

Structural Reforms in a Debt Overhang

Javier Andrés¹, Óscar Arce² and Carlos Thomas³

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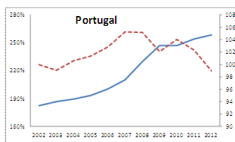
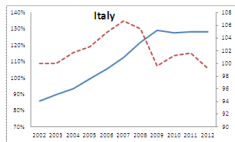
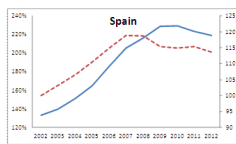
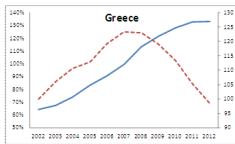
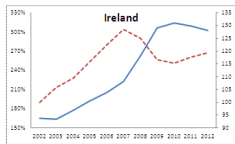
¹Universidad de Valencia, Banco de España

²Banco de España

³Banco de España

Motivation (I)

- High levels of private debt and need to deleverage act as a drag on growth in the EMU periphery



— Private debt (% GDP)
- - - GDP (2002=100, right scale)

Motivation (II)

- 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

- 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) 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')
 \Rightarrow economy enters regime (b): slow and protracted deleveraging
- Time of change from regime (b) to (a), i.e. end of deleveraging phase, is *endogenous*

Preview of results

- 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*)

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 (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

- 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,

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

b_t^{new} : gross new credit

- If collateral value $< \gamma \frac{b_{t-1}}{\pi_t}$, setting $b_t =$ collateral value would require $b_t^{new} < 0$...
- ... but debtor *cannot* be forced to pay back faster than $1 - \gamma$; hence $b_t^{new} = 0$.

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

$$\begin{aligned} c_t^e + p_t^h [h_t^e - (1 - \delta_h) h_{t-1}^e] + q_t [k_t - (1 - \delta_k) k_{t-1}] \\ = m c_t y_t^e - \frac{W_t}{P_t} n_t^e + b_t^e - \frac{R_{t-1}}{\pi_t} b_{t-1}^e + \sum_{s=r,h,k} \Pi_t^s, \end{aligned}$$

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

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

- We target key ratios of the Spain in 2007:

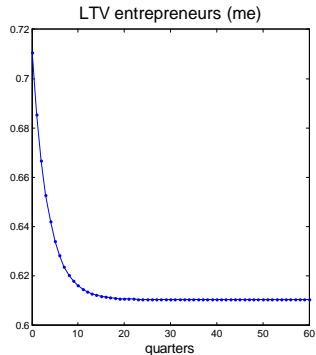
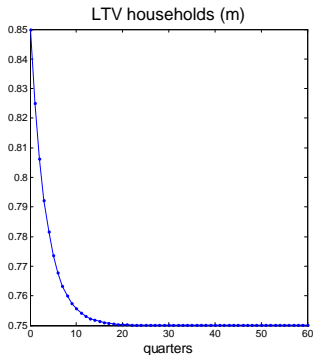
Ratio	Data (%)	Model (%)
construction share of GDP	12.45	15.11
construction share of employment	13.39	15.44
labor share of GDP	61.59	64.84
corporate debt / annual GDP	125.36	128.85
household debt / annual GDP	80.22	79.94
net foreign debt / annual GDP	79.3	79.3
gross exports / GDP	26.9	26.9

- 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 average debt maturity: $1 / (1 - \gamma) = 50$, $1 / (1 - \gamma^e) = 25$ qrts

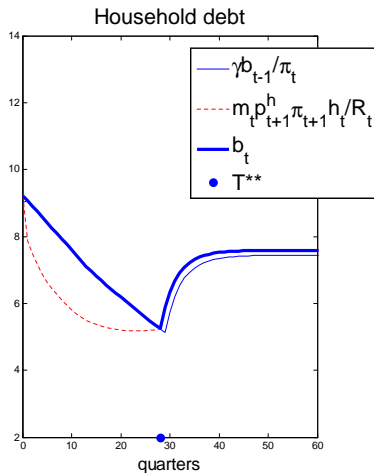
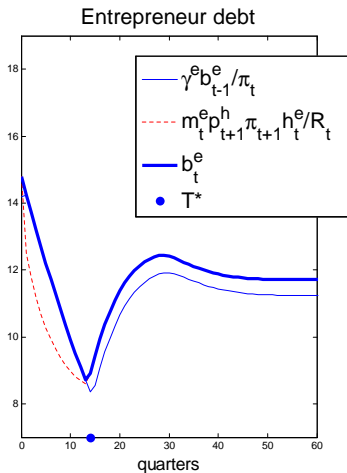
Baseline scenario: a deleveraging shock

