Structural Reforms in a Debt Overhang

Javier Andrés¹, Óscar Arce² and Carlos Thomas³

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¹Universidad de Valencia, Banco de España
²Banco de España
³Banco de España
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Motivation

- Household and corporate deleveraging acts as a drag on growth in the EMU periphery.

- In the short term, little room for expansionary fiscal policy or (conventional) monetary policy (ZLB).

- Much of the focus is on structural reforms.
  - Most official views (e.g. IMF, ECB, EC) support reforms.

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

- This paper: study impact of structural reforms in an environment of high debt and slow deleveraging and ZLB.
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 $\Rightarrow$ double debt regime:

a) When collateral is high, borrowers access to new loans.

b) When collateral is scarce, credit flows freeze and debt is amortized at its contractual rate (slow deleveraging)

A large negative financial shock ("credit crunch") may shift the economy from a) to b).

Eventually, the economy moves endogenously from b) to a), thus ending the deleveraging process
Structural reforms boost output in long run (as expected), but they have the potential to do it also in the short run.

Particularly true for product market reforms:
- stimulate investment and collateral accumulation...
- ...and bring forward the (endogenous) end of contractionary deleveraging

Labor market reforms that reduce union’s monopolistic power create much more modest and less robust short-run gains.
- the collateral accumulation channel weakens,
- although reforms that include higher wage flexibility may generate some additional gains.
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 → depress aggregate demand
  - this channel may dominate positive income effect (from long-run gains) in the short run

- Galí & Monacelli (2014): 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 and, hence, how reforms interact with deleveraging.
Model structure

- Small open economy in a monetary union
  ⇒ monetary policy exogenous ≈ 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

$$c_t + p^h_t [h_t - (1 - \delta_h) h_{t-1}] = b_t - \frac{R_{t-1}}{\pi_t} b_{t-1} + \int_0^1 \frac{W_t(i)}{P_t} n_t^C(i) \, di.$$
We assume *long-run debt* ⇒ A constant fraction $1 - \gamma$ of outstanding (nominal) principal is amortized each period (Woodford, 2001).

Then the dynamics of *real* outstanding debt:

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

Debtors cannot be forced to prepay faster than at the contractual rate:

- In equilibrium, no voluntary early prepayments: $b_{t}^{\text{new}} \geq 0$. 

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Financial frictions (II)

- New borrowing is subject to a collateral constraint

\[ b_{t}^{\text{new}} \leq \max \left\{ 0, \left( \frac{m_{t}}{R_{t}} E_{t} \pi_{t+1} p_{t+1}^{h} h_{t} - \frac{\gamma}{\pi_{t}} b_{t-1} \right) \right\} \]

- An asymmetric debt-regime:
  - When collateral is high (excess collateral $> 0$) $\implies b_{t}^{\text{new}} > 0$ and $b_{t}$ satisfies
    \[ b_{t} = m_{t} \frac{1}{R_{t}} E_{t} \pi_{t+1} p_{t+1}^{h} h_{t} \]
  - When collateral is low (excess collateral $< 0$) $\implies b_{t}^{\text{new}} = 0$ and $b_{t}$ follows the contractual amortization path:
    \[ b_{t} = \frac{\gamma}{\pi_{t}} b_{t-1} \]
Maximize

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

subject to

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

\[ = mc_t y_t^e - \frac{W_t}{P_t} n_t^e + b_t^e - \frac{R_{t-1}}{\pi_t} b_{t-1}^e + \sum_{s=r,h,k} \Pi_t^r, \]

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

\[ b_t^e \leq \left\{ \begin{array}{l} \frac{1}{R_t} m_t^e E_t \pi_{t+1} p_{t+1}^h h_t^e, \\ \gamma^e \frac{b_{t-1}^e}{\pi_t}, \end{array} \right. \]

\[ \frac{1}{R_t} m_t^e E_t \pi_{t+1} p_{t+1}^h h_t^e \geq \gamma^e \frac{b_{t-1}^e}{\pi_t}, \]

\[ \frac{1}{R_t} m_t^e E_t \pi_{t+1} p_{t+1}^h h_t^e < \gamma^e \frac{b_{t-1}^e}{\pi_t}. \]
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 $m = 0.70$, entrepreneurs $m^e = 0.64$
- Amortization rates: households $1 - \gamma = 0.02$, entrepreneurs $1 - \gamma^e = 0.03$

$\Rightarrow$ average debt maturity: $1 / (1 - \gamma) = 50$, $1 / (1 - \gamma^e) = 33$ 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: endogenous debt-regime change

Entrepreneur debt

\[ \gamma^{e}_{b_{t-1}} / \pi_{t} \]

\[ m^{e}_{p_{t+1}} \pi_{t+1} h^{e}_{t} / R_{t} \]

Household debt

\[ \gamma^{b}_{t-1} / \pi_{t} \]

\[ m^{h}_{p_{t+1}} \pi_{t+1} h_{t} / R_{t} \]

\[ b_{t} \]

\[ T^{*} \]

\[ T^{**} \]
Deleveraging shock: macroeconomic effects

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Deleveraging shock: long vs short-term debt

Long run debt produces a more realistic deleveraging path and (critically) allows for endogenous regime change.
Product market reform

- We simulate a sudden, permanent fall in desired 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 labor 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 $\rightarrow$ entrepreneurs’ net worth is *higher* in the reform scenario
- Entrepreneurs cut down their consumption significantly
- Total demand improves, pushing up total profits
Reform brings forward the end of the deleveraging phase: $T^*$ and $T^{**}$ both go down.

