Structural Reforms in a Debt Overhang

Javier Andrés[1], Óscar Arce[2] and Carlos Thomas[3]

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[1]Universidad de Valencia, Banco de España
[2]Banco de España
[3]Banco 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**: We study the impact of structural reforms in an environment of high debt and slow deleveraging

Framework

- DSGE model, small open economy inside monetary union.
- Lenders & borrowers, collateral constraints *à la* Kiyotaki & Moore (1997), where 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 $\Rightarrow$ **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.

Preview of results

- 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 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):
  - At the ZLB, deflationary structural reforms increase real interest rate $\longrightarrow$ 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 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 the effects of reforms in a high-debt scenario and, hence, how reforms interact with deleveraging.**

Model structure

- Small open economy in a monetary union
  $\Rightarrow$ 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

Impatient households

Maximize

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

subject to

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

Financial frictions (I)

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

- Then the dynamics of *real* outstanding debt:

$$\underbrace{b_t}_{\text{final debt}} = \underbrace{\frac{b_{t-1}}{\pi_t}}_{\text{initial debt}} - \underbrace{\frac{1-\gamma}{\pi_t} b_{t-1}}_{\text{amortization}} + \underbrace{b_t^{new}}_{\text{new gross flow}} = \frac{\gamma}{\pi_t} b_{t-1} + b_t^{new}.$$

- Debtors cannot be forced to prepay faster than at the contractual rate:
  - In equilibrium, no voluntary early payments: $b_t^{new} \geq 0$.

Financial frictions (II)

- New borrowing is subject to a collateral constraint

$$b_t^{new} \leq \max\left\{0, \underbrace{m_t \frac{1}{R_t} E_t \pi_{t+1} p_{t+1}^h h_t - \frac{\gamma}{\pi_t} b_{t-1}}_{\text{EXCESS COLLATERAL}}\right\}$$

- An *asymmetric debt-regime*:
  - When **collateral is high** (*excess collateral* > 0) $\Longrightarrow b_t^{new} > 0$ 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) $\Longrightarrow b_t^{new} = 0$ and b_t follows the contractual amortization path:

$$b_t = \frac{\gamma}{\pi_t} b_{t-1}$$

Entrepreneurs

Maximize

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

subject to

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

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

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

Calibration

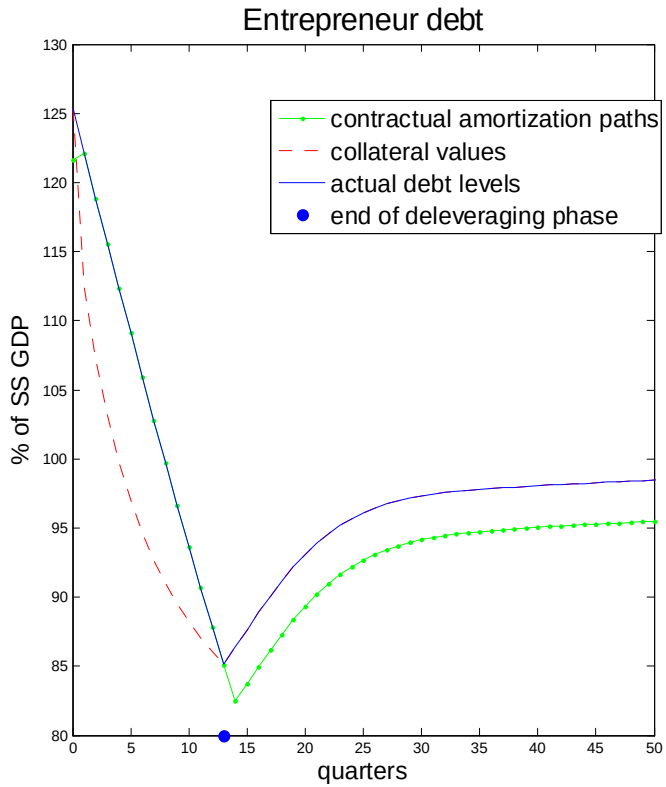
- We target key ratios of the Spanish economy in 2007 (initial condition)
- Some parameters of interest:

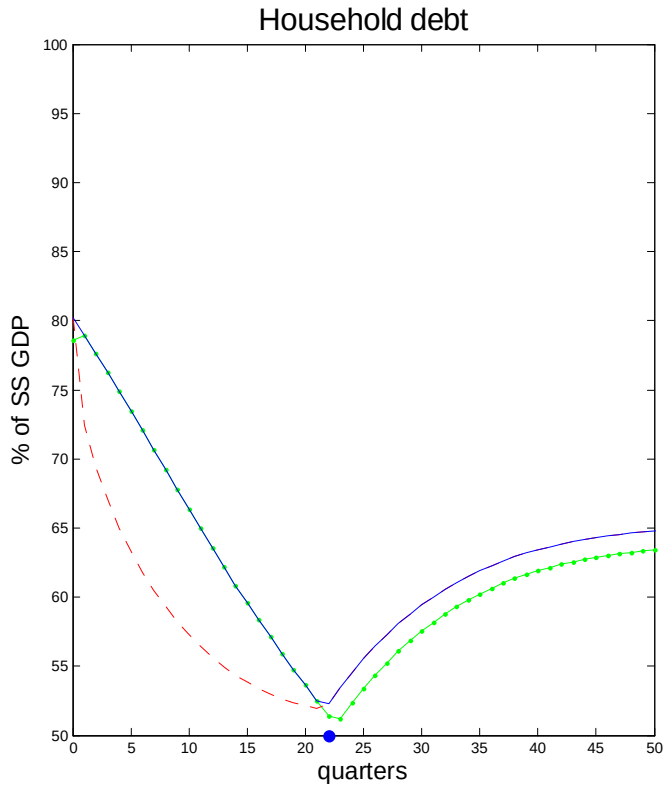
Param	Value	Description	Target/Source
$\bar{m}$	0.70	initial LTV households	av. LTV of new mortgages
$\bar{m}^e$	0.64	initial LTV entrepreneurs	debt of NFCs / GDP
$1-\gamma$	0.02	amortization rate households	av. age outstanding HH debt
$1-\gamma^e$	0.03	amortization rate entrepr.	av. age outstanding NFC debt

Baseline scenario: a deleveraging shock

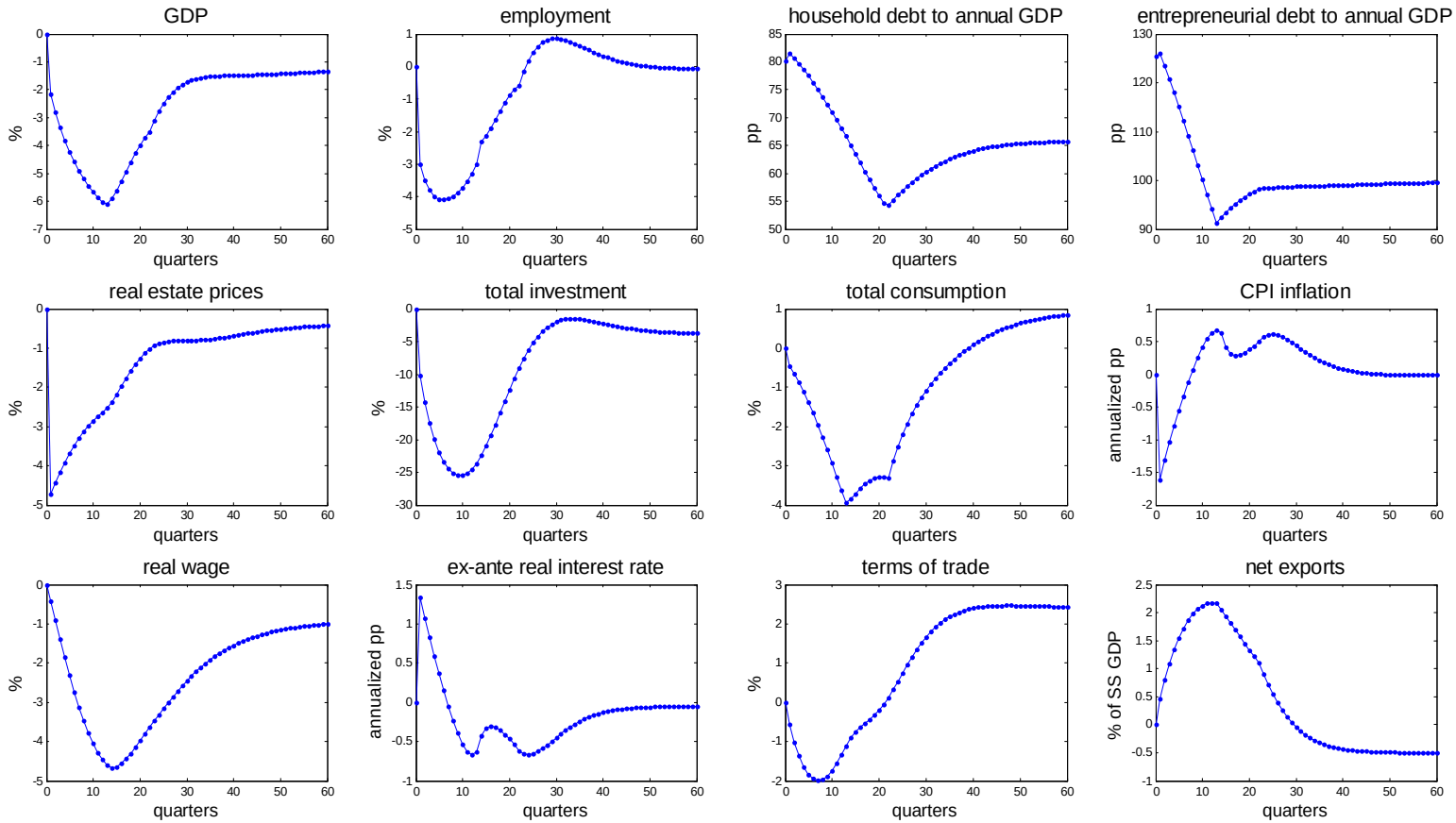
- We simulate a *deleveraging* shock for entrepreneurs and constrained households:
  - Gradual, permanent fall (10pp) in LTV ratios: m_t, m_t^e