- We simulate a *deleveraging* shock for entrepreneurs and constrained households:
 - Gradual, permanent fall (10pp) in loan-to-value (LTV) ratios: m_t , m_t^e

Deleveraging shock: LTV ratios



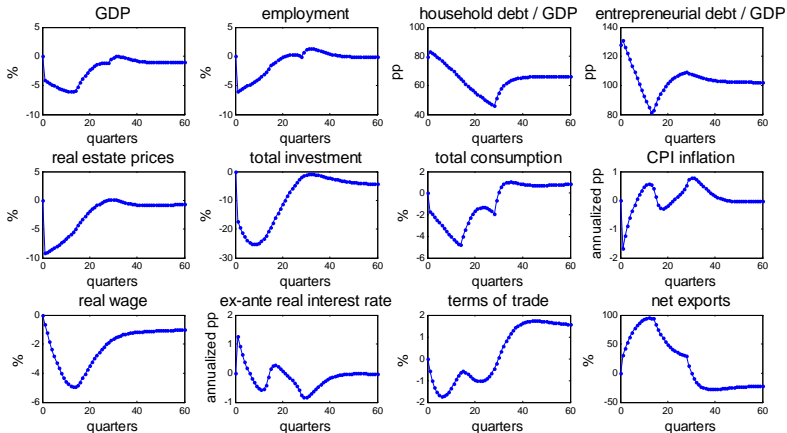
Deleveraging shock: regime changes



Baseline scenario: a deleveraging shock

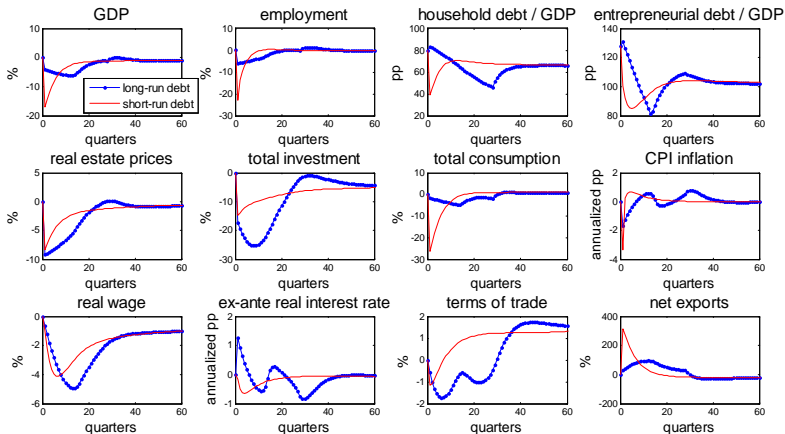
- Large initial shock and asymmetric debt limits produce a double *regime change*:
 - For $t = 1, \dots, T^*$, value of entrepreneurs' collateral falls below $\gamma^e b_{t-1}^e / \pi_t$
 - For $t = 1, \dots, T^{**}$, value of households' collateral falls below $\gamma b_{t-1} / \pi_t$
- $\gamma^e < \gamma \Rightarrow T^* < T^{**}$: faster amortization of entrepreneurial debt
- Dates of regime change T^* and T^{**} are solved endogenously

Deleveraging shock: macroeconomic effects



Deleveraging shock: long vs short-term debt

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



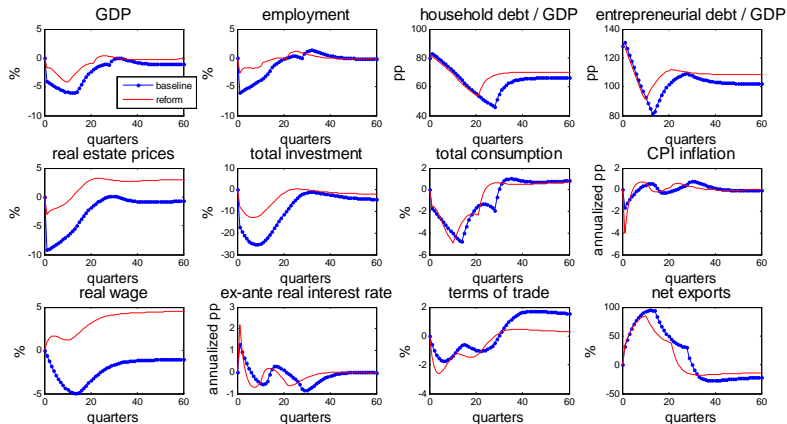
Deleveraging shock

Debt, consumption and investment

- Two phases in the dynamics of debt:
 - Until T^* (T^{**}), smooth deleveraging at rate γ^e / π_t (γ / π_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')

