New Perspectives on the European Debt Crisis

Enrique G. Mendoza
University of Maryland,
University of Pennsylvania & NBER
New perspectives

1. Focus on adverse macroeconomic effects of sovereign debt crises (w. V. Yue, QJE 2012)
   • Debt crises turn into Great Recessions

2. Think of the European debt crisis as a *domestic* debt crisis (w. P. D’Erasmo)
   • Outright defaults on domestic debt are infrequent but they do occur

3. Study unpleasant arithmetic of fiscal austerity (w. L. Tesar & J. Zhang)
   • Use workhorse Macro model to quantify required tax hikes and the size of fiscal externalities & welfare costs.
DEBT CRISES FACTS
Stylized facts of debt crises in Europe & beyond

- Surge in debt ratios
- Rise in spreads
- Sharp economic slowdown
- Banking system exposure (broad & narrow)
- Dynamics around recent EM debt crises
Surging debt ratios

Debt / GDP

Greece, Ireland, Spain, Portugal

Lehman's Collapse
Greece's Rescue
Package I
Ireland's Rescue
Package
Greece's Rescue
Package II
Surging debt ratios

![Graph showing surging debt ratios for Italy, France, United Kingdom, and Germany from 1993 to 2012. The graph indicates a significant increase in debt ratios over time, with Italy having the highest debt ratio among the countries depicted.](image-url)
Widening spreads (v. German 5 yr. bonds)

- Portugal
- Greece
- Spain
- Ireland

Lehman’s Collapse
Greece’s Rescue Package I
Ireland’s Rescue Package
Greece’s Rescue Package II

basis points
Widening spreads (v. German 5 yr. bonds)

- Greece’s Rescue Package II
- Ireland’s Rescue Package
- Greece’s Rescue Package I
- Lehman’s Collapse

basis points

UK - Italy - France
Sharp slowdown
(annualized quarterly GDP growth, IMF forecast)
Another “Lost Decade”?
(real GDP index, 2007=100, IMF forecast 2013-17)
Banks’ direct exposure (2011 Q2)

(Lending to PIGS + Italy Sovereigns) / Banks’ Capital

US Germany France UK

ES:Spain GR:Greece IE:Ireland IT:Italy PT:Portugal PIGS + Italy
Banks’ total “macro” exposure (2011 Q2)
Macro dynamics around recent defaults

- 23 EM default events during 1977-2009
- Event windows for HP-filtered cyclical components
- Defaults coincide with the through of “Great Recessions”
  - Medians: $GDP$ -5%, $C$ -6.5%, $L$ -20%, $IntGds$ -20%, $Imp. IntGds$ -25%
  - $NX/GDP$ rise 12 ppts.
DEBT CRISIS & GREAT RECESSIONS
Four key empirical regularities

1. Debt crises coincide with through of Great Recessions
2. Spreads peak at the same time and they are generally countercyclical
3. Large TFP drops driven by reallocation of inputs (Gopinath & Neiman (10))
4. Average debt ratios of 50%+ coexist with default frequencies in the 2-5% range.
Questions

- Why do debt crises have large negative effects on private economic activity?
- How do these effects affect default incentives & dynamics?
- Can these effects help us explain the stylized facts?
- Is there a connection between trade openness and default?
Output dynamics in default models

- Exogenous output costs are key for obtaining eq. with debt & defaults in bad times.
  a) Proportional (Aguiar & Gopinath (06), Yue (10)):
    \[ y_t^{\text{def}} = \lambda y_t \]
  b) Stepwise-increasing (Arellano (08)):
    \[ y_t^{\text{def}} = y_t \text{ if } y_t \leq \lambda E[y]; \quad y_t^{\text{def}} = \lambda E[y] \text{ if } y_t > \lambda E[y] \]

