Government Debt, Default, and Inflation: Greece and Spain Today, and the United States in 1933

Eric M. Leeper
Indiana University

Center for Economic Policy, Harris School of Public Policy, University of Chicago
November 2015
What’s Up With Government Debt?

- It’s hard to be conscious during the past 8 years and not notice that government debt is much in the news
  - We hear worries about whether U.S. fiscal policy is sustainable going forward
  - We hear worries about whether Japanese fiscal policy is sustainable now
  - But the Eurozone is the poster child
    - severe austerity even in face of recession
    - sovereign debt crisis triggered a second recession
- To get beyond the panic & politics, we need some understanding of government debt
  - what it does
  - how it gets valued
  - what the consequences of rapid debt growth might be
Some roles that debt plays

1. (Usually) a safe store of value
   - agents put saving into bonds to smooth their consumption in the face of volatile income

2. It permits government to smooth taxes & spending
   - avoids introducing an additional source of instability

3. It provides liquidity/collateral
   - can convert Treasuries to cash at low cost
   - important source of backing for repurchase—credit—transactions

4. Debt is a form of foreign reserves
   - use Treasuries to acquire foreign currency for foreign exchange interventions (South Korea)
   - use Treasuries to channel private saving (China)
Two Kinds of Government Debt

1. Real debt: denominated in “goods”
   - arises whenever debt is in units whose quantity the government cannot control
     - indexed to inflation; foreign currency; gold; eggplants
   - a claim to goods in the future
   - government must acquire those goods to honor obligations
   - if it cannot acquire the goods, default only option

2. Nominal debt: denominated in home currency (“dollars”)
   - arises whenever debt is in units whose quantity the government can control
     - vast majority of government debt is of this kind
   - a claim to “dollars” in the future
   - government need not be able to acquire goods
   - it can print new dollars to reduce market value of debt
   - default less likely

- This distinction is critical
Two Kinds of Government Debt

- An individual country in the eurozone doesn’t control eurozone monetary policy
  - to them, debt in euros is *real debt*
- Default much more likely on real debt, so euro rates embed default premium

<table>
<thead>
<tr>
<th></th>
<th>Debt/GDP</th>
<th>10-year yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>157</td>
<td>22.5</td>
</tr>
<tr>
<td>Italy</td>
<td>123</td>
<td>5.5</td>
</tr>
<tr>
<td>Spain</td>
<td>84</td>
<td>5.9</td>
</tr>
<tr>
<td>Japan</td>
<td>237</td>
<td>0.8</td>
</tr>
<tr>
<td>U.K.</td>
<td>86</td>
<td>1.9</td>
</tr>
<tr>
<td>U.S.</td>
<td>102</td>
<td>1.8</td>
</tr>
</tbody>
</table>

General government debt as percentage of GDP & 10-year government bond yield in 2012. Sources: ECB, Eurostat, IMF
European Yield Spreads: Great Convergence

10-year government bond yields over German bund. Source: European Central Bank
European Yield Spreads: Great Divergence

10-year government bond yields over German bund. Source: European Central Bank
What Gives Debt Its Value?

- Government debt is like any asset
  - value depends on expected “cash flows”
  - future cash flows discounted back to present
- Budget surpluses net of interest payments—primary surpluses—are the cash flows
  - interest payments cannot support the principal
  - revenues in excess of non-interest spending are the “goods” that back debt

\[
\frac{B_{t-1}}{P_t} = \frac{E_t}{P_t} \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k}
\]

\(B_{t-1}/P_t\) : real value of debt

\(r_{t,t+k}\) : real discount factor between periods \(t\) and \(t + k\)

\(S_{t+k}\) : real primary surplus in period \(t + k\)

\(E_t\) : form expectations at time \(t\) when debt is sold
What Gives Debt Its Value?

\[ \frac{B_{t-1}}{P_t} = E_t \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k} \]

