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## 6.1. What do price-cost margins and worker's bargaining power tell us about Portuguese markets?

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### 1. Motivation

Sustained economic growth and higher aggregate welfare require the efficient allocation of resources in the economy, which is enhanced by competition across markets. Therefore, from a policy perspective, it is crucial to identify the markets where the degree of competition is insufficient.

Assessing competition is especially relevant for the Portuguese economy. Firstly, before the latest crisis, a weak competitive setup may have favored an over allocation of resources in the non-tradable sector, thus negatively affecting productivity and welfare. More resources were drawn out of export-oriented activities, thereby contributing to the accumulation of external imbalances. Secondly, in the economic and financial assistance program, Portugal committed to a series of structural reforms, many of them with the aim of increasing competition in the product market. Therefore, it is interesting to assess the latest developments in competition indicators.

The markup is a commonly used indicator for the degree of competition in a given market. By measuring the difference between the selling price and the production cost of a good or service, we can evaluate firms' ability to increase profits by sustaining prices above their marginal costs. A positive markup implies the rejection of the paradigm of perfectly competitive markets, signaling that firms hold market power.

However, perfect product market competition also requires the existence of perfect competition in the labour market, meaning that workers are paid exactly in accordance with their productivity. There is significant evidence that this assumption does not hold and, more importantly, if this feature is not disregarded, it leads to a consistent underestimation of market power in product markets.

This column assesses the evolution of product market competition in Portugal between 2010 and 2016 through the estimation of markups, both in product and labour markets. Results highlight the need to address labour and product market imperfections in an integrated way. Additionally, we confirm that there is significant room for improving competition in the Portuguese economy. Furthermore, during the period of analysis, estimated price-cost margins exhibit a stable pattern whereas workers' bargaining power follow a downward trend, meaning that workers' capacity to extract some of their employers' profits decreased significantly.

## 2. The analytical framework

The methodology used to estimate markups is based on the work of Hall (1988) and Roeger (1995). They were inspired by the seminal contribution of Solow (1957), which introduced growth accounting to determine the role of technological progress, and also relaxed the assumption of perfect competition in product markets, thus making it possible to estimate markups.

By assuming a standard neoclassical production function and following the same assumptions as in Solow (1957), it is possible to derive the Solow residual, which is the difference between total output growth and the part that is explained by the accumulation of capital, labour and intermediate inputs. Under certain assumptions, the Solow residual would be exactly equal to technological progress but by relaxing the assumption of perfect competition on the output market this equivalence does not exist. Nevertheless, in an imperfect competition setting the Solow residual can be decomposed into a technological component and a markup. Given that the technological component is unobservable, Roeger (1995) proposed considering the difference between the (primal) Solow residual and its dual, which is derived from the the firms' cost minimization problem, so that it is possible to eliminate this unobserved parameter and, consequently, consistently estimate markups.

However, both Roeger (1995) and Hall (1988) assumed perfectly competitive labour markets and, consequently, workers' bargaining power was absent. Since there is empirical evidence that markups are significantly underestimated, their approach was modified to account also for imperfect competition in the labour market (Crépon *et al.*, 2005; Abraham *et al.*, 2009).

Within an imperfect labour market setup, it can be assumed that wages and the number of workers are simultaneously chosen according to a standard efficient bargaining problem, which involves

sharing the surplus between profit-maximizing firms and workers whose utility comes from employment and wages.

In this Section we obtain consistent markups' estimates by simultaneously considering product and labour market imperfections (through the joint estimation of price-cost margins and the workers' bargaining power, respectively) in the Portuguese economy for the period 2010-2016. Therefore, we closely follow Amador and Soares (2017), which performed a similar exercise for a previous period.

