Portugal: Market Competition and workers' bargaining power in 2012-2016

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Motivation

This research project aims at assessing the degree of competition in the product market of the Portuguese Economy, for the 2012-2016 period and it was mainly motivated by 3 facts:

- From a policy perspective, it is crucial to analyze the degree of competition since highly competitive markets are both welfare and growth enhancing - **Blanchard and Giavazzi, 2003**
- The subject of our research is especially relevant as Portugal during its Economic Adjustment Programme (2011-2014), implemented a series of structural reforms
- In the past, the non-existence of a suitable competitive setup may have favored an over allocation of resources in the nontradable sector contributing then to the accumulation of huge external imbalances - **Reis, 2013; Dias et al., 2016**

Literature Review

The most commonly used tool to assess competitive pressures is a comparison between the markups prevailing in each different market:

- Markups can give relevant information on the degree of market competition - **Molnár and Bottini, 2010**
- Even tough markups are not the panacea for the major challenge of measuring competition, an extensive body of empirical literature has validated their use to assess the degree of market competition
  - Markups are a robust measure of market competition - **Aghion et al., 2005**
  - Markups are superior indicators of product market competition - **Grifftih and Harrison, 2004**

Literature Review

There are mainly two approaches to estimate mark-ups:

1. Demand side approach - **Berry et al.,1995; Goldberg, 1995; Feenstra and Weinstein, 2010**
2. Supply side approach
   - Hall proposed a methodology based on the relationship between the Solow Residual and the growth rate of inputs, using IV - **Hall, 1988**
   - Hall's methodology using GMM - **Dobbelaere, 2004**
   - Hall's methodology using a control function method - **Olley and Pakes, 1996; Levinsohn, 1993**
     - The model structure underlying the proxy method does not identify accurately the production function and, hence productivity - **Gandhi et al., 2017**
   - Roeger proposed a methodology which uses the difference between the primal and the dual Solow Residual - **Roeger, 1995**

Literature Review

The validity of the assumptions underlying the standard methodologies of both Hall (1988) and Roeger (1995) has been questioned by the literature. Therefore, both methodologies were modified so that it was possible to simultaneously estimate product and labour market imperfections.

- **Boulhol, 2005; Crépon et al., 2005; Dobbelaere, 2004; and Abraham et al., 2009** corrected the standard models to account for imperfect competition in the labour market
- **Molnár and Bottini, 2010; and Dobrinsky et al., 2004**, relaxed the constant returns to scale assumption

Methodology

Our study follows the methodology used by **Amador and Soares (2017)**, which solves the endogeneity problem by using the difference between the primal and the dual Solow Residual and relaxes the perfect competitive labour market assumption.

- Assuming CRS and imperfect labour markets the primal Solow Residual is given by:

$$SR = (1 - \frac{1}{\mu})(\Delta q - \Delta k) + (\frac{\phi}{1-\phi})(\alpha^L - 1)[\Delta l - \Delta k] + \frac{1}{\mu}\theta \quad (1)$$

- From the cost minimization problem, the dual Solow Residual is:

$$SR^d = (1 - \frac{1}{\mu})(\Delta r - \Delta p) + (\frac{\phi}{1-\phi})(\alpha^L - 1)[\Delta r - \Delta w] + \frac{1}{\mu}\theta \quad (2)$$

Methodology

Taking the difference to cancel out the unobserved technological parameters:

$$SR - SR^d = \left(1 - \frac{1}{\mu}\right)[(\Delta p + \Delta q) - (\Delta r + \Delta k)] + \\ + \frac{\phi}{1-\phi}\left(\alpha^L - 1\right)[(\Delta l + \Delta w) - (\Delta r + \Delta k)] \tag{3}$$

where

$$SR - SR^d \equiv (\Delta p + \Delta q) - \alpha^L(\Delta w + \Delta l) - \alpha^M(\Delta p^m + \Delta m) - \\ -(1 - \alpha^L - \alpha^M)(\Delta r + \Delta k)]$$