Deleveraging shock: endogenous debt-regime change



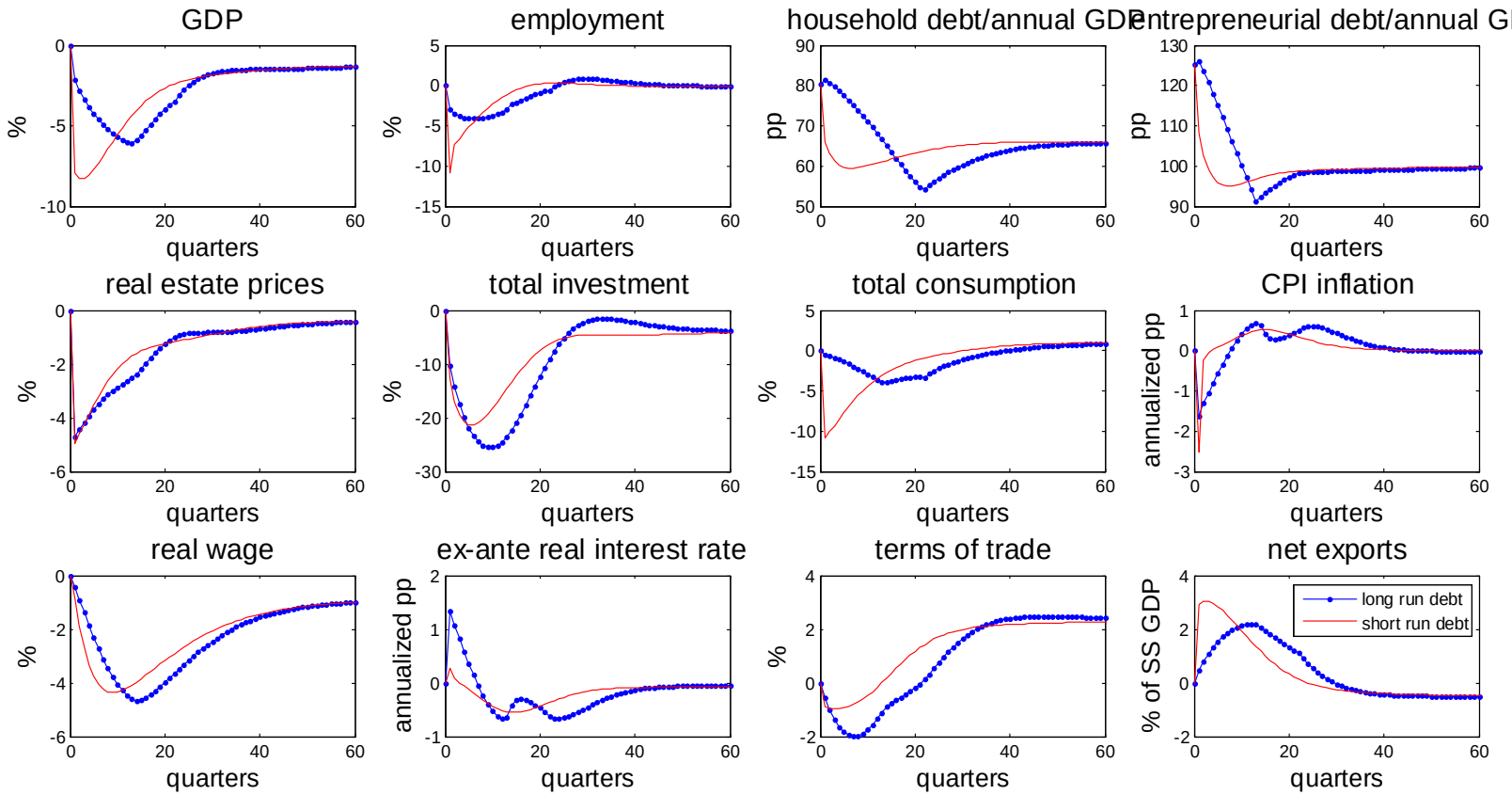


Deleveraging shock: macroeconomic effects



Deleveraging shock: long vs short-term debt

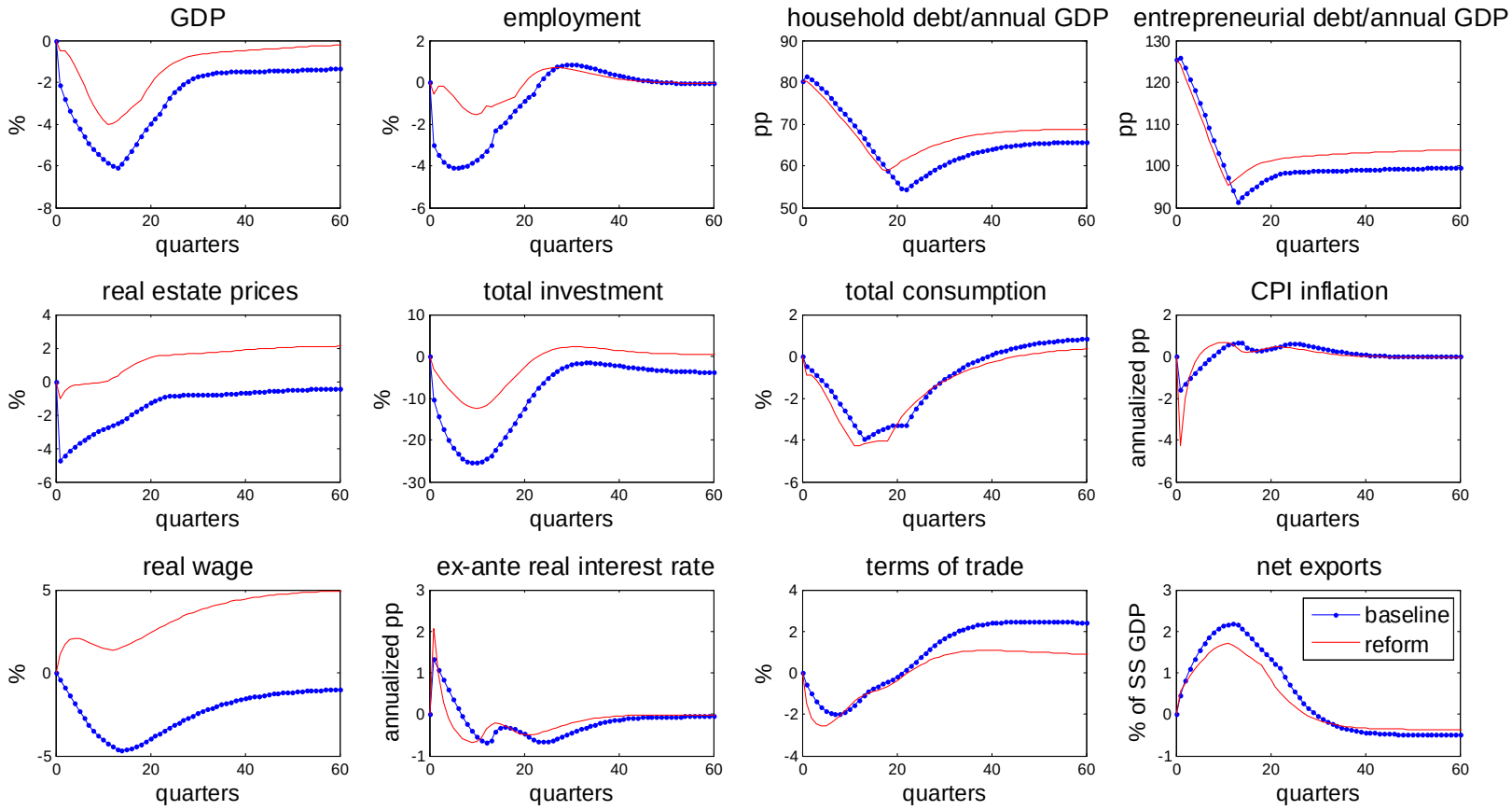
Long-run debt produces a more realistic deleveraging path and (critically) allows for endogenous regime change



Product market reform

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

Product market reform



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: deleveraging ends earlier

- Reform brings *forward* the end of the deleveraging phase: T^* and T^{**} both go down. Focus on T^* (entrepreneurs):