Under imperfect competition in the labour market and computing the difference between the primal (SR) and the dual Solow Residual ( $SR^d$ ), we can obtain equation (14), which enables us to jointly estimate the markup ( $\mu$ ) and the workers' bargaining power ( $\phi$ ). In this setup,  $\phi$  should assume values between 0 and 1, where a competitive labour market corresponds to  $\phi = 0$ , while  $\phi = 1$  implies that firms' surplus is fully transferred to the workers. As a result, markets with bargaining power estimates outside the  $[0, 1]$  interval were disregarded.

$$SR - SR^d = \left(1 - \frac{1}{\mu}\right) [(\Delta p + \Delta q) - (\Delta r + \Delta k)] + \frac{\phi}{1 - \phi} (\alpha^L - 1) [(\Delta l + \Delta w) - (\Delta r + \Delta k)] \quad (14)$$

By including the last term accounting for an imperfect labour market we are able to improve the consistency of our estimates. The exclusion of this last term would have caused a downwards bias which would be higher the higher the bargaining power ( $\phi$ ), the share of labour costs in output ( $\alpha^L$ ) and the larger the difference between the growth rate of nominal labour and nominal capital costs  $[(\Delta l + \Delta w) - (\Delta r + \Delta k)]$ .

Estimating equation 14 enables us to test the assumption of perfect competition in product markets of the Portuguese economy for the 2010-2016 period. The benchmark specification of this study corresponds to OLS estimations with clustered errors at the firm level since observations of the same firm are expected to be correlated over time. Furthermore, fixed and random effects regressions for each market were estimated to ensure the robustness of results. The fixed effects model was estimated to control for measurement errors related to the firm, for instance, associated to the assumption for the cost of capital. The random effects model was estimated to ascertain that our results remain unchanged to estimation assumptions. Lastly, two-step Heckman regressions were run to account for the potential

sample selection bias associated to the exclusion of firms reporting negative operational profits.

Data was drawn from the annual accounts of Portuguese firms reported under *Informação Empresarial Simplificada* (IES) for the period 2010-2016. In line with Amador and Soares (2017), some observations were eliminated from the database to ensure robust estimates. Firms reporting negative operational results in four or more consecutive years were disregarded in order to be consistent with the assumption of profit maximization in the long run. Additionally, sectors “Agriculture and Mining”, “Education” and “Health” were withdrawn given their small share in total gross value added (GVA) or the sizeable relevance of public entities for their regular functioning.

### 3. Results

The results show that the hypothesis of perfect competition is broadly rejected in Portuguese product markets, confirming Amador and Soares (2017) and Folque (2017). Considering a 5 per cent significance level, estimated markups are statistically significant for around 92 per cent of the markets.

For our benchmark specification, price-cost margins range between a minimum of 4 per cent and a maximum of 65 per cent, approximately. Even though our estimates show a high level of heterogeneity across markets, as expected, it is noteworthy that the rank of markets obtained across the different model specifications is virtually unchanged meaning that the identification of less competitive markets is robust across the different models. The robustness of our results across the different specifications is especially relevant from a policy perspective.

The results also confirm previous empirical evidence about price-cost margin estimates becoming higher once labour markets are assumed to be imperfectly competitive, that is, when workers hold some bargaining power. In that case, our markup estimate captures the overall surplus extracted by the firm from the consumer through its market power, including the part that is transferred to workers through their bargaining power. In our results the average coefficient is around 14 percentage points (p.p.) which is in line with the results of Amador and Soares (2017) and Bassanetti *et al.* (2010) that found an underestimation of 11 p.p. and 10 p.p., respectively. Yet the correlation between markups estimated under perfect competition and markups estimated for the imperfect competition case is very high (around 82 per cent).