- At 2-5% def. frequency, a) yields negligible debt ratios, b) yields 6%
  - b) does better, but is disconnected from actual output dynamics and defaults occur below \( \lambda E[y] \), hence at zero cost (i.e. in regular downturns)
Percent output costs of default
Modeling Default & Great Recessions (Mendoza-Yue Model)

- Firms use external working capital loans to pay for subset of imported inputs
- Default freezes all external borrowing, forcing substitution of inputs & labor misallocation
- Three key elasticities: domestic v. foreign inputs, across foreign inputs, and labor supply
- Efficiency loss drives endogenous cost of default
- Gov. defaults strategically taking this into account
Percent output costs of default
Output Cost of Default: Application to Argentina 2002
Output dynamics around default

![Graph showing percent deviation over quarters with lines for Model Mean, Error Band, Argentina, and All-Country Median.]
Interest rate dynamics before default

![Graph showing interest rate dynamics over time](image)

- **Model Mean**
- **Error Band**
- **Argentina**
- **All-Country Median**
Financial amplification

- Defaults occur with “typical” TFP shocks (1.3 std. devs. on average)
- Output response to same size TFP shock is 81% larger in a default
- Slow recovery (low re-entry prob.)
## Long-run moments

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average debt/GDP ratio</td>
<td>35%</td>
<td>22.88%</td>
</tr>
<tr>
<td>Average bond spreads</td>
<td>1.86%</td>
<td>0.74%</td>
</tr>
<tr>
<td>Std. dev. of bond spreads</td>
<td>0.78%</td>
<td>1.23%</td>
</tr>
<tr>
<td>Consumption std./GDP std.</td>
<td>1.44</td>
<td>1.05</td>
</tr>
<tr>
<td>Correlations with GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bond spreads</td>
<td>-0.62</td>
<td>-0.17</td>
</tr>
<tr>
<td>trade balances</td>
<td>-0.87</td>
<td>-0.54</td>
</tr>
<tr>
<td>labor</td>
<td>0.39</td>
<td>0.52</td>
</tr>
<tr>
<td>intermediate goods(^1)</td>
<td>0.90</td>
<td>0.99</td>
</tr>
</tbody>
</table>

\(^1\) Denotes intermediate goods variable.
Main message

- Default triggers a financial amplification mechanism that hits the private sector and has feedback links with debt & default
- Working capital is tractable & empirically relevant way to model this mechanism
- Banking collapse is a more complex, but very relevant, alternative (Padilla (12))
- Default should be less frequent in economies more open to external trade!
THE EUROPEAN DEBT CRISIS AS A DOMESTIC DEBT CRISIS
Why a domestic debt crisis?

- High economic integration of EU
- Sov. debt denominated in same currency
- Large fraction of debt held inside EU
- EU institutions internalize EU-wide effects of default (e.g. effects on Greece & Spain, but also on creditors, Euro economy, etc)
- Reinhart & Rogoff (2011): The study of domestic defaults is a “Forgotten History…”
Strategic domestic default

1. Economy inhabited by heterogeneous agents with incomplete markets
2. Agents face idiosyncratic income shocks and aggregate $G/T$ shocks, buy bonds for smoothing and self insurance
3. Gov. issues non-state contingent bonds, faces $G$ shocks, levies lump-sum taxes
4. Gov. values all agents and defaults if default payoff exceeds repayment payoff
5. Gov. is utilitarian (aggregates welfare using economy's endogenous wealth distribution)
Default tradeoffs

- Default is a mechanism for “short-run” redistribution favoring the “poor,” and provides state-contingency to fiscal policy (lower taxes, lower consumption inequality)
- …but it freezes a key asset market used for “long-run” consumption/tax smoothing & self insurance, and it lowers lenders’ wealth
- Feedback loop: wealth distribution affects default incentives, but the dist. itself depends on risk premia, which depend on default risk
Main questions

- Can these tradeoffs support existence of domestic debt subject to default risk?
- Can this setup match the large domestic debt ratios and low frequency of default?
- How much does inequality/short-run redistribution affect default incentives?
- What is the long-run social value of public debt?
Distributional incentives: 2-period case