$0 \preccurlyeq \phi \preccurlyeq 1$ denotes workers' bargaining power

Methodology

The previous equation only permits the estimation of time-invariant mark-ups. As a result, in order to check whether mark-ups changed over time, the empirical model was extended by adding some interaction variables:

$$y_{it} = \beta_i x_{it} + \delta_i z_{it} + \beta_t x_{it} + \delta_t z_{it} + \alpha_t + \epsilon_{it} \tag{4}$$

where

$$y_{it} = SR_{it} - SR^d_{it} \equiv (\Delta p_{it} + \Delta q_{it}) - \alpha^L_{it}(\Delta w_{it} + \Delta l_{it}) - \alpha^M_{it}(\Delta p^m_{it} + \Delta m_{it}) - (1 - \alpha^L_{it} - \alpha^M_{it})(\Delta r_{it} + \Delta k_{it})] \tag{5}$$

$$x_{it} = (\Delta p_{it} + \Delta q_{it}) - (\Delta r_{it} + \Delta k_{it}) \tag{6}$$

$$z_{it} = \left(\alpha^L_{it} - 1\right)[(\Delta l_{it} + \Delta w_{it}) - (\Delta r_{it} + \Delta k_{it})] \tag{7}$$

All variables are indexed with market (i) and time (t) sub-indices.

Data and Variables

Database Description

- Data drawn from the annual accounts of Portuguese firms reported under IES, Corporate Simplified Information, for the period 2010-2016
- To ensure robust estimates some observations were eliminated from the database:
  - Only firms reporting strictly positive sales, labour costs, intermediate inputs and net capital stock (tangible and intangible) were considered.
  - Observations with depreciation rates, share of labour costs and intermediate inputs in total sales outside the [0,1] range were excluded.
  - To correct for the existence of outliers, observations below the 5^{th} percentile and above the 95^{th} percentile in the distribution of growth rates of sales, labour costs, intermediate inputs and net capital stock were disregarded.
  - Sectors as "Agriculture and Mining", "Education" and "Health" were withdrawn given their insignificant share in total gross value added (GVA) or the relevance of the government on their regular functioning.
  - Firms reporting negative operational results in four or more consecutive years were disregarded.

Table 1: Drescriptive statistics (mean and standard deviation)

	2011	2012	2013	2014	2015	2016
output growth rate	-0.0623	-0.102	-0.00504	0.0208	0.0314	0.0242
	(0.233)	(0.216)	(0.201)	(0.186)	(0.181)	(0.171)
labor costs growth rate	-0.0107	-0.0673	-0.0302	0.0194	0.0453	0.0475
	(0.200)	(0.190)	(0.180)	(0.167)	(0.164)	(0.155)
gross capital growth rate	-0.154	-0.169	-0.139	-0.107	-0.0770	-0.0583
	(0.302)	(0.277)	(0.299)	(0.309)	(0.317)	(0.327)
real user cost of capital	0.197	0.196	0.219	0.226	0.220	0.214
	(0.143)	(0.138)	(0.144)	(0.147)	(0.151)	(0.150)
financial cost of capital	0.0540	0.0569	0.0543	0.0536	0.0497	0.0450
	(0.0650)	(0.0654)	(0.0637)	(0.0619)	(0.0601)	(0.0577)
depreciation rate	0.178	0.169	0.172	0.172	0.174	0.174
	(0.125)	(0.121)	(0.129)	(0.132)	(0.136)	(0.136)

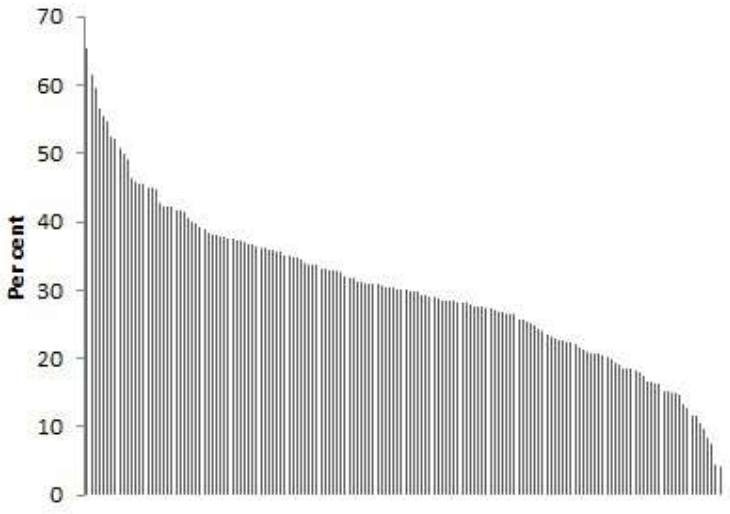
Note: The first line contains the average of each variable and in parenthesis we have the standard deviation.