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

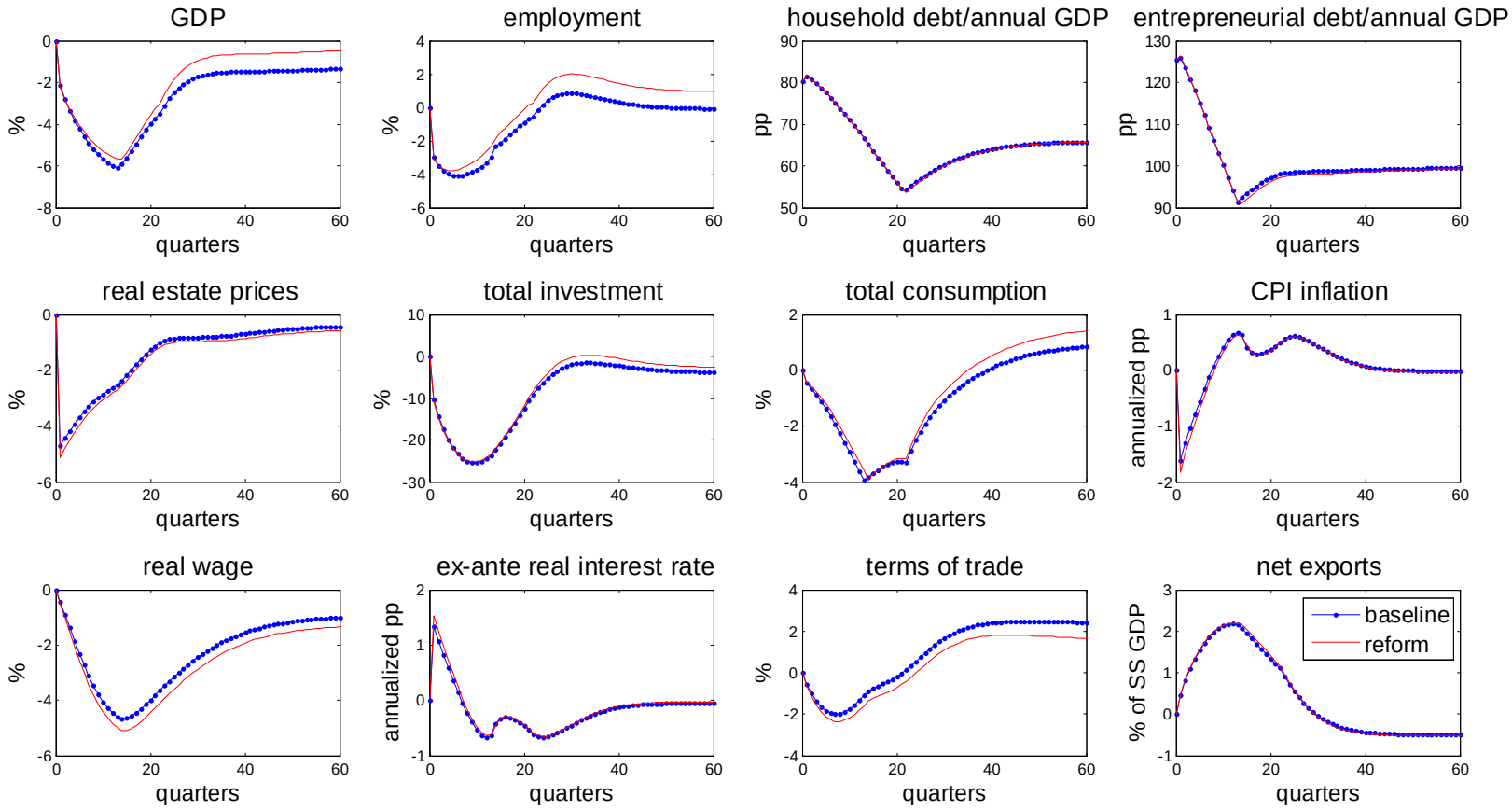
- But, also, as from T^* onwards, real estate provides collateral services, we get
  - $\downarrow T^* \Longrightarrow \uparrow$ investment $(t) \Longrightarrow \uparrow$ asset prices $(t) \Longrightarrow \uparrow$ net worth $(t+1)$ ....