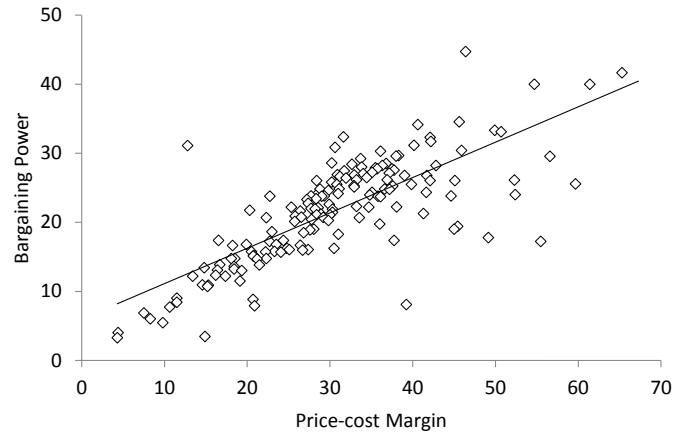


Figure 43: Product and labour market imperfection, percent

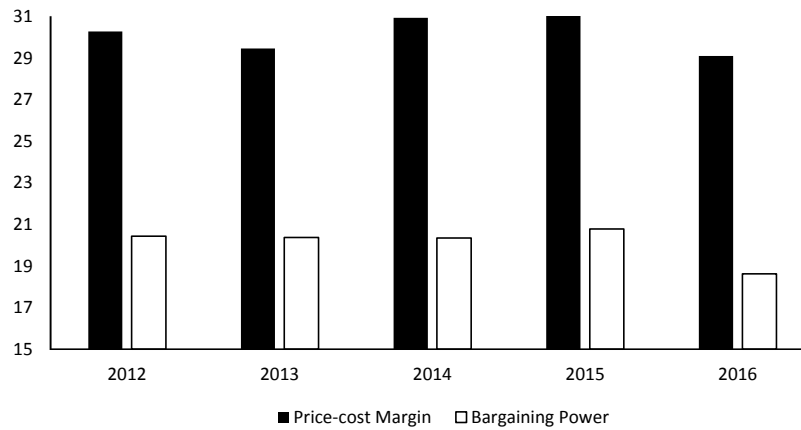
Similarly to price-cost margins estimates, the workers' bargaining power estimates are generally consistent across estimation strategies, even though for some markets the fixed effects estimates differ from the benchmark.

Moreover, Figure 43 shows a positive correlation between product market imperfection and the degree of imperfection in the labour market (around 80 per cent), which is consistent with previous empirical literature.

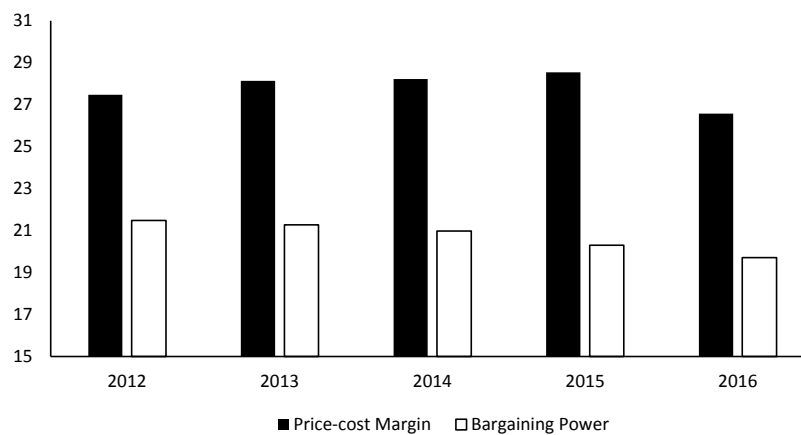
According to Dobbelaere (2004), the positive correlation between price-cost margins and workers' bargaining power can be explained in two different ways. One explanation is that a high bargaining power leads to increased wages and a reduction of the rents left to the firm. As a result, some firms exit the market and there is a decrease in the degree of competition in the product market (and consequently an increase in markups). Conversely, workers' bargaining power tends to be higher when there are rents to be extracted from the firms, that is, if there is strong competition in the product market (meaning that markups are low) and thus no surplus to be extracted, workers tend to exert less bargaining pressure.

Figure 44 presents the evolution of the two variables under analysis during the 2012-2016 period, using both GVA and employment as weighting variables. Despite a slight difference on the levels, we can see that price-cost margins are in both cases roughly stable during the period considered.

On the contrary, when analyzing the evolution of workers' bargaining power, our estimates show a clear decrease during the period under analysis (which is more pronounced when using employment



(a) Markets weighted with GVA



(b) Markets weighted by employment

Figure 44: Evolution of price-cost margins and workers' bargaining power (Overall Economy), percent

as weight). This significant decrease of the workers' bargaining power took place in all the sectors and, thus, on the overall economy and it may be associated with labour market reforms. This result implies that workers' ability to capture part of the surplus extracted by firms from consumers is now lower. In fact, this decrease can be partially explained by the slight decrease in markups.