Results

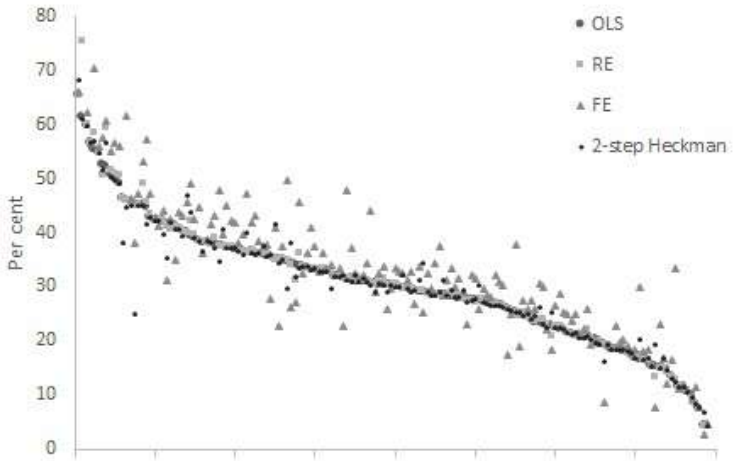
The perfect competition hypothesis is broadly rejected in Portuguese product markets

To ensure the robustness of our results, 4 different models were estimated

- OLS estimation with clustered errors at the firm level
- Fixed effects model
- Random effects model
- Two-step Heckman regressions



(a) Benchmark specification

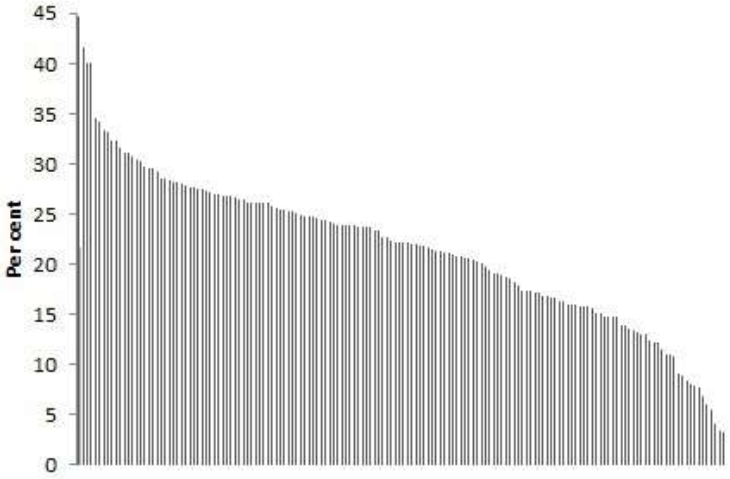


(b) Alternative specifications

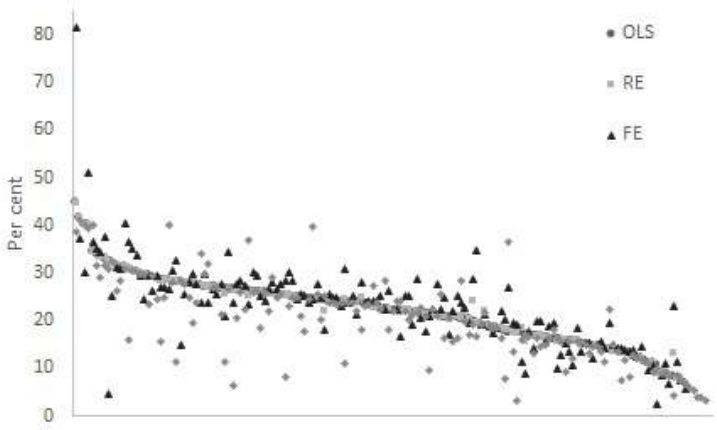
Figure 1: Price-cost margins across markets under imperfect labour markets