- We simulate a sudden, permanent fall in desired *price markups* (5%)

Product market reform



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,

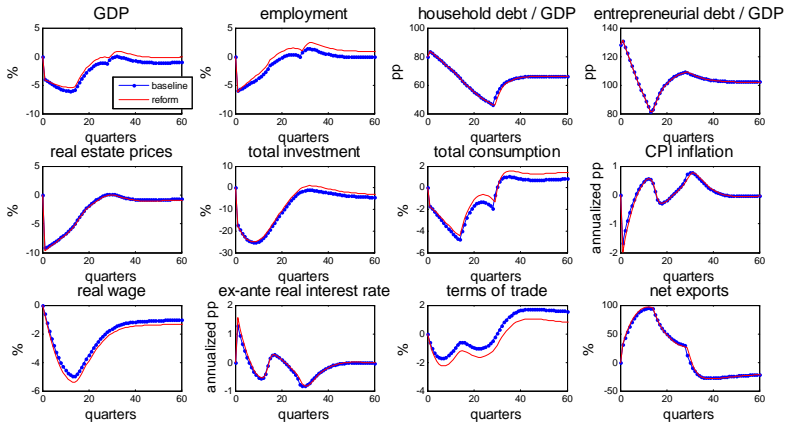
- Higher asset prices → entrepreneurs' net worth is *higher* in the reform scenario
- Entrepreneurs cut down their consumption significantly
- Total demand goes up, pushing up profits

Product market reform: deleveraging ends earlier

- 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.

- We simulate a sudden, permanent fall in desired *wage markups* (5%).
 - Model proxy for unions' bargaining power.

Labor market reform

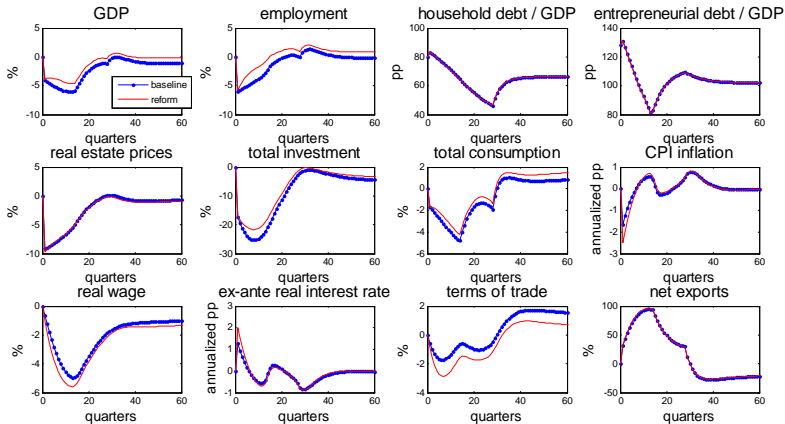


Labor market reform (cont'd)

- 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
⇒ 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)

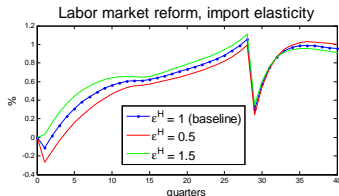
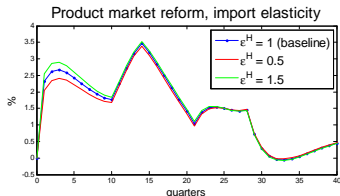
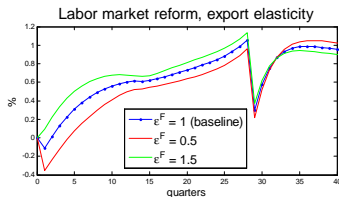
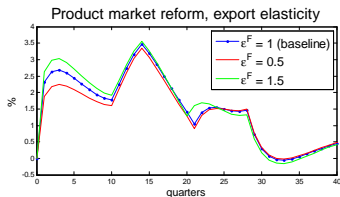
Broader labor market reform



- 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



Differential effect of reform on GDP

The role of long-run debt

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

$$\begin{aligned} \frac{R_{t-1}}{\pi_t} b_{t-1}^e - b_t^e &= \frac{R_{t-1} - \gamma^e}{\pi_t} b_{t-1}^e \\ &= \frac{\overbrace{(R_{t-1} - 1)}^{\text{net interest rate}} + \overbrace{(1 - \gamma^e)}^{\text{amortization rate}}}{\pi_t} b_{t-1}^e. \end{aligned}$$

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

- 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