- \( t=0 \): exogenous initial wealth distribution:
  - A fraction \( \gamma \) of hh’s holds \( b_0^L = 0 \)
  - A fraction \( (1 - \gamma) \) holds \( b_0^H = \frac{B_0 - \gamma b_0^L}{1-\gamma} \)

- \( g \) shock at \( t=1 \) is the only random shock
- Gov. chooses \( B_1 \) and can default at \( t=1 \)
- Debt holdings & date-1 consumption without default:

\[
\gamma: b_1^L = B_1 - \epsilon; \quad (1 - \gamma): b_1^H(\gamma) = B_1 + \frac{\gamma}{1-\gamma}\epsilon; \quad \epsilon \in [0, B_1]
\]

\[
c_1^{L,d=0} = y - g + b_1^L - B_1, \quad c_1^{H,d=0}(\gamma) = y - g + b_1^H - B_1
\]
Distributional incentives
...but redistribution alone would always lead to default!
What explains debt then?

• Exogenous default costs (again!)
• The missing long-run tradeoffs:
  1. No idiosync. shocks, no income heterogeneity
  2. No tax smoothing & self insurance → Limited role of debt market
• Politicians weigh H agents more than the true wealth distribution
Supporting debt with costly default
Long-run social value of public debt 
(stationary eq. without default)

- Steady state gov. budget constraint
  \[ \tau = \bar{g} + B(1 - q(B)) \]

- Agents’ constraints (using \( \tilde{b} = (b - B) \)):
  \[ c = y + \tilde{b} - q(B)\tilde{b}' - \bar{g} \]
  \[ \tilde{b}' \geq -B \]

- Debt enhances borrowing ability, improves ability to self-insure, and allows tax smoothing
Welfare cost of closing the debt market (consumption compensating variations)

<table>
<thead>
<tr>
<th>$B/Y$</th>
<th>$q(B)$</th>
<th>$\tau(B)$</th>
<th>$\bar{\alpha}(B)$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1000</td>
<td>0.9998</td>
<td>0.1829</td>
<td>-0.6168</td>
</tr>
<tr>
<td>0.6333</td>
<td>0.9640</td>
<td>0.2057</td>
<td>-1.3729</td>
</tr>
<tr>
<td>0.9000</td>
<td>0.9591</td>
<td>0.2197</td>
<td>-1.4073</td>
</tr>
<tr>
<td>1.4333</td>
<td>0.9538</td>
<td>0.2491</td>
<td>-1.1837</td>
</tr>
<tr>
<td>1.9667</td>
<td>0.9510</td>
<td>0.2792</td>
<td>-0.7366</td>
</tr>
<tr>
<td>2.5000</td>
<td>0.9493</td>
<td>0.3096</td>
<td>0.0513</td>
</tr>
</tbody>
</table>

\[
\alpha(b, y; B) = \left[ \frac{V(b, y; B)}{V_{aut}(y)} \right]^{\frac{1}{\sigma-1}} - 1
\]

\[
\bar{\alpha}(B) = \int \alpha(b, y; B) d\Gamma(b, y)
\]
Full model simulation: debt and default decision
Full model simulation: debt and bond prices
UNPLEASANT ARITHMETIC OF FISCAL AUSTERITY
Arithmetic of fiscal austerity

- Workhorse two-country Neoclassical model with exogenous growth, capital adj. costs, and trade in goods and bonds
- Distortionary taxes on $L$, $K$ and $C$
- EU setup: full integration, harmonized $C$ tax, large entitlement programs
- $G$ includes expenditures and transfers
- Intertemporal gov. budget constraint holds (debt markets work smoothly)
- 2008 fiscal shock: unanticipated rise in debt
## Pre-crisis tax rates & fiscal shock