Results

The hypothesis of perfect competition in labour market is generally rejected



(a) Benchmark specification



(b) Alternative specifications

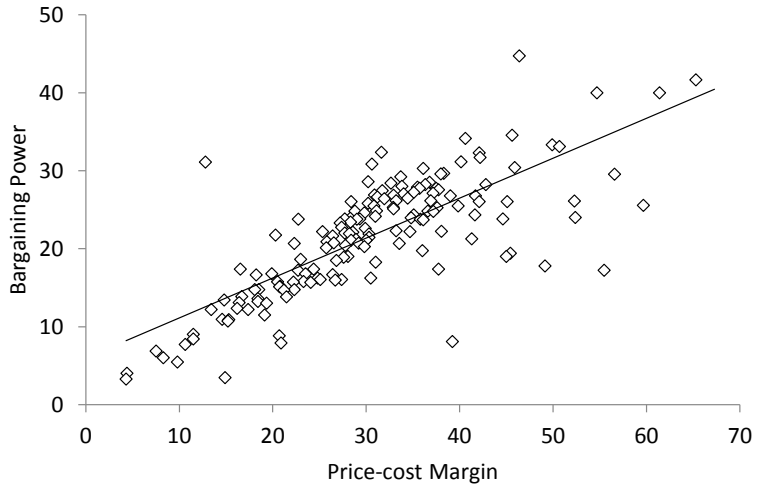
Figure 2: Workers' bargaining power across markets (2012-2016)

Results

Mark-ups would be underestimated if we assume perfectly competitive labour markets

- Mark-ups estimates become higher when assuming imperfect labor markets - underestimation is around 15 p.p.

(a) Mark-ups under perfect and imperfect labour markets



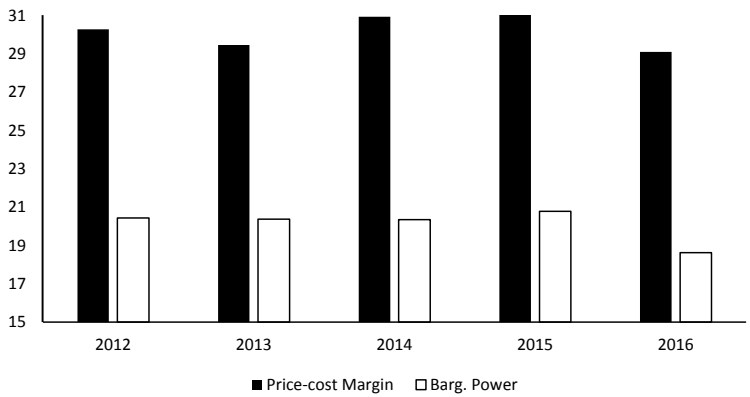
(b) Product and labour market imperfection

Figure 3: Mark-ups under perfect and imperfect labour markets and product and labour market imperfection (2012-2016)

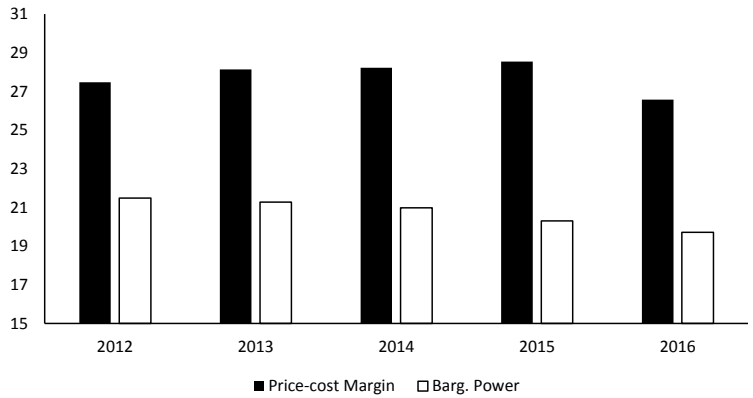
Results

Did the reforms implemented during the Economic Adjustment Programme have an effect?