- Some observations
  1. Debt valuation is forward looking
  2. Higher surpluses—more backing—make debt more valuable
  3. Higher discount factors—lower real discount rates—raise present value of surpluses & make debt more valuable
  4. For real debt, replace $B/P$ with $b$, so price level irrelevant
  5. When there is a maturity structure for debt, bond price, $Q_t$, appears in $Q_t B_{t-1}/P_t$
Real Debt & Default

- Every country faces a *fiscal limit*
  - point at which—for economic or political reasons—country can no longer raise surpluses to finance debt
  - quantifying fiscal limit requires taking a stand on many country-specific details
    - elasticities that summarize private behavior
    - expected future policy choices
    - population’s tolerance of taxes
    - citizens’ demand for public service & goods
    - evolution of demographics
    - economy’s growth potential
    - elected officials’ discount rates
- Default is about *willingness*, rather than *ability* to pay
  - as a country’s debt approaches its fiscal limit, probability of default rises
  - I’ll illustrate how the fiscal limit can help us think about sovereign risk
Modeling the Fiscal Limit

- A representative household/worker
  - buys consumption goods & bonds
  - supplies labor which is transformed into goods using a technology with random productivity
  - seeks to smooth consumption

- The government
  - levies tax against labor income at rate $\tau_t$
  - purchases goods in amount $g_t$
  - provides transfers in amount $z_t$: 2 transfer regimes
    - “stationary:” transfers/GDP does not grow
    - “explosive:” transfers/GDP grow (reflecting aging population)

- Explosive transfers financed by issuing debt & raising taxes
- Higher tax rates raise revenues to peak of Laffer curve
Model-Based Laffer Curves

Position of Laffer curve depends on private behavior

Author’s calculations
Define the fiscal limit as present value of *maximum surpluses*

Maximum surpluses arise when
- revenues at their maximum level, given shocks
- expenditures at their minimum level, given shocks

Of course, other definitions are possible

Fiscal limit can embody political economy

An explicit economic model is essential to price risk

Illustration that follows calibrates model to Greek data
Features of the Fiscal Limit

Fiscal limit answers: “given the economic environment, what is the distribution of government debt that can be supported?”

- uncertain: a probability distribution
- forward-looking—about expected policies & their credibility
- depends on
  1. private behavior
  2. policy behavior
  3. fundamental shocks to the economy
- Fiscal limit distribution emerges from the distribution of expected present value of maximum primary surpluses
Fiscal limit CDF computed using peak of labor Laffer curve, constant government purchases, current transfers regime. Vertical line at 170%. Source: Bi & Leeper (2012)

- Low (High) Productivity Can Reduce (Raise) Country’s Sustainable Debt Level
- Unstable (Stable) Growth in Transfers Can Reduce (Raise) Country’s Sustainable Debt Level
Spain

- Greece is an easy case to analyze
  - issues with Greek debt were egregious

- Spain is more of a challenge
  - heading into the financial crisis, Spanish debt was declining
  - fell to 35% of GDP in 2008
  - with the recession, debt rose, but not at alarming rate
  - by 2011, Spanish bond yields were rising
  - peaking at about 6 percentage points above German bund in summer 2012

- Many attributed this to “contagion,” expressing surprise that moderate debt levels might do this

- How do we make sense of this?
Spanish Sovereign Risk

Source: Eurostat; European Central Bank; IMF
From 1998–2008, Spanish inflation exceeded euro area inflation by an average of 1 percentage point
- investors would become concerned about Spain’s competitiveness
- reduced competitiveness manifests in weak future economic growth
- reduces revenues & increases expenditures ⇒ reduces expected path of future primary surpluses
- at the same time, Spanish debt began to grow
- Spain moved closer to its fiscal limit distribution, driving up risk premia

As Spanish inflation fell & growth rose, spreads declined
- now, despite debt near 100%, yields back down
Uses of the Fiscal Limit

- Focuses attention on distance between current debt & fiscal limit
  - current debt alone not a sufficient statistic

- To gauge a “safe” level of debt
  - Slovakia’s Council for Budget Responsibility decided on 40% debt-GDP, rather than Maastricht’s 60%

- To evaluate sovereign risk consequences of reforms
  - if people believe pension reforms permanent or government will crack down on tax evasion, limit shifts out to make debt less risky

- IMF now considering replacing its “fiscal space” concept with fiscal limit
  - to be used as a basis for policy advice
What If Debt is Nominal?