Focus on $T^*$ (entrepreneurs). On the one hand:

- $\uparrow$ investment ($t$) $\implies$ $\uparrow$ asset prices ($t$) $\implies$ $\uparrow$ net worth ($t + 1$) $\implies$ $\uparrow$ investment ($t + 1$) $\implies$ $\uparrow$ asset prices ($t + 1$) $\implies$ ....
- Faster recovery of net worth leads *ceteris paribus* to an earlier $T^*$.

But, on the other hand, as from $T^*$ onwards, real estate provides collateral services, we get

- $\downarrow T^*$ $\implies$ $\uparrow$ investment ($t$) $\implies$ $\uparrow$ asset prices ($t$) $\implies$ $\uparrow$ net worth ($t + 1$) ....

Hence, endogenous $T^*$ works as an *amplifying mechanism*. 
We simulate a sudden, permanent fall in desired wage markups (5%).

Model proxy for unions’ bargaining power.
Labor market reform (II)

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Long-run gains in GDP and employment

Short/medium-run effects:

- Small 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
- Consumption, rather than investment, raises internal demand.
  ⇒ forces that brought $T^*$’s forward with product market reform are not active now.
A broader labor market reform (I)

- Reduction in desired wage markups must overcome 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).
A broader labor market reform (II)

More flexible wages improve the short run response significantly....
A broader labor market reform (III)

....mainly, by favouring a faster pick up in competitiveness

Differential effect of reforms on terms of trade
Robustness 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**

- **A general message**: the positive short-run effects of product mkt reforms are more robust than those of labour mkt reforms.
The role of the external sector (I)

Responsiveness of net exports to reform-driven depreciation in terms of trade is key (especially, in the case of labor market reforms).

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The role of the external sector (II)

Why labor mkt reforms are more sensitive to the external sector?

- A labor mkt reform stimulates internal demand through its impact on consumption (recall that investment does not respond much)
- Consumption depends much on labor income, $w \times L(w)$.
- So a high elasticity of $L(w)$ wrt $w$ is needed for a positive effect, given the fall in $w$.
- In turn, a sufficiently strong response of employment requires a responsive external sector.

The contrast with a product mkt reform is clear: $w$, $L$ and $I$ all go up
While deleveraging, LR-debt isolates debt dynamics and expenditure capacity from changes in debtors’ net wealth:

$$NetWealth^e_t = (1 - \delta_h) p_t^h h^e_{t-1} + (1 - \delta_k) q_t k_{t-1} - \frac{R_{t-1}}{\pi_t} b^e_{t-1}.$$ 

...with three important effects.
1. The **debt deflation channel** weakens.

   - Net debt payments during deleveraging \( (b_t^e = \gamma^e b_{t-1}^e / \pi_t, \ t \leq T^*) \):

   \[
   \frac{R_{t-1}}{\pi_t} b_{t-1}^e - b_t^e = \frac{R_{t-1} - \gamma^e}{\pi_t} b_{t-1}^e
   \]

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

   - With LR-debt, \( 1 - \gamma^e \) is small, so it is the extra *debt deflation* effect.

2. As borrowers are (strongly) constrained while deleveraging \( (b_t^{new} = 0) \), the extra rise in the **real interest rate** induced by the reforms does not have a contemporaneous negative impact on debt.

3. The impact of reforms on **asset prices** also gets diluted in the short run, as the price-collateral-debt link breaks down while deleveraging.
Which of these three effects dominate depends on the reform at hand:

- **Labor mkt reform**: effects 1, 2 and 3 all lead to a more positive impact of the reform (the negative effects of $\downarrow \pi$, $\uparrow R$ and $\downarrow P^h$ are all weaker with LR debt)

- **Product mkt reform**: effects 1 and 2 work as before, but here LR debt dampens the (now) positive effect of the reform on $P^h$. This last negative effect dominates: LR-debt weakens the short-run positive effect of the reform.
Long-run debt and the impact of reforms (IV)

GDP effects of reforms: long-term vs. one-period debt
Concluding remarks

- Structural reforms may boost GDP and employment already in the short run in a very complex macrofinancial environment...
  - ... with private deleverage, tight financing conditions and lack of monetary accommodation
- Product market reforms are effective in bringing forward the end of deleveraging and recession
- On labor market reforms:
  - Higher wage flexibility is essential to favour a quick pick up in competitiveness
  - The external sector lever and the presence of long-run debt are important determinants of the short-run impact of reforms