1. Mark-ups are roughly stable during the period considered (with a slight decrease from 2015 to 2016)
2. The estimates show a decrease of worker's bargaining power during this period



(a) Gross Value Added weights



(b) Employment weights

Figure 4: Evolution of Price-Cost Margins and Workers' Bargaining Power for Overall Economy

Results

Is the stability of mark-ups common to all sectors?

1. Higher decrease in the non-manufacturing sector, possibly benefiting from labour market and specific policy reforms aiming to improve competition
2. Mark-ups in non-tradable sectors decreased, which is positive in the perspective of avoiding the over-allocation of resources in these markets, with a potentially negative bearing on economic growth

Table 2: Price-cost margins per sector (2012-2016) (per cent)

		Price-cost Margin							
		2012				2016			
	Number of Markets	Non-weighted	Sales	GVA	Employment	Non-weighted	Sales	GVA	Employment
Overall economy	158	29.84	24.61	30.29	27.48	29.21	24.16	29.11	26.57
Tradable	92	29.53	27.70	29.42	29.27	28.79	27.28	28.58	28.24
Non-Tradable	66	30.27	22.20	31.08	25.87	29.80	21.50	29.65	24.97
Manufacturing	64	29.13	27.09	28.73	28.75	29.16	27.09	28.42	27.80
Non-Manufacturing	94	30.32	23.62	30.89	26.88	29.25	22.80	29.42	25.94
of which									
Electricity, Gas & Water	4	43.70	51.08	54.26	39.34	45.78	48.92	49.91	38.66
Construction	9	33.56	31.01	30.93	30.89	35.06	28.48	28.62	28.25
Trade	21	15.70	14.15	15.51	15.75	15.52	13.69	15.30	15.68
Transp. & Communications	16	31.84	32.03	32.60	32.65	29.41	31.40	31.76	31.10
Other Services	44	34.86	35.13	36.05	33.57	33.05	34.01	34.89	31.76

Results

What about the workers' bargaining power by sector?

1. Workers' bargaining power decreased in both tradable and non-tradable sectors
2. Higher decrease in the non-manufacturing sector, possibly benefiting from labour market and specific policy reforms aiming to improve competition

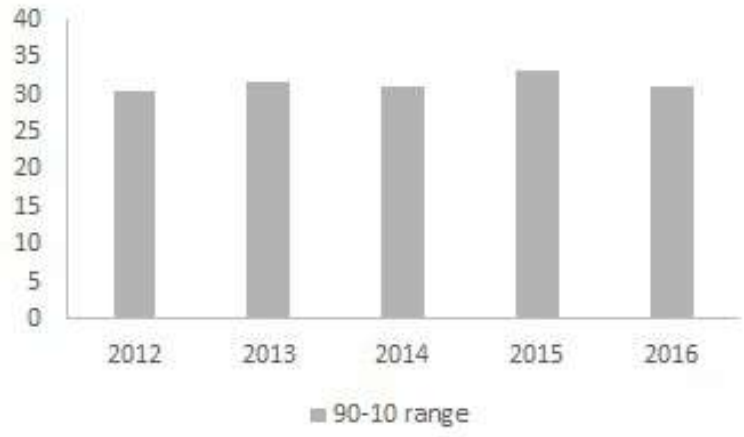
Table 3: Workers' bargaining power per sector (2012-2016) (per cent)