- Hence, endogenous T^* works as an **amplifying mechanism.**

Labor market reform (I)

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

Labor market reform (II)



Labor market reform (III)

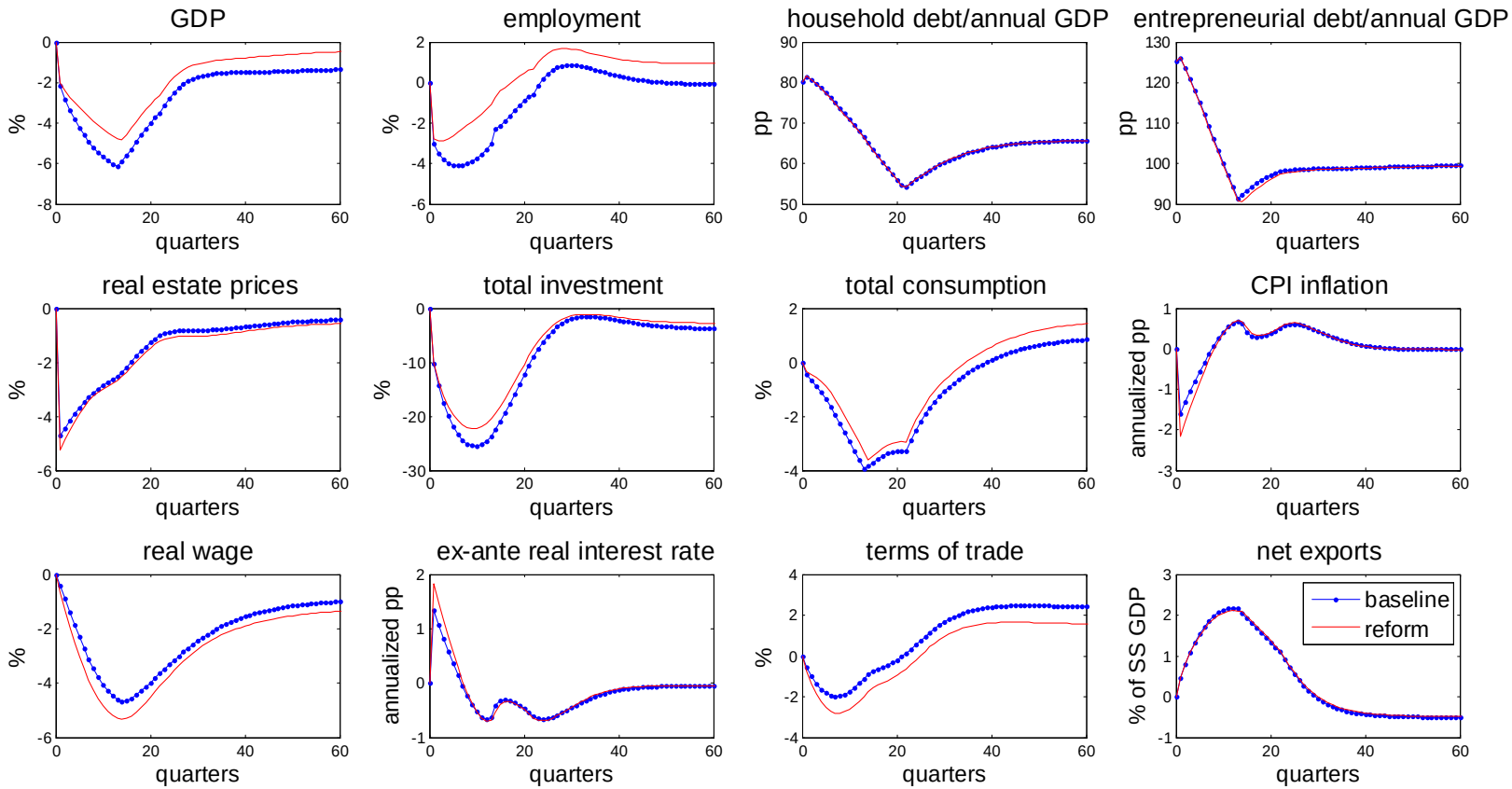
- Long-run gains in GDP and employment.
- Short/medium-run effects:
  - Small effect on GDP on impact, then gradual improvement
  - Similar effect on employment (main variable targeted by such a reform).
- Positive short/medium-run effects smaller than those of product market reform:
  - Investment does not respond positively: entrepreneurs meet higher demand by hiring more (cheaper) labor
  - Consumption, rather than investment, raises internal demand.
    $\Rightarrow$ 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 prices.
- 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).

