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March 2012

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# Competition in the Portuguese Economy: An overview of classical indicators<sup>\*</sup>

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#### Abstract

This article offers an extensive overview of competition indicators in the Portuguese economy in the period 2000-2009. The article covers qualitative competition indicators as well as classical profitability and concentration measures, focusing on the differences between tradable and nontradable sectors. The analysis carried out is distinct from that of competition authorities, aiming to set an overall scenario for competition developments. The article concludes that, although there are apparently no widespread problems, there is substantial room for improvements in business competition environment in several markets, notably in the non-tradable area.

Keywords: Market competition, Portuguese economy

JEL Codes: L10, L60, O50

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# 1 Introduction

Competitive markets are a key ingredient in medium and long term economic growth and the intervention of public authorities is sometimes warranted to correct competition related distortions. Several aspects are acknowledged as important to assure a competitive business environment. Firstly, free-entry and exit of firms and low administrative costs tend to generate greater market competition, leading to higher productivity and investment. Free entry implies an increase in efficiency because prices tend to be drawn closer to marginal costs, implying an efficient allocation of resources in the economy, i.e., *static efficiency*. In this context, firms tend to become more efficient, cutting waste and duplication, which means higher productive efficiency. Companies that fail to undertake such adjustments tend to leave the market, freeing-up market quota for the most efficient ones. Secondly, a competitive business environment fosters innovation aimed at reducing production costs and creating new products. The substitution of old technologies and products by new ones in the Schumpeterian sense, relates with the concept of *dynamic efficiency*, which is determinant for total factor productivity growth. The effects of increased competition on investment are rooted on firms' need to increase productivity and market shares, as discussed in empirical work by Alesina et al. (2005).

The analysis of business competition environment in an economy involves several complementary approaches. One approach relies on the analysis of the institutional structure that sets competition rules in different markets and their enforcement. This approach includes the excessive complexity of some regulatory processes and the need to interact with different structures of government (typically designated as bureaucracy), burdening both entry and exit decisions and diminishing incentives to innovate. Such comparative analysis generally draws on pooled competition indices, typically weighted averages of partial indicators, some of them with a qualitative nature. The major handicap of this approach is not to take full account of how rules actually affect business competition environment, i.e., enforcement and impact of legislation.

A complementary approach to analyze competition is based on the use of sectoral aggregates or firm-level data, which implicitly or explicitly requires a definition of relevant markets. An accurate definition of relevant markets takes into account the degree of product substitution, transportation costs and the geographic location of producers and consumers. However, this type of studies departs from the basic assumption that markets can be correctly identified using NACE sectors. Although in some cases this can be a strong assumption, an analysis based on a high sectoral disaggregation may reduce such criticism. Sectoral aggregate or firm-level studies on market power exist for many countries and could be organized along two different strands. The first strand is based on regressions, using growth accounting equations and profit maximization firms under imperfect competition, as in Hall (1988) and Roeger (1995). Some examples of empirical work using sectoral aggregate data are Martins and Scarpetta (1999), for 36 manufacturing industries in 14 OECD countries, Christopoulou and Vermeulen (2008), for a comparison of mark-ups in the Euro Area and the US, including the services sector and Badinger (2007) for 10 European countries and 18 sectors, including manufacturing, services and construction. Examples of papers using firm level data are Altomonte et al. (2010) for 8 EU countries, Kiyota et al. (2009) for Japan and Estrada (2009) for a comparison centered on the Spanish case. The second strand of research consists in the computation of markups from firm level data or national accounts. Examples of studies with firm level data are Altomonte et al. (2010) for 8 EU countries, Braila et al. (2010) for Belgium, Maliranta et al. (2007) for Finland and Creusen et al. (2006) for Netherlands, who have also included different competition indicators. This latter strand of research takes into account firm level heterogeneity, which is disregarded in regression based studies.

A third approach to competition analysis is the one followed by competition authorities, which bases on an accurate definition of the relevant markets and makes use of very detailed and, sometimes, non-public firm data. In fact, the identification of true violations of competition laws (e.g., collusive behaviour, mergers and acquisitions to obtain market power, abuse of dominant position, vertical restrictions or predatory pricing) and subsequent punishment requires in-depth investigations and precise knowledge about individual market's characteristics.