<table>
<thead>
<tr>
<th>GDP Weighted Aggregates</th>
<th>FGN</th>
<th>GIIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mendoza-Razin-Tesar Tax Rates:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAXC</td>
<td>17.00%</td>
<td>14.00%</td>
</tr>
<tr>
<td>TAXN</td>
<td>36.00%</td>
<td>34.00%</td>
</tr>
<tr>
<td>TAXK</td>
<td>19.00%</td>
<td>21.00%</td>
</tr>
</tbody>
</table>

### 2008-2011 debt change:

<table>
<thead>
<tr>
<th></th>
<th>FGN</th>
<th>GIIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBT08/GDP08</td>
<td>66.00%</td>
<td>79.00%</td>
</tr>
<tr>
<td>DEBT11/GDP08</td>
<td>80.00%</td>
<td>115.00%</td>
</tr>
<tr>
<td>DEBT SHOCK</td>
<td>14 ppts.</td>
<td>36 ppts.</td>
</tr>
</tbody>
</table>

FGN=France, Germany & Netherlands
GIIPS=Greece, Ireland, Italy, Portugal & Spain
Restoring fiscal solvency

- Tax hikes restore solvency when PDV of primary balance rises as much as debt:

\[
\sum_{t=0}^{\infty} \left[ \prod_{\tau=0}^{t} R_{\tau}(\tau, \tau^*) \right]^{-1} \left[ \tau_K (r_t(\tau, \tau^*) - \delta) k_t(\tau, \tau^*) + \tau_L w_t(\tau, \tau^*) L_t(\tau, \tau^*) + \tau_C c_t(\tau, \tau^*) \right].
\]

- Dynamic Laffer curves

- Fiscal externalities: Eq. prices & allocations depend on country tax structures
Arithmetical questions

- Can tax hikes restore fiscal solvency, and if so at what levels?
- How large are the fiscal externalities?
- What are the welfare implications?
- What are the benefits of coordination?
- How does tax austerity compare v. cuts in outlays and debt haircuts?
Dynamic Laffer curves: capital tax

- Pre crisis GIIPS capital tax
- Required GIIPS capital tax
Transitional dynamics: Capital tax
Welfare & externalities: Capital tax

<table>
<thead>
<tr>
<th></th>
<th>FGN</th>
<th>GIIPS</th>
<th>GIIPS in autarky</th>
</tr>
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<tbody>
<tr>
<td>Welfare effects (compensating variation in C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transition</td>
<td>3.63%</td>
<td>2.53%</td>
<td>6.83%</td>
</tr>
<tr>
<td>Long-run</td>
<td>-2.14%</td>
<td>-7.62%</td>
<td>-9.91%</td>
</tr>
<tr>
<td>Total</td>
<td>1.49%</td>
<td>-5.09%</td>
<td>-3.08%</td>
</tr>
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PDV of tax revenue (ppts. increase)

<p>| | | | |</p>
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<tbody>
<tr>
<td></td>
<td>18.5</td>
<td>36.3</td>
<td>57.7</td>
</tr>
</tbody>
</table>

FGN=France, Germany & Netherlands
GIIPS=Greece, Ireland, Italy, Portugal & Spain
Caveats

• On the negative side:
  1. Neoclassical model has relatively inelastic capital tax base
  2. Abstracted from sov. risk+financial instability
  3. Ignored efficiency loss due to sectoral input misallocation, sticky prices

• On the positive side:
  1. Adjustment via cuts in unproductive outlays and haircuts would be less painful
  2. Haircuts are akin to making GIIPS’s debt shock smaller and FGN’s larger
New perspectives: Summary

- Sovereign debt crises & Great Recessions
  - Focus on fin. amplification and efficiency loss
- Domestic nature of European debt crisis
  - Not the classic two-player game between benevolent sovereign and foreign lenders
  - Tradeoffs of freezing a key asset market
- Unpleasant arithmetic of fiscal austerity
  - Tax hikes can restore solvency but welfare effects and EU-wide externalities are large