THE CYCLICAL BEHAVIOUR OF MARKUPS: COMPOSITION AND CHANGES IN PRICING STRATEGIES

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DG RESEARCH

• **IO literature that incorporates strategic behaviour of firms suggests that markups are heterogeneous across firms within a sector.**

• **Firms with lower marginal cost make competitors specializing in distant varieties which enables the former to set higher markup (Vogel (2008)).**

    • Lower marginal costs come from higher TFP, easy access to credit market, and less union bargaining power

• **Therefore, the changes over time of average markups might come from changes in the composition of firms and changes in their pricing strategies.**

• **The paper tries to shed some light on the importance of those different mechanisms.**

• **There has been an increase in Gross Operating Surplus after the crisis coinciding with many changes in the composition of active firms, in particular increase in productivity, in financial tensions and decrease of churn rate.**

• **Disentangling the importance of composition and pricing is important to determine whether those patterns will be more or less permanent**

NFCs: GROSS OPERATING SURPLUS
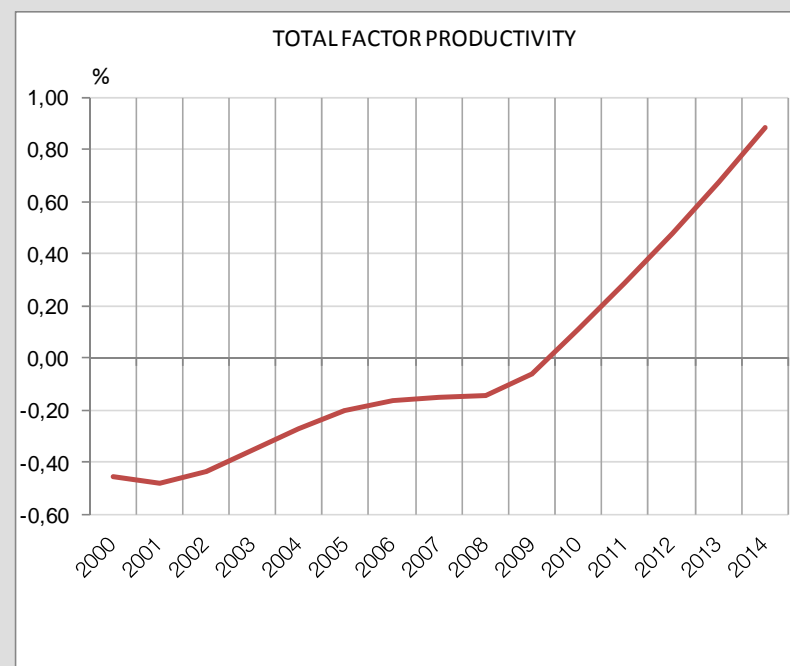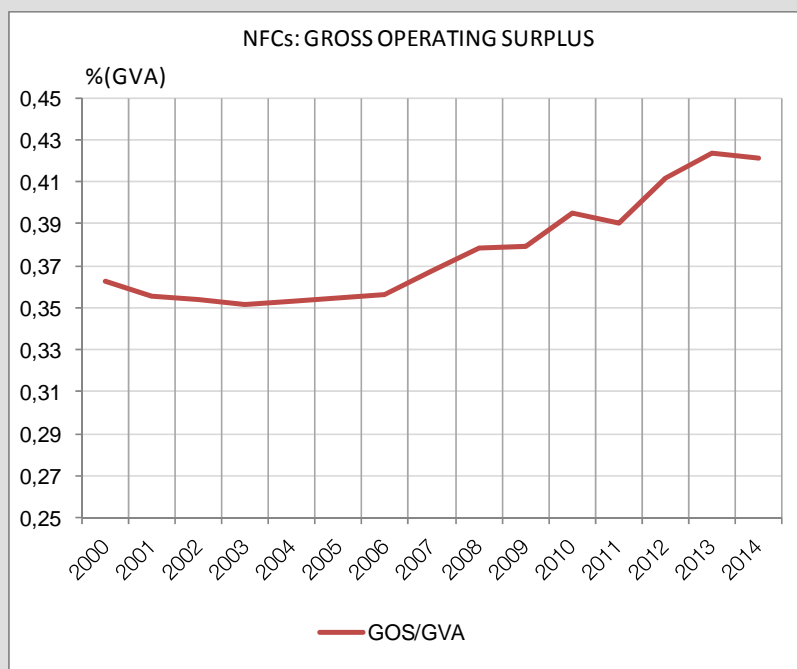
TOTAL FACTOR PRODUCTIVITY

