Structural Reforms in a Debt Overhang

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Motivation (I)

- High levels of private debt and need to deleverage act as a drag on growth in the EMU periphery
In the short term, little room for
- fiscal policy (large deficits)
- (conventional) monetary policy (ZLB).

Much of the focus is on **structural reforms**, mainly in product and labor markets.
- Most official views (e.g. OECD, IMF, ECB) support reforms.

Reforms are clearly positive in the long run, but their **short/medium term** impact is less well understood.

EMU periphery conditioned by high debt *cum slow private-sector deleveraging*

**This paper**: study impact of structural reforms in an environment of slow deleveraging
Framework

- DSGE model, small open economy inside monetary union
- Lenders & borrowers, collateral constraints à la Kiyotaki & Moore (1997). As in Iacoviello (2005), real estate is the only collateral.
- Key point of departure: **long-term debt** ⇒ double debt regime:
  a) In normal times: debt restricted by value of collateral
  b) In crisis times: no new credit, debt amortized slowly
- Baseline deleveraging scenario: negative shock to LTV ratios (‘credit crunch’) ⇒ economy enters regime (b): slow and protracted deleveraging
- Time of change from regime (b) to (a), i.e. end of deleveraging phase, is *endogenous*
Structural reforms (reductions in desired price & wage markups) boost output in long run (as expected), but also in short run.

Particularly true for product market reform

- Brings forward the (endogenous) end of deleveraging phase/recession

Labor market reform creates modest short-run gains

- Double layer of nominal rigidities (wages and prices) delays improvement in price competitiveness
- Broader reform (including higher wage flexibility) generates sizable short-run gains

Long-run debt weakens negative Fisherian debt deflation effect (becomes second order)
Recent literature

Some recent work on the impact of reforms:

- Eggertsson, Ferrero & Raffo (2014):
  - if monetary policy is at ZLB, deflationary structural reforms increase real interest rate \( \rightarrow \) depress aggregate demand
  - this channel may dominate positive income effect (from long-run gains) in the short run

- Galí & Monacelli (2013): short-run effects of wage moderation (through lower payroll taxes) is small if no monetary accommodation

- Fernández-Villaverde, Guerrón-Quintana & Rubio-Ramírez (2012):
  - credible *announcement* of future structural reforms triggers gains already in the short-run (positive income effect)
  - BUT no deflationary effect on impact

- None of these papers study effects of reforms in a scenario of slow deleveraging
Model structure

- Small open economy in a monetary union
  - monetary policy exogenous \( \approx \) ZLB

- Three consumer types
  - Patient households (lenders)
  - Impatient households (borrowers)
  - (Impatient) entrepreneurs (borrowers)

- Three production sectors
  - Consumption goods (entrepreneurs + retailers)
  - Equipment capital producers
  - Construction

- Trade with rest of world: consumption goods and foreign debt

- Standard real and nominal frictions: investment adjustment costs, nominal price and wage rigidities
Maximize

$$E_0 \sum_{t=0}^{\infty} \beta^t \left\{ \log(c_t) + \vartheta \log h_t - \chi \int_0^1 \frac{n_t^C(i)^{1+\varphi}}{1+\varphi} \, di \right\},$$

subject to

$$c_t + p_t^h [h_t - (1 - \delta_h) h_{t-1}] = b_t - \frac{R_{t-1}}{\pi_t} b_{t-1} + \int_0^1 \frac{W_t(i)}{P_t} n_t^C(i) \, di.$$

and an asymmetric debt constraint...
Asymmetric debt constraint

- We assume long run debt
- A constant fraction $1 - \gamma$ of nominal outstanding principal is amortized each period (Woodford, 2001)
- Dynamics of real outstanding debt,

\[ b_t = \frac{b_{t-1}}{\pi_t} + b_{t}^{\text{new}} - \frac{1 - \gamma}{\pi_t} b_{t-1} = \frac{\gamma}{\pi_t} b_{t-1} + b_{t}^{\text{new}}. \]

\( b_{t}^{\text{new}} \): gross new credit
- If collateral value < $\gamma \frac{b_{t-1}}{\pi_t}$, setting $b_t = \text{collateral value}$ would require $b_{t}^{\text{new}} < 0$ ...
- ... but debtor cannot be forced to pay back faster than $1 - \gamma$; hence $b_{t}^{\text{new}} = 0$. 
Asymmetric debt constraint (cont’d)

- This implies a double debt regime:
  - in 'normal' times, borrowing is restricted by expected discounted value of collateral,
    \[
    \frac{1}{R_t} m_t E_t \pi_{t+1} p_{t+1}^h h_t,
    \]
    