- Analysis of sovereign default treated debt at real

\[ b_{t-1} = E_t \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k} \]

- in period \( t \), \( b_{t-1} \) is given
- all adjustments must occur through \( E_t PV(S) \)

- Nominal debt brings the price level, \( P_t \), into the picture

\[ \frac{B_{t-1}}{P_t} = E_t \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k} \]

- in period \( t \), \( B_{t-1} \) is given
- but \( P_t \) is not
- \( P_t \) converts the dollar-denominated debt into units of goods, as in \( E_t PV(S) \)
What If Debt is Nominal?

\[ \frac{B_{t-1}}{P_t} = E_t \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k} \]

- Suppose the economy is near its fiscal limit
- This means the value of debt is reaching its maximum
- If nominal debt continues to grow, but \( E_t PV(S) \) is unchanged...
  - the dollar value of debt rises
  - but the real value is fixed by \( E_t PV(S) \)
  - price level must rise to keep real value of debt consistent with future surpluses
- Raises the possibility that \( P_t \) might be determined by fiscal requirements
  - this is heresy
  - especially for monetarists & new Keynesians
What If Debt is Nominal?

\[ \frac{B_{t-1}}{P_t} = E_t \sum_{k=0}^{\infty} \frac{1}{r_{t,t+k}} S_{t+k} \]

- Suppose government cuts taxes next year & promises never to raise them
  - households feel wealthier & seek to raise consumption
  - they reduce current saving & increase demand for goods
  - higher demand raises dollar-price of goods
  - \( P_t \) rises until equilibrium re-established
- Similar analysis applies to current tax cut financed by nominal bond sales
- These are **unbacked fiscal expansions**
The Gold Standard

- Under the Gold Standard...
  - country commits to exchange its currency for gold at a fixed parity (e.g., $35 per troy ounce)

- There is a strange nostalgia for the Gold Standard
  - constantly-rising price level did not arise
  - U.S. price level was the same...
    - in 1869 as in 1778
    - in 1933 as in 1817

- Some view it as akin to a price-level target
  - this is wrong conceptually & in practice
  - price level determined by supply of gold relative to monetary needs of the economy
  - nothing prevents divergent trends in supply & demand from producing persistent inflation or deflation
Debt Valuation Under Gold Standard

- Treasuries were a commitment to pay off in dollars, redeemable at fixed parity in gold
  - if government doesn’t have gold, it needs to acquire it by raising taxes (“goods”) to pay for it
- Fiscal policy was forced to passively adjust $E_t PV(S)$ to align with outstanding debt, given price level
  - so-called “fiscal orthodoxy”
- April 1933 Roosevelt took America off gold to liberate monetary & fiscal policies
- This action converted Treasuries into *nominal debt*
  - payable in dollars, which the Fed can print
- Something other than supply/demand for gold must now determine price level
U.S. Price Level Since Gold Standard

U.S. Inflation Since Gold Standard

Mean = 3.6%
Higher mean
Lower variance

Annual CPI inflation 1934–2014, in percent. Source: Author’s calculations
U.S. Inflation in the 1930s

Wholesale price inflation

Consumer price inflation

Abandon gold standard

Annual growth rate, in percent. Source: BEA & BLS from NBER Macrohistory Database; Eggertsson (2008)
U.S. Real Activity in the 1930s

Industrial production (growth rate)

Unemployment rate (percent)

Annual growth rate, in percent & percentage points. Source: Federal Reserve Board; Eggertsson (2008)
What Turned Things Around?