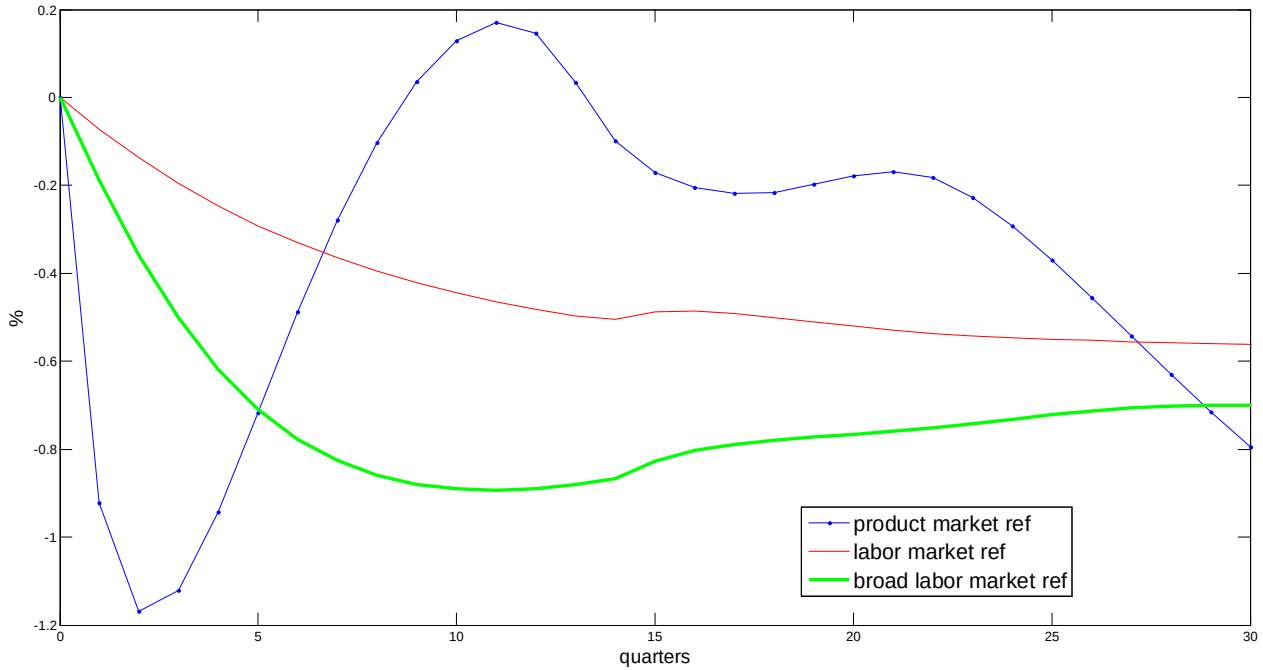
A broader labor market reform (II)

More flexible wages improve the short run response....



A broader labor market reform (III)

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



Diferential effect of reforms on terms of trade

Robustness analysis

- **A general message**: the positive short-run effects of product mkt reforms are more robust than those of labour mkt reforms.
- Two important elements for understanding the short-run effects of reforms:
  - **The external sector**
  - **Long-term debt**

Robustness analysis: short-run effects of reforms

Average effect in the first 4 qrts:

	Product mkt ref.		Labor mkt ref.	
	GDP	Employment	GDP	Employment
Baseline	2.29	3.35	0.01	0.06
Price elasticity of gross trade flows				
$\varepsilon_F = 1.5$	2.58	3.75	0.13	0.21
$\varepsilon_F = 0.5$	1.38	2.07	-0.55	-0.73
$\varepsilon_H = 1.5$	2.29	3.63	0.09	0.16
$\varepsilon_H = 0.5$	1.81	2.68	-0.24	-0.30
Amortization rates				
$(1-\gamma, 1-\gamma^e) = (0.04, 0.06)$	2.35	3.50	-0.11	-0.11
$(1-\gamma, 1-\gamma^e) = (0.06, 0.08)$	2.64	3.93	-0.15	-0.17
$\gamma = \gamma^e = 0$ (one-period debt)	3.68	4.31	-0.29	-0.22

Baseline calibration: $\varepsilon_F = \varepsilon_H = 1$, $(1-\gamma, 1-\gamma^e) = (0.02, 0.03)$

The role of the external sector

- Why labor 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, $w \times L(\underline{w})$.
  - So a high elasticity of $L(\underline{w})$ 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

The role of long-run debt

- Long-run debt produces a key effect: The **(net) debt deflation channel** weakens.

- Net debt payments during deleveraging ($b^e_t = \gamma^e b^e_{t-1}/\pi_t,\ t < T^*$):

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

- With LR-debt, $1 - \gamma^e$ is small, so is the extra *debt deflation* effect, thus mitigating the short-term cost of reforms.
- As debt maturity shortens, the previous mitigating effect weakens, and labour reforms become costly in the short-run.