    \( m_t \): exogenous loan-to-value (LTV) ratio
  - when collateral values fall below contractual amortization path, 
    \( \gamma b_{t-1} / \pi_t \), the latter becomes the effective debt limit

- Formally,
  \[
  b_t \leq \begin{cases} 
  \frac{1}{R_t} m_t E_t \pi_{t+1} p_{t+1}^h h_t, & \frac{1}{R_t} m_t E_t \pi_{t+1} p_{t+1}^h h_t \geq \gamma \frac{b_{t-1}}{\pi_t} \\
  \gamma \frac{b_{t-1}}{\pi_t}, & \frac{1}{R_t} m_t E_t \pi_{t+1} p_{t+1}^h h_t < \gamma \frac{b_{t-1}}{\pi_t} \end{cases}
  \]
Maximize

\[ E_0 \sum_{t=0}^{\infty} \beta^t \log c_t^e, \]

subject to

\[ c_t^e + p_t^h [h_t^e - (1 - \delta_h) h_{t-1}^e] + q_t [k_t - (1 - \delta_k) k_{t-1}] \]

\[ = mc_t y_t^e - \frac{W_t}{P_t} n_t^e + b_t^e - \frac{R_{t-1}}{\pi_t} b_{t-1}^e + \sum_{s=r,h,k} \Pi_t', \]

\[ y_t^e = A_t k_{t-1}^{\alpha_k} (h_{t-1}^e)^{\alpha_h} (n_t^e)^{1-\alpha_h-\alpha_k}, \]

\[ b_t^e \leq \left\{ \begin{array}{l}
\frac{1}{R_t} m_t^e E_t \pi_{t+1} p_{t+1}^h h_t^e, \\
\gamma^e \frac{b_{t-1}^e}{\pi_t}, \\
\frac{1}{R_t} m_t^e E_t \pi_{t+1} p_{t+1}^h h_t^e \geq \gamma^e \frac{b_{t-1}^e}{\pi_t} \end{array} \right. \]
We target key ratios of the Spain in 2007:

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Data (%)</th>
<th>Model (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>construction share of GDP</td>
<td>12.45</td>
<td>15.11</td>
</tr>
<tr>
<td>construction share of employment</td>
<td>13.39</td>
<td>15.44</td>
</tr>
<tr>
<td>labor share of GDP</td>
<td>61.59</td>
<td>64.84</td>
</tr>
<tr>
<td>corporate debt / annual GDP</td>
<td>125.36</td>
<td>128.85</td>
</tr>
<tr>
<td>household debt / annual GDP</td>
<td>80.22</td>
<td>79.94</td>
</tr>
<tr>
<td>net foreign debt / annual GDP</td>
<td>79.3</td>
<td>79.3</td>
</tr>
<tr>
<td>gross exports / GDP</td>
<td>26.9</td>
<td>26.9</td>
</tr>
</tbody>
</table>
Parameters not pinned down by targets are set to standard values within NK-DSGE literature.

Parameters affecting debt constraints:

- LTV ratios: households $m = 0.85$, entrepreneurs $m^e = 0.71$
- Amortization rates: households $1 - \gamma = 0.02$, entrepreneurs $1 - \gamma^e = 0.04$

\[ \Rightarrow \text{average debt maturity: } \frac{1}{1 - \gamma} = 50, \quad \frac{1}{1 - \gamma^e} = 25 \text{ qrts} \]
Baseline scenario: a deleveraging shock

We simulate a *deleveraging* shock for entrepreneurs and constrained households:

- Gradual, permanent fall (10pp) in loan-to-value (LTV) ratios: $m_t, m^e_t$
Deleveraging shock: LTV ratios

LTV households (m)

LTV entrepreneurs (me)

quarters

quarters
Deleveraging shock: regime changes

Entrepreneur debt

Household debt

\[ \gamma b_{t-1} / \pi_t \]

\[ m_t e^h \pi_{t+1} e^h / R_t \]

\[ b^e_t \]

\[ T^* \]

\[ \gamma b_{t-1} / \pi_t \]

\[ m_t^h \pi_{t+1} h_t / R_t \]

\[ b_t \]

\[ T^{**} \]
Baseline scenario: a deleveraging shock

- Large initial shock and asymmetric debt limits produce a double regime change:
  - For \( t = 1, \ldots, T^* \), value of entrepreneurs’ collateral falls below \( \gamma^e b^e_{t-1} / \pi_t \)
  - For \( t = 1, \ldots, T^{**} \), value of households’ collateral falls below \( \gamma b_{t-1} / \pi_t \)
  - \( \gamma^e < \gamma \Rightarrow T^* < T^{**} \): faster amortization of entrepreneurial debt
  - Dates of regime change \( T^* \) and \( T^{**} \) are solved endogenously
Deleveraging shock: long vs short-term debt