Table 12 presents price-cost margins and workers' bargaining power estimates for several industries from the aggregation of individual markets, using GVA and employment as weights for the years of 2012 and 2016.

At the sectoral level, it can still be observed that price-cost margin estimates become higher once labour markets are assumed to be imperfectly competitive. However, and contrary to what happened

	Price-cost Margin				Bargaining Power			
	2012		2016		2012		2016	
	GVA	Employment	GVA	Employment	GVA	Employment	GVA	Employment
Overall economy	30.29	27.48	29.11	26.57	20.43	21.48	18.63	19.71
Tradable	29.42	29.27	28.58	28.24	22.13	22.67	20.31	21.10
Non-Tradable	31.08	25.87	29.65	24.97	18.90	20.42	13.36	17.85
Manufacturing	28.73	28.75	28.42	27.80	22.10	22.66	21.47	21.30
Non-Manufacturing	30.89	26.88	29.42	25.94	19.79	20.93	17.37	18.89
of which								
Electricity, Gas & Water	54.26	39.34	49.91	38.66	16.54	13.66	5.97	9.51
Construction	30.93	30.89	28.62	28.25	25.72	25.62	24.01	23.69
Trade	15.51	15.75	15.30	15.68	12.21	12.61	11.89	12.30
Transports & Communications	32.60	32.65	31.76	31.10	22.35	24.06	20.98	22.24
Other Services	36.05	33.57	25.60	26.48	25.60	26.48	22.45	22.18

Table 12: Price-cost margins and workers' bargaining power per sector (2012-2016) (per cent)

Note: Industrial markets weighted by GVA or by employment.

at the individual market level, for some industries there is no positive correlation between price-cost margins and workers' bargaining power.

The industries with the highest price-cost margins in 2012 are "Electricity, Gas and Water", "Transports and Communications" and "Other Services". The first two are capital intensive network sectors where scale economies are expected to play an important role and thus profits to be above the average of the economy. "Other Services" include several sorts of activities and a varied set of services, and registers a significant decrease in markups from 2012 to 2016, possibly associated with the implemented product market reforms.

Conversely, for the whole period the lowest price-cost margin is by far observed in the "Trade" sector (about 16 per cent), an atomized industry composed of many small units and just a few large ones that aggressively compete on prices. "Trade" also has the lowest bargaining power because is the sector where the higher proportion of workers earns the minimum wage or values near that.

Both manufacturing and non-manufacturing sectors present a decreasing trend in markups between 2012 and 2016. One would expect markups to be lower on manufacturing due to the higher exposure to international competition. However, this only happens when GVA is the basis for aggregation. The decrease was more significant in the Non-Manufacturing sector, in particular, in the "Electricity" industry.

Regarding the comparison between tradable and non-tradable sectors, in 2016 results depend on the variable used to weigh the es-

timates. When considering the GVA as the weighting variable, the non-tradable sector has a higher price-cost margin than the one of the tradable sector. When employment is the variable used to weigh our estimates, the relation is the opposite. However, as the estimates are very close, there is not enough evidence of a significant difference between price-cost margins in each sector. Nevertheless, it is noteworthy that price-cost margins in the non-tradable sector is decreasing in this period, which is positive in the perspective of avoiding the over-allocation of resources in such markets, with potentially negative effects on efficiency and thus on Portuguese economic growth.

#### 4. Final remarks

This column shows that the Portuguese labour and product markets are far from the perfect competition paradigm. Therefore, our findings suggest that reforms aiming at strengthening competition in both labour and product markets should be implemented. Furthermore, those reforms should tackle labour and product markets imperfection in an integrated way.

Nevertheless, results should be interpreted with caution. One should focus more on the evolution and on relative comparisons of estimates across sectors than on its levels. Moreover, the levels of the estimated coefficients can change significantly with updates in the database.

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