- **Basic idea of Hall of interpreting the procyclical behaviour of the solow residual as a sign of imperfect competition instead of a sign of procyclical technological progress.**

$$(\Delta q - \Delta k) = \mu s_L(\Delta l - \Delta k) + \mu s_M(\Delta m - \Delta k) + \frac{1}{\mu}\Delta\alpha \quad \longrightarrow \quad SR = \left(1 - \frac{1}{\mu}\right)(\Delta q - \Delta k) + \frac{1}{\mu}\Delta\alpha$$

- **To avoid the potential correlation of the residual that includes technological progress with the cycle we follow Roeger (1995) that uses changes in nominal solow residual to perform the following estimation (that indeed is the same as Hall's in nominal terms without the technological progress term):**

$$SR + SR^d = \left(1 - \frac{1}{\mu}\right)\left[(\Delta pq) - (\Delta rk)\right]$$

- **We incorporate the idea that wages are set via a bargaining process <u>at the sector level</u> (Crépon et al. (2005), Dobbelare (2004))**

$$SR + SR^d = \left(1 - \frac{1}{\mu}\right)\left[(\Delta pq) - (\Delta rk)\right] + \frac{\phi}{1 - \phi}(s_L - 1)\left[(\Delta wl) - (\Delta rk)\right]$$

$$SR + SR^d = \left(1 - \frac{1}{\mu}\right)[(\Delta pq) - (\Delta rk)] + \frac{\phi}{1-\phi}(s_L - 1)[(\Delta wl) - (\Delta rk)]$$

$$\Delta y_{it}^s = \beta^S \Delta x_{it}^s + + \delta^s \Delta z_{it}^s + \gamma^s \cdot D_t^s + \varepsilon_{it}^s$$

- **Markups vary by firm within a sector with productivity and difficulties to access to credit.**
- **They might also change their price strategies in recession**

$$\Delta y_{it}^s = \left[\beta_0^S + \beta_0^S \cdot D_{\frac{2008}{12}}^s + \beta^s(f_{it-1}^s) + \beta^s(f_{it-1}^s) \cdot D_{\frac{2008}{12}}^s\right]\Delta x_{it}^s + \left[\delta^s + \delta^s \cdot D_{2008/12}^s\right]\Delta z_{it}^s + \gamma^s \cdot D_t^s + \varepsilon_{it}^s$$

$$\beta^s(f_{it}) = \beta_1^S(tfp_{it}^s - \overline{tfp^s}) + \beta_2^S(debt_{it}^s - \overline{debt^s})$$

- **Confounding factor: change in accounting rule that occurs in 2008**
- **We assume that all firms in a sector are affected the same way, so errors are concentrated in the constant**
- **We assume that new accounting rules affect immediately whereas pricing strategies change slowly**

$$\Delta y_{it}^s = \left[\beta_0^S + \beta_0^S \cdot D_{\frac{2008}{12}}^s + \beta_0^S \cdot D_{\frac{2010}{12}}^s + \beta^s(f_{it-1}^s) + \beta^s(f_{it-1}^s) \cdot D_{\frac{2008}{12}}^s \right] \Delta x_{it}^s + \cdots + \gamma^s \cdot D_t^s + \varepsilon_{it}^s$$

$$\beta^s(f_{it}) = \beta_1^S(tfp_{it}^s - \overline{tfp^s}) + \beta_2^S(debt_{it}^s - \overline{debt^s})$$