		Bargaining Power							
		2012				2016			
	Number of Markets	Non-weighted	Sales	GVA	Employment	Non-weighted	Sales	GVA	Employment
Overall economy	158	21.95	17.63	20.43	21.48	20.58	16.55	18.63	19.71
Tradable	92	21.96	21.07	22.13	22.67	20.87	20.31	20.90	21.27
Non-Tradable	66	21.94	14.93	18.90	20.42	20.17	13.36	16.33	18.21
Manufacturing	64	21.96	20.96	22.10	22.66	21.65	20.63	21.47	21.30
Non-Manufacturing	94	21.95	16.30	19.79	20.93	19.85	14.68	17.37	18.89
of which									
Electricity, Gas & Water	4	19.25	16.08	16.54	13.66	19.07	6.71	5.97	9.51
Construction	9	25.06	25.77	25.72	25.62	24.99	23.92	24.01	23.69
Trade	21	12.36	10.98	12.21	12.61	11.90	10.56	11.89	12.30
Transp. & Communications	16	22.55	21.63	22.35	24.06	20.16	20.62	20.98	22.24
Other Services	44	25.91	25.30	25.60	26.48	22.22	22.02	22.45	22.18

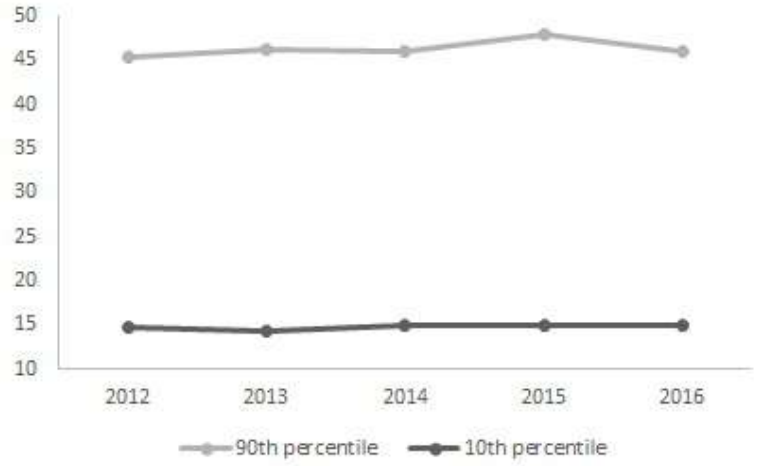
Results

Mark-up's distribution

1. On average, a firm operating in the market at the 90^{th} percentile has a **mark-up 30 p.p. higher** than a firm which operates in the market at the 10^{th} percentile of the mark-up's distribution.
2. This gap in mark-ups is roughly stable during the period considered.



(a) 90-10 percentile range



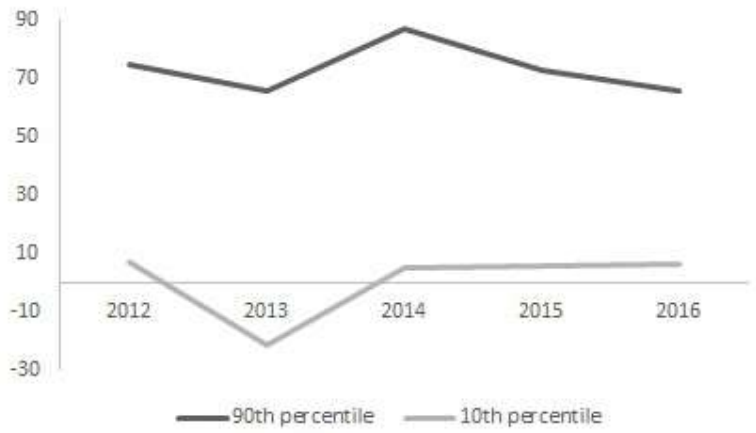
(b) OLS mark-up's distribution percentiles

Figure 5: Evolution of the difference between the 90^{th} percentile and the 10^{th} percentile of the OLS mark-up's estimates distribution (per cent)