Long run debt produces a more realistic deleveraging path and (critically) allows for endogenous regime change.
Two phases in the dynamics of debt:

- Until $T^*$ ($T^{**}$), smooth deleveraging at rate $\frac{\gamma_e}{\pi_t}$ ($\gamma/\pi_t$)
- After $T^*$ ($T^{**}$), debt picks up quickly: real estate is again valuable as collateral $\Rightarrow$ asset prices, credit and investment "virtuous circle"

- Consumption follows a similar pattern to debt
- Investment recovers somewhat earlier than consumption and debt (‘creditless recovery’)
Product market reform

- We simulate a sudden, permanent fall in desired \textit{price markups} (5\%).
Product market reform

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Product market reform: macro effects

Long run:
- GDP goes up, employment remains stable (real wages and labour share go up)

Short/medium run:
- GDP and employment fall by less than in the baseline
- Investment behaves significantly better, anticipating higher future demand.
- Consumption falls slightly below the baseline
- Additional terms of trade depreciation fuels gross exports, though net exports worsen due to stronger domestic demand
Product market reform: positive effect on investment

Key question: How is the additional investment financed in the short term?
- On the one hand,
  - Entrepreneurs current unit profits drop as markups fall
  - Deflationary effect of reform raises the real value of debt repayments
- On the other hand,
  - Higher asset prices → entrepreneurs’ net worth is higher in the reform scenario
  - Entrepreneurs cut down their consumption significantly
  - Total demand goes up, pushing up profits
Reform brings *forward* the end of the deleveraging phase: $T^*$ and $T^{**}$ both go down.

Focus on $T^*$ (entrepreneurs):

- Higher initial net worth allows for more investment in the short term
- Higher investment today implies higher net worth and investment tomorrow, and so on
- Faster recovery of net worth leads *ceteris paribus* to an earlier $T^*$
- Anticipation of earlier recovery of credit leads to higher asset prices today, higher net worth and investment, etc.
Labor market reform

- We simulate a sudden, permanent fall in desired wage markups (5%).
  - Model proxy for unions’ bargaining power.
Labor market reform (cont’d)

- Long-run gains in GDP and employment
- Short/medium-run effects:
  - No effect on GDP on impact, then gradual improvement
  - Similar effect on employment (main variable targeted by such a reform)
- Positive short/medium-run effects smaller than those of product market reform:
  - Investment does not respond positively: entrepreneurs meet higher demand by hiring more (cheaper) labor
  - Entrepreneur consumption slightly increases
    \[ \Rightarrow \] forces that brought \( T^* \)'s forward with product market reform are not active now
Reduction in desired wage markups must overcome a double layer of nominal rigidities (wages and prices) before affecting price competitiveness.

Typically, labor market reforms affect not only markups, but also speed of nominal wage adjustment.

- Spain’s 2012 reform a clear example!

Consider a broader labor market reform that also reduces nominal wage rigidity.

- Reduce Calvo parameter from 3/4 to 2/3 (average wage duration from 4 to 3 qrts)
Broader labor market reform

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Further analysis

- Two important channels for understanding the positive short-run effects of reforms:
  - The role of the external sector
  - The role of long-term debt
The role of the external sector

Responsiveness of net exports to reform-driven depreciation in terms of trade is key

![Graphs showing the impact of product market and labor market reforms on export and import elasticities.](image)

Differential effect of reform on GDP
The role of long-run debt

- Entrepreneurial net debt flows (gross of interest payments) during deleveraging phase \( (b^e_t = \gamma^e b^e_{t-1} / \pi_t, \ t \leq T^*) \):

\[
R_{t-1} \frac{b^e_{t-1} - b^e_t}{\pi_t} = \frac{R_{t-1} - \gamma^e}{\pi_t} b^e_{t-1} = \frac{(R_{t-1} - 1) + (1 - \gamma^e)}{\pi_t} b^e_{t-1}.
\]

- Long-run debt \( \Rightarrow \) amortization rate \( 1 - \gamma^e \) is small \( \Rightarrow \) debt deflation effect \( (\downarrow \pi_t) \) from reform is small!
Concluding remarks

- Structural reforms may boost GDP and employment already in the short run...
  - ... even without monetary accommodation
- Especially true for product market reform (brings forward end of deleveraging/recession)
- Also true for a broad labor market reform that includes higher wage flexibility
- Long-run debt buffers short-term costs of reforms