Pricing   Composition

Changes within sectors

- **Changes between sector might also mask changes in the representative firm (average across firms in a sector) and changes in pricing of all firms in a sector. To separate out we run a oaxaca-blinder decomposition of the change in the coefficients**
  - Changes in coefficients will be changes in pricing

$$\Delta y_{it}^s = \left[\beta_0^s + \beta_0^s \cdot D_{\frac{2008}{12}}^s + \beta_0^s \cdot D_{\frac{2010}{12}}^s + \beta^s(f_{it-1}^s) + \beta^s(f_{it-1}^s) \cdot D_{\frac{2008}{12}}^s \right] \Delta x_{it}^s + \cdots + \gamma^s \cdot D_t^s + \varepsilon_{it}^s$$

Changes between sectors

$$\beta_t^s = \alpha_{0t} + \alpha_{1t} TFP_{st} + \alpha_{2t} Debt_{st} + \epsilon_{st}$$
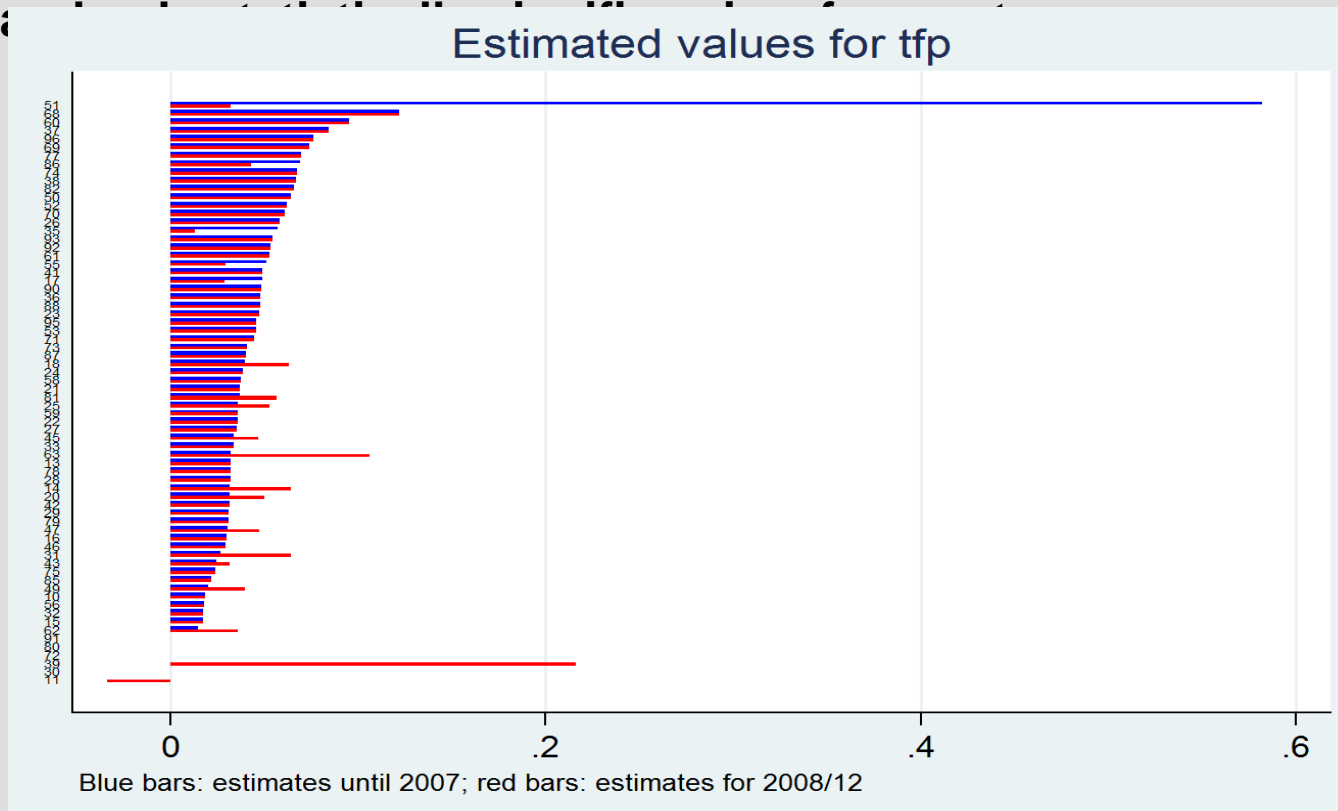
Pricing   Composition