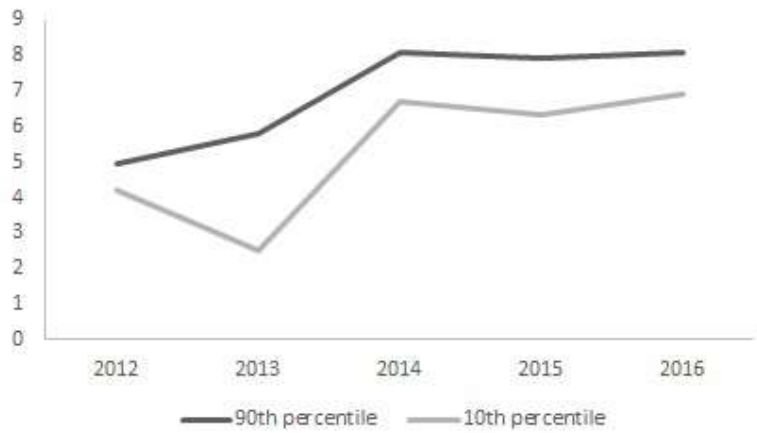
Results

Does higher mark-ups translate into higher profits?

1. The results suggest that, on average, higher mark-ups are associated with higher profits, confirming its validity as a proxy of market power.
2. However, the results also indicate that higher mark-ups are related to the existence of higher fixed costs or higher financial difficulties.



(a) Average EBT



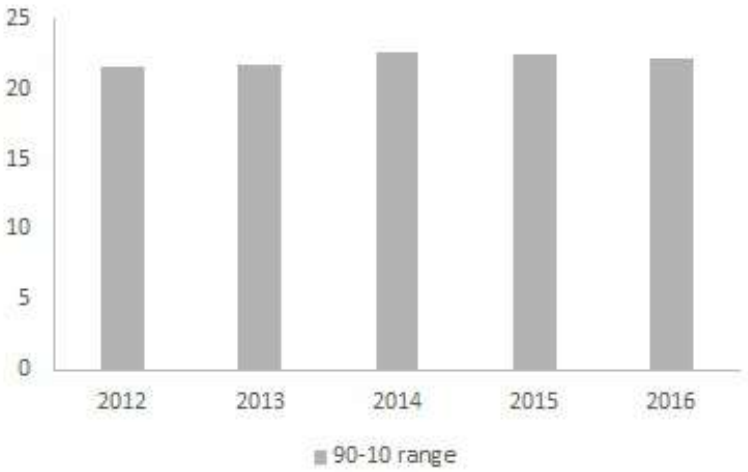
(b) Average EBT to assets ratio

Figure 6: Evolution of the average EBT (millions of euros) and average EBT to assets ratio (per cent) for markets above the 90^{th} percentile and below the 10^{th} percentile of the OLS mark-up's estimates distribution

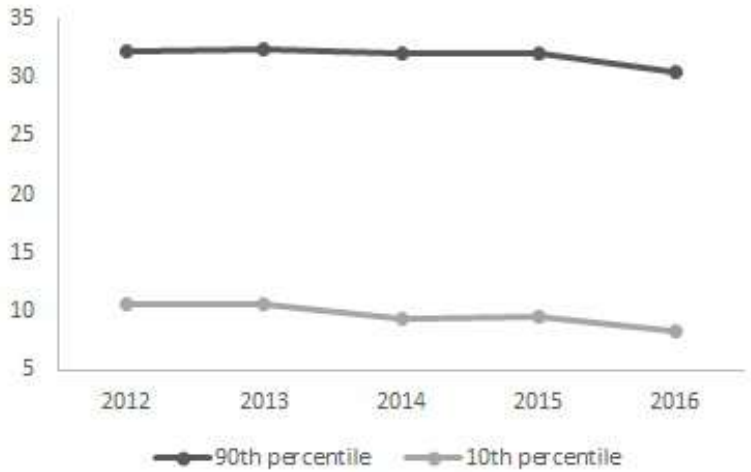
Results

Workers' bargaining power distribution

1. On average, workers of a firm operating in the market at the 90^{th} percentile have a **bargaining power 22 p.p. higher**.
2. There is a slight upward trend on the difference between these two percentiles.



(a) 90-10 percentile range



(b) Bargaining power percentiles

Figure 7: Evolution of the difference between the 90^{th} percentile and the 10^{th} percentile of the OLS bargaining power estimates distribution

Results

Are classical measures suitable to assess market power?

