following dynamic panel data model,

\[
y_{s,c,t} = \alpha_{s,c} + \lambda_{s,t} + \mu_{c,t} + y_{s,c,t-1} + \\
+ \sum_{\tau=0}^{T} \left( \beta_{F,\tau} \text{FinDep}_s + \beta_{L,\tau} \text{Liq}_s + \beta_{X,\tau} X_s \right) \cdot \text{DEF}_{c,t-\tau} + \epsilon_{s,c,t},
\]

where:

- \( y_{s,c,t} \) is the log of value added in industry \( s \), country \( c \) and time \( t \).
- \( \text{FinDep}_s \) is an index of financial dependence, as constructed by Rajan and Zingales (1998).
- \( \text{Liq}_s \) is an index of liquidity needs, as constructed by Raddatz (2006).
- \( X_s \) is a set of additional industry characteristics.
- \( \text{DEF}_{c,t} \) is a dummy that takes value 1 in the first year of a default episode. I herein report results for \( T = 0 \).

**Testing hypothesis:** \( \beta_F < 0 \) and \( \beta_L < 0 \).
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Econometric Methodology and Data

Econometric methodology

Arellano and Bond (1991) first-differenced GMM estimator, using the first lag (in levels) of the lagged dependent variable. Sector-time and country-time fixed effects are eliminated prior to estimation by sector-time and country-time mean differencing.

Data over 1980-2002

- Sectoral data from UNIDO INDSTAT3 2005 database;

- Industry characteristics from Kroszner at al. (2006). Indexes are normalized between 0 and 1;

- Default dummy taking value 1 in the first year of each default episode. Default episodes from Standard and Poor's sovereign default database (Beers and Chambers (2002).
  - 41 default episodes (1008 obs.) in the period 1980-1990
  - 16 default episodes (376 obs.) in the period 1990-2002
### Table: Estimation Results

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>$y_{s,c,t} - 1$</td>
<td>0.373*** (0.054)</td>
<td>0.375*** (0.054)</td>
<td>0.455*** (0.059)</td>
<td>0.454*** (0.059)</td>
<td>0.483*** (0.055)</td>
</tr>
<tr>
<td>$DEF_{c,t} \cdot FinDep_s$</td>
<td>-0.094 (0.070)</td>
<td>-0.097 (0.071)</td>
<td>-0.208* (0.117)</td>
<td>-0.196* (0.117)</td>
<td>-0.275* (0.148)</td>
</tr>
<tr>
<td>$DEF_{c,t} \cdot Liq_s$</td>
<td>-0.092* (0.052)</td>
<td>-0.069 (0.069)</td>
<td>-0.053 (0.088)</td>
<td>-0.126 (0.115)</td>
<td>-0.093 (0.125)</td>
</tr>
<tr>
<td>$DEF_{c,t} \cdot Tang_s$</td>
<td>0.033 (0.065)</td>
<td></td>
<td>-0.115 (0.116)</td>
<td>-0.044 (0.143)</td>
<td></td>
</tr>
<tr>
<td>$DEF_{c,t} \cdot ExpOrs_{c}$</td>
<td></td>
<td></td>
<td></td>
<td>-0.078 (0.160)</td>
<td></td>
</tr>
</tbody>
</table>

1\textsuperscript{st} autocorr.  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
2\textsuperscript{nd} autocorr. | 0.00 | 0.00 | 0.42 | 0.42 | 0.27 |
Sargan test | 0.00 | 0.00 | 0.21 | 0.21 | 0.12 |
Obs. | 15406 | 15406 | 15605 | 15605 | 12828 |

\(**, **, *\) represent significance at 1%, 5%, and 10%, respectively. The table reports the one-step first-differenced GMM estimator for the main specifications for the 1980-1990 and the 1990-2002 samples. The set of instruments includes the first lag of the lagged dependent variable. Country-time effects are removed by country-time differencing prior to estimation. Sector-country fixed effects are removed by first differencing. Heteroskedasticity-consistent standard errors are reported within parenthesis. 1\textsuperscript{st} autocorr. and 2\textsuperscript{nd} autocorr. are autocorrelation tests on the estimation residuals. $p$-values for the asymptotic $N(0,1)$ distribution are reported. The Sargan test of over-identifying restrictions is based on a two-step GMM estimation. $p$-values for the asymptotic $\chi^2$ distribution are reported.
CONCLUSION

- This paper analyzes the connection between sovereign defaults and liquidity crises without considering foreign intervention.

- The model assumes:
  - a lack of private collateral and, as a result, public debt represents a source of liquidity;
  - non-discrimination in sovereign default.

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