- Abandoning the gold standard did two things:
  1. It left price level to be determined by monetary & fiscal policies
  2. It converted effectively real debt into *nominal debt*

- There wasn’t a significant expansion in monetary policy
  - short-term interest rates were near zero
  - growth in monetary base, if anything, slowed

- It is clear that the Fed was not adjusting interest rates in response to price level
  - behavior necessary for monetary policy to determine price level
  - Friedman & Schwartz (1963): recovery in the first half of 1933 “owed nothing to monetary expansion”
Monetary Policy & Inflation

Consumer price level (left scale)

Abandon gold standard

3-month Tbill (right scale)

Index (1929=100) & percentage points. Source: BEA & BLS from NBER Macrohistory Database; Eggertsson (2008)
Annual growth rate, in percent. Source: Friedman & Schwartz (1970); Eggertsson (2008); NBER Macrohistory Database
What Turned Things Around?

- Roosevelt emphasized the virtues of inflation
  - implemented an **unbacked fiscal expansion**
- Monetary steps
  1. April 19: abandoned gold standard
  2. April 28: Thomas Amendment allowed president to
     - reduce gold content of dollar up to 50%
     - issue up to $3 billion in “greenbacks”
     - allow Feds to do up to $3 billion in OM purchases
  3. Dollar lost 30–45% of value
- Fiscal steps
  1. 1933–40: Public works expenditures—$6.5 billion
  2. 1933–35: Public Works Administration—$3.3 billion
  3. 1934: Civil Works Administration—$800 million
  4. 1934–37: FERA—$3.1 billion
  5. 1936–40: Works Progress Administration—$8.1 billion
What Turned Things Around?

- With these policy actions came change in expectations
  1. monetary policy will peg interest rate to allow inflation
  2. fiscal policy will finance deficits with debt
  3. higher debt will not necessarily entail higher future surpluses

- Wittingly or unwittingly, Roosevelt engineered an unbacked fiscal expansion

- For several years primary deficit rose
- Nominal debt grew more rapidly than real debt
- Stein (1996) calls this a “fiscal revolution”
- Meltzer (2003) says monetary policy was “in the back seat”
- I call it a classic example of what the *fiscal theory of the price level*
Primary Surplus

Billions of dollars; fiscal years. Source: Annual Reports of the Treasury
Growth in Treasury Debt

- Real gross Treasury debt (growth rate)
- Nominal gross Treasury debt (growth rate)
- Abandon gold standard

Annual growth rate, in percent. Source: Monthly Treasury Bulletin
Cold Feet

- Roosevelt administration quickly grew nervous about the new regime
- Began to reverse some of the deficit spending
  - primary deficit fell from $4 billion (FY 1936) to $2 billion (FY 1937)
  - to surplus of almost $3 billion (FY 1938)
- Fed doubled reserve requirements in 1936–1937
  - Friedman & Schwartz (1963) blame this for sharp contraction in broad money
  - ensuing recession in 1937–1938
  - jury is now out
- I suspect that this, too, was a fiscal phenomenon: for another time
A Closely-Related Story Today

- Since the crisis...
  - federal funds rate pegged near zero
  - nominal government debt increase 85% since 2008
  - $2.55 trillion in excess reserves from quantitative easing

- We’ve heard dire predictions of (hyper-)inflation
  - since 2012, U.S. CPI inflation hovered around 2%
    (the Fed’s target)
  - 10-year Treasury yield around 2.5%

- Conventional money-only stories cannot explain this:
  also for another time
Recent U.S. Developments

Annual rates in percentage and percentage points; in trillions of dollars. Source: BLS; Federal Reserve Board; Treasury
Wrap Up

- Crucial to distinguish real vs. nominal debt
- Real debt must be backed by surpluses
  - if at fiscal limit, default is only option
- Nominal debt *may be* backed by surpluses
  - but current & future price level changes can revalue debt
  - inflation is an alternative to default
- If large fraction of debt is nominal...
  - fiscal policy may play central role in determining price level
- Cannot understand inflation without studying monetary & fiscal policies jointly
References

Material on the fiscal limit draws on

Material on real vs. nominal debt draws on
Material on the fiscal theory during the Great Depression draws on

Final graph on “Recent U.S. Developments” is a variation on a figure in