DATA

• **Central Balance Sheet Data Office at the Banco de España 1995-2012: output in gross terms, 3 inputs (labour, capital and materials – intermediate consumption)**

• **Firm level user cost of capital as in Jorgenson and Hall (1967)**

• **TFP as Olley and Pakes (1996) and Levinson and Petrin (2003)**

• **Financial pressure: Total liabilities over assets (includes suppliers and trade credits but it is a proxy of balance sheet strength)**

   • Also robust to the ratio of financial expenditures plus total short term liabilities over cash flows and share of short term liabilities over total liabilities
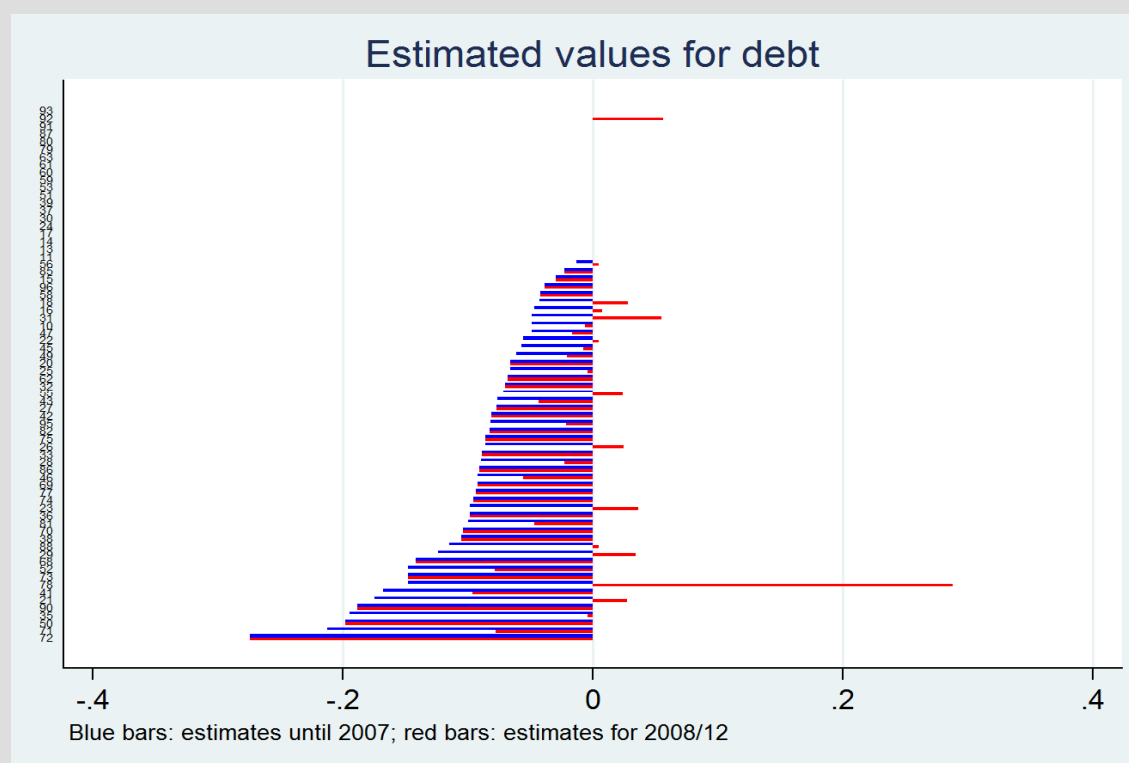
- **Within a sector firms of any sector with higher TFP present higher markups.**
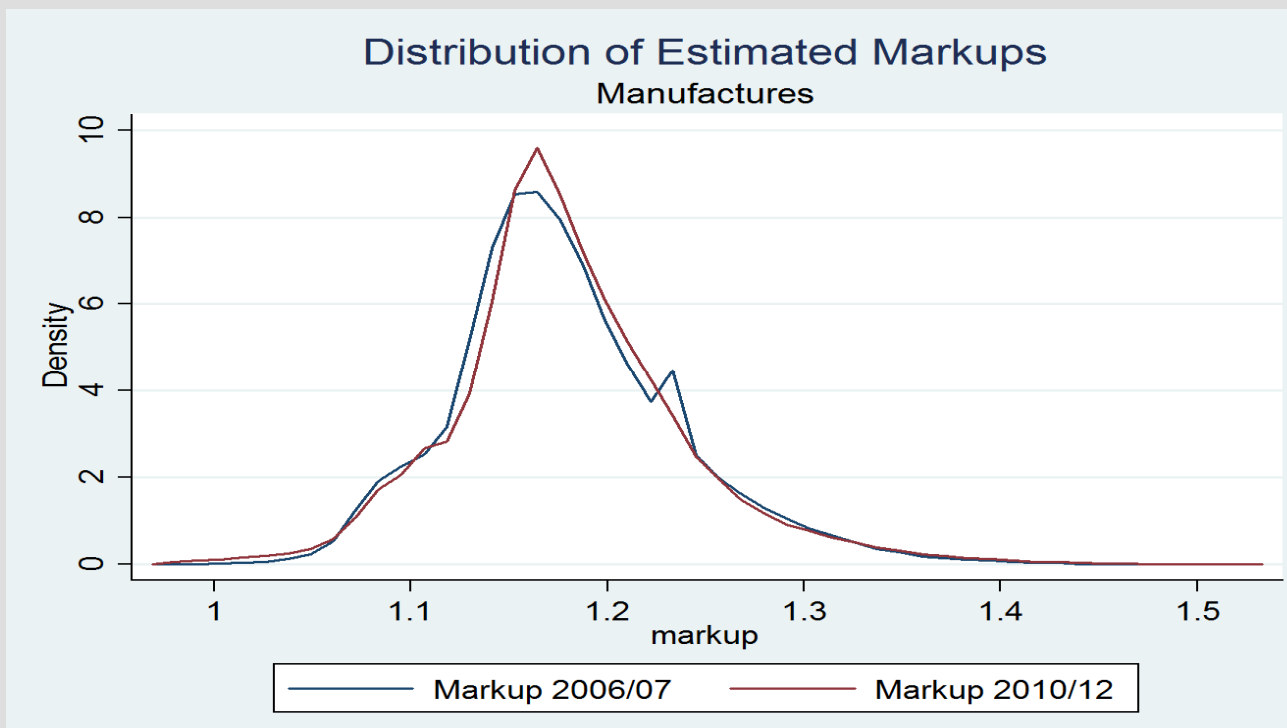- **The change in pricing of TFP after the crisis is not sistematic across sectors** ...