1. Contrary to expectations, the correlation between the change in mark-ups and the change in the HHI is negative and low (-0.19)

Table 4: Price-cost margins (per cent) and the Instability and Concentration Indexes (2012-2016)

	Weighted by GVA					Weighted by Employment				
	Price-cost margin		HHI		Instability Index	Price-cost margin		HHI		Instability Index
	2012	2016	2012	2016	2012-2016	2012	2016	2012	2016	2012-2016
Overall economy	30.29	29.11	0.11	0.12	0.43	27.48	26.57	0.07	0.07	0.44
Tradable	29.42	28.58	0.10	0.10	0.44	29.27	28.24	0.07	0.07	0.41
Non-Tradable	31.08	29.65	0.12	0.03	0.45	25.87	24.97	0.07	0.07	0.48
Manufacturing	28.73	28.42	0.11	0.11	0.31	28.75	27.80	0.07	0.07	0.32
Non-Manufacturing	30.89	29.42	0.11	0.12	0.48	26.88	25.94	0.07	0.07	0.50
of which										
Electricity, Gas & Water	54.26	49.91	0.26	0.30	0.16	39.34	38.66	0.17	0.19	0.29
Construction	30.93	28.62	0.06	0.05	0.53	30.89	28.25	0.05	0.04	0.54
Trade	15.51	15.30	0.03	0.02	0.51	15.75	15.68	0.03	0.02	0.50
Transp. & Communications	32.60	31.76	0.19	0.22	0.45	32.65	31.10	0.16	0.17	0.47
Other Services	36.05	34.89	0.09	0.09	0.59	33.57	31.76	0.08	0.07	0.50

Results

Are classical measures suitable to assess market power?

2. Contrary to what was expected, the correlation between the change in mark-ups and the instability index is positive and low (0.15).

Table 5: Price-cost margins (per cent) and the Instability and Concentration Indexes (2012-2016)

	Weighted by GVA					Weighted by Employment				
	Price-cost margin		HHI		Instability Index	Price-cost margin		HHI		Instability Index
	2012	2016	2012	2016	2012-2016	2012	2016	2012	2016	2012-2016
Overall economy	30.29	29.11	0.11	0.12	0.43	27.48	26.57	0.07	0.07	0.44
Tradable	29.42	28.58	0.10	0.10	0.44	29.27	28.24	0.07	0.07	0.41
Non-Tradable	31.08	29.65	0.12	0.03	0.45	25.87	24.97	0.07	0.07	0.48
Manufacturing	28.73	28.42	0.11	0.11	0.31	28.75	27.80	0.07	0.07	0.32
Non-Manufacturing	30.89	29.42	0.11	0.12	0.48	26.88	25.94	0.07	0.07	0.50
of which										
Electricity, Gas & Water	54.26	49.91	0.26	0.30	0.16	39.34	38.66	0.17	0.19	0.29
Construction	30.93	28.62	0.06	0.05	0.53	30.89	28.25	0.05	0.04	0.54
Trade	15.51	15.30	0.03	0.02	0.51	15.75	15.68	0.03	0.02	0.50
Transp. & Communications	32.60	31.76	0.19	0.22	0.45	32.65	31.10	0.16	0.17	0.47
Other Services	36.05	34.89	0.09	0.09	0.59	33.57	31.76	0.08	0.07	0.50

Main Conclusions

1. The overall level of mark-ups in Portugal remained relatively stable during the period between 2012 and 2016, suggesting that competition in product markets did not change significantly.
   - Nevertheless, mark-ups were significantly reduced in some non-manufacturing sectors such as energy and construction.
   - Mark-ups in the non-tradable sector decreased in this period.
2. The positive mark-ups suggest the existence of market power by firms and that there is room for improving the level of competition in the Portuguese economy.

Main Conclusions

3. Product and labour market imperfections are positively correlated, indicating that economic policy should be designed to address them in an integrated way
4. Workers' bargaining power decreased in the 2012-2016 period, possibly associated with the labour market reforms.
5. Higher mark-ups are associated with higher profits thus indicating that they are a good proxy for market power and competition

Thank you for your attention.
Questions and comments are welcomed!