In this article we include the two initial approaches, i.e., pooled competition indices and sectoral aggregate and firm-level data, focusing on classical competition indicators. Although the selected approaches are much less accurate than the in-depth investigations carried out by competition authorities, they provide a broad and cross-sectoral picture along a relatively long time span (2000-2009).

This topic is relevant, given the strong macroeconomic imbalances that presently exist in the Portuguese economy and the low potential GDP growth rate. In fact, it has been referred that one of the causes for the present macroeconomic situation was the progressive reallocation of resources from the tradable to the non-tradable sector in the years preceding and following the accession to the monetary union in 1999. Such reallocation of resources might be related with competition and the behaviour of relative profit margins. Therefore, the aim of this article is to provide empirical evidence on cross-sector competition developments in Portugal, focusing on the distinction between tradable and non-tradable sectors. There are almost no studies on sectoral competition developments in the Portuguese economy. One exception is Molnar and Bottini (2010), who used firm level data from the Amadeus database and estimated markups, at market level for services sectors, from 1993 to 2006. They concluded that Portugal, along with central European OECD countries, Italy and Sweden, presents high markups in services markets comparatively to a large set of European countries.

The paper is organized as follows. In the next section we briefly review the rationale for competition policy and regulation as well as the main elements of the Portuguese competition institutional setting. Section 3 presents existing pooled competition indicators. Section 4 reviews a set of classical sectoral aggregate and firm-level competition indicators. Next, section 5 presents the databases, descriptive statistics and the classification of tradable and non-tradable markets. Section 6 presents the results, comprising concentration and profitability measures, consistency of results across indicators and illustrations with representative markets. Section 7 reports sectoral aggregations and results for the overall economy. Finally, section 8 offers some concluding remarks.

# 2 Competition policy and regulation: brief rationale and institutional framework

The existence of competitive markets is a crucial element for an efficient allocation of resources in the economy. Nevertheless, the practical implementation of this principle is extremely difficult. A wide set of market failures like incomplete markets, information asymmetries, externalities and natural monopolies justifies the intervention of the authorities through price controls, public ownership and competition policy.

Several problems affect regulation and competition policy. Firstly, the classical problem is the definition of the relevant market, i.e., the set of firms that produce goods that compete for the satisfaction of the same consumer's need. This requires an assessment on the degree of product substitutability and geographical location. Secondly, a related problem is to distinguish oligopoly from collusion in markets. Thirdly, in a natural monopoly, the solution that maximizes social welfare does not allow for the recovery of costs, i.e., if prices equal marginal cost the firm runs losses. Therefore, there is a trade-off between productive efficiency and the maximization of social welfare. Fourthly, in a context where there is substantial asymmetry of information regarding demand, technology or cost structure, firms may pressure regulators to obtain benefits, an outcome commonly known as *capture* of the regulator. Fifthly, the efficient solution may raise equity concerns if prices are set according to the Ramsey principle.<sup>1</sup>

<sup>&</sup>lt;sup>1</sup>Ramsey pricing sets prices (or rates) on the various services provided by the regulated firm such as to maximize

Other problems relate to non-economic objectives involved in competition decisions, i.e., whether strategic or sovereignty issues are relevant, weight on the consumer surplus as opposed to total surplus and quality of sectoral and firm data.

Portuguese and EU institutional and legal settings include competition policy and regulation aspects. Competition policy has assumed a key role in European economic integration and in the construction of a common market. The basic principles of competition policy were present in the treaties of Paris (1951) and Rome (1957).<sup>2</sup> Currently, intra-EU competition is regarded as a driver of the internal market, closely linked to free circulation of goods, persons, services and capital. Rules dealing with collusion and cooperative business behavior are present in Article 101 of the Treaty on the Functioning of the European Union and those dealing with the abuse of dominant position in Article 102 (formerly Articles 81 and 82 of the EC Treaty). These provisions are complemented by Regulations, such as the Merger Control Regulation. The EU law is applied in a decentralized way (EC Regulation 1/2003 of 16.12.2002, applicable from 1 May 2004) with a posteriori control. However, if the combined aggregate worldwide turnover or the aggregate Community-wide turnover lie above certain thresholds, mergers must be notified and reviewed by the European Commission, i.e., they have a Community dimension.

European reality, in terms market regulation, has changed substantially in the last