Estimated values for tfp

Blue bars: estimates until 2007; red bars: estimates for 2008/12

- **Within a sector firms of any sector with lower liabilities over assets present higher markups.**
- **The change in pricing of debt is negative and signifficant in 40% of sectors**

Estimated values for debt

Blue bars: estimates until 2007; red bars: estimates for 2008/12

- **Important heterogeneity within sector.**

Distribution of Estimated Markups
Manufactures

• **The average lerner index is around 0.35. Markups lay in an interval of between 1 and 1.39. This range is similar to the one obtained in Estrada (2009) and in Moreno and Rodriguez (2011)**

Estimated values for dx

Blue bars: estimates until 2007; red bars: estimates for 2008/12
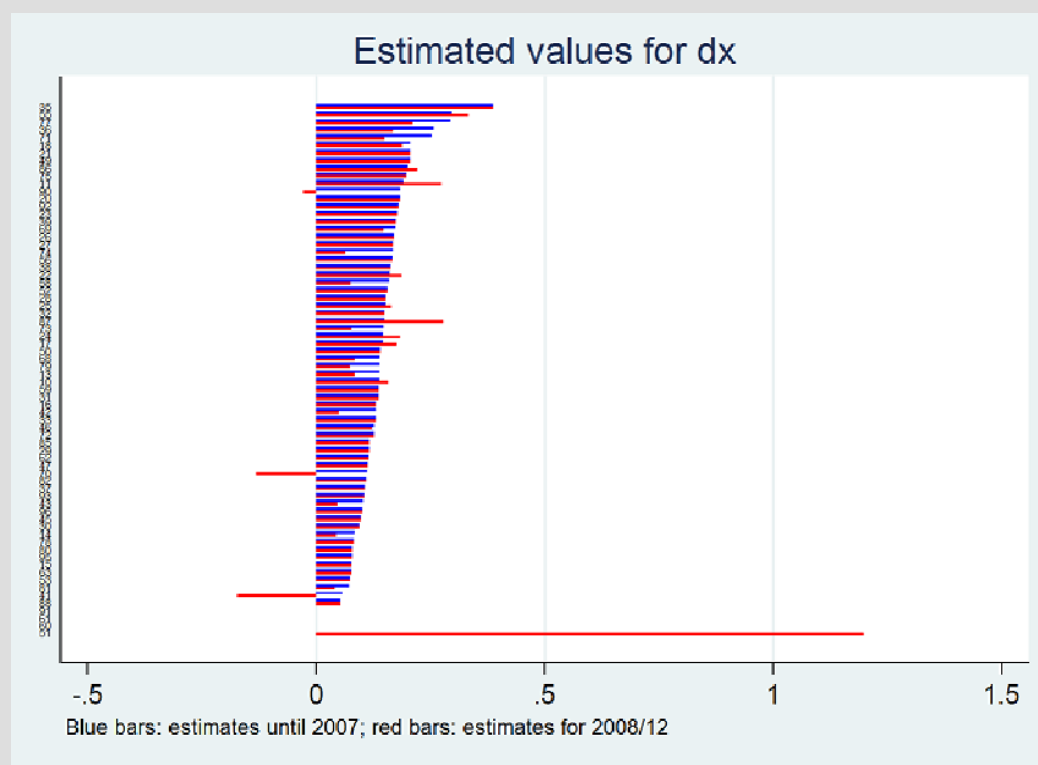
• **For almost half of the sectors there is an increase in markups during the years of the recession**

Estimated values for dx10
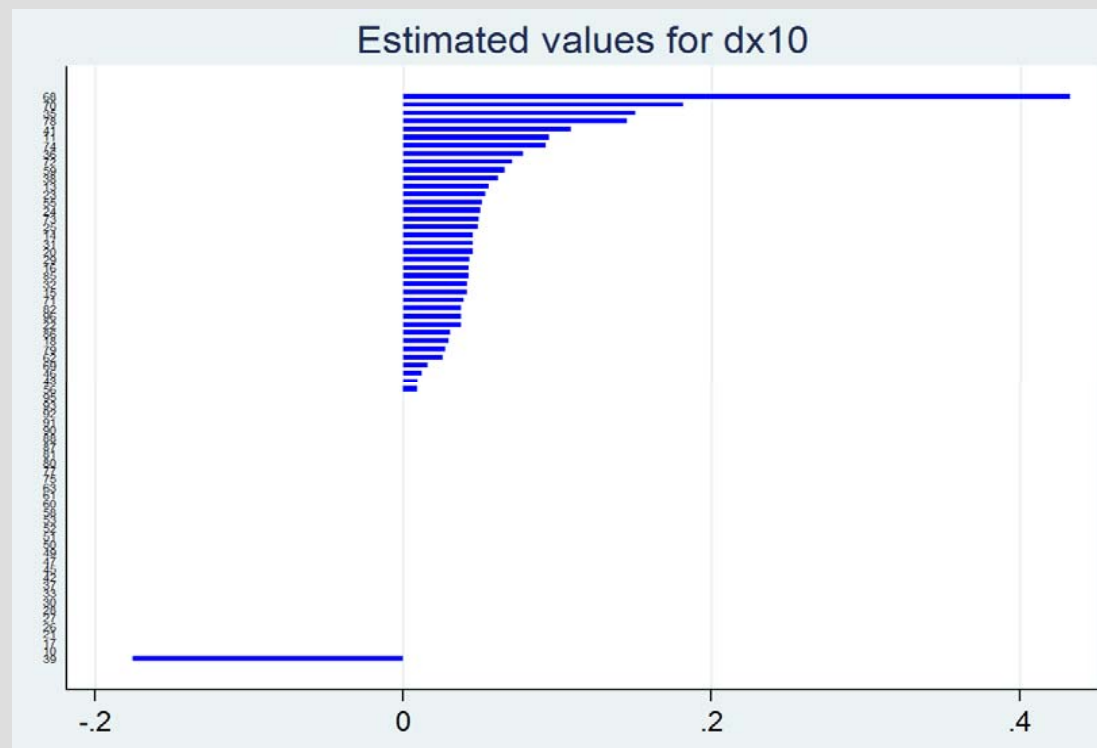
• **The coefficients of the regression between sector have the same as in the within sector: TFP (+), debt (-)**