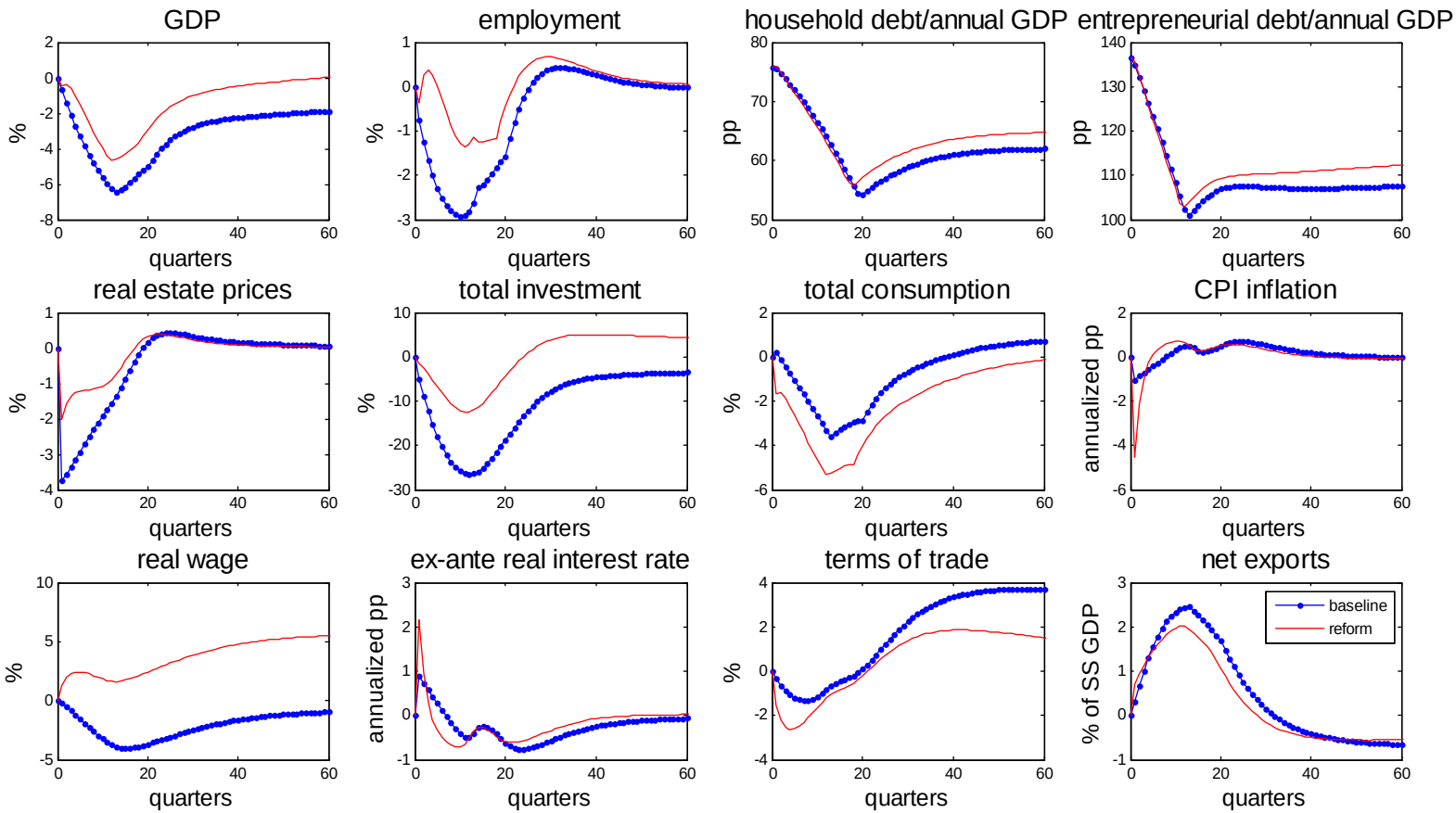
Concluding remarks

- Structural reforms may boost GDP and employment already in the short run,...
  - ...in a scenario of private deleveraging, tight financing conditions and lack of monetary accommodation.

- Product market reforms are effective in bringing forward the end of the contractionary deleveraging phase.

- On labor market reforms:
  - Higher wage flexibility is specially effective by favouring a quick pick up in competitiveness.
  - Short-term positive effects are more modest and less robust.
  - The external sector lever and the presence of long-run debt are important determinants of their short-run impact.

Background slides



Product market reform: positive effect on investment

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 $\longrightarrow$ entrepreneurs' net worth is *higher* in the reform scenario
- Entrepreneurs cut down their consumption significantly
- Total demand improves, pushing up total profits

Long-run debt and the impact of reforms: Further details (I)

1. The **debt deflation channel** weakens.
   - Net debt payments during deleveraging ($b^e_t = \gamma^e b^e_{t-1}/\pi_t,\ t \leq T^*$):

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

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

2. As borrowers are (strongly) constrained while deleveraging ($b^{new}_t = 0$), 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.

Long-run debt and the impact of reforms: Further details (II)

- 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.