• **They suffer important changes across periods (in particular it increases the importance of TFP)**

Determinants of estimated averages markups (β_0)

	[1]	[2]	[3]	[4]
	1995-2007		2008-2012	
Variable	OLS	Weighted OLS	OLS	Weighted OLS
Average TFP	0.0010***	0.0010***	0,0048***	0,0048***
	(0.00002)	(0.00003)	(0.0014)	(0.001)
Leverage ratio	-0,1155	-0,2396	-0.0867	-0.282
	(0.0743)	(0.0689)***	(0.1364)	(0.1819)
Constant	0.204***	0.277***	0.212***	0.3278***
	(0.045)	(0.036)	(0.0892)	(0.1207)
Observations	70	70	70	70
R2	0,22	0,63	0,15	0,59

*** Significant at 1%; ** Significant at 5%; * Significant at 10%. Robust standard errors in parentheses.

[2] and [4] weights given by share of each industry's output on total output.

• **Our estimations suggest an increase of 10pp in markups for Spain (1.16 to 1.27), similar in size to the one obtained in Montero and Urtasun (2014)**

• **Most of the action occurs due to changes in prices at the sector level through changes in the pricing behaviour of all firms in a market**

Price-cost markups by sector

Sector	Average	Composition	Composition plus changes in prices within sectors	Composition plus changes in prices within and between sectors
	1996-2007	2008-2012	2008-2012	2008-2012
Manufacture	1,179	1,182	1,183	1,228
Utilities	1,264	1,241	1,218	1,327
Construction	1,114	1,127	1,122	1,481
Trade	1,137	1,137	1,141	1,143
Transport	1,233	1,243	1,231	1,238
Acommodati	1,236	1,247	1,241	1,279
TIC Services	1,149	1,132	1,133	1,164
Professional	1,226	1,239	1,235	1,329
Other Marke	1,167	1,160	1,158	1,188
Non-market	1,167	1,171	1,172	1,206
Total econon	1,162	1,169	1,168	1,266

WHAT DO WE LEARNT SO FAR?

• Our estimations suggest an important degree of heterogeneity of markups at the firm level.

• Despite important changes during the Great Recession in the composition of firms within sector and despite some firms changed their pricing behaviour due to financial frictions, most of the action across time is transmitted at the sector level (in line with Chevalier and Scharfstein (1996)).

• In that sense, sector level data could be a good proxy of changes in markups across time.

• Those sectors with higher TFP appear to increased their markups the most. This suggest that the recession affected the entry flows of firms leading to a decrease in the number of varieties that compete in a market. This is especially important in sectors with differenciated products (high TFP).

• **When considering as explanatory variables of the sector regressions average TFP and leverage ratios, most of the changes in the lernex index could be attributed to changes in the coefficients instead of the covariates (especially changes in the TFP coefficient)**

Determinants of the changes of the estimated averages markups (β_0)		
	[1]	[2]
	1995-2007	
Variable	*1995-2007*	*2008-2012*
Average TFP	0.1383***	0.1814***
	(0.00884)	(0.0160)
Growth in crisis (2008-2012)		0.043
		(0.0183)**
Endowments		-0.0266
		(0.0322)
Coefficients		0,0239***
		(0.0154)
Interaction		-0.0216
		(0,0248)

*** Significant at 1%; ** Significant at 5%; * Significant at 10%. Robust standard errors in parentheses.

Underlying regression using weights given by share of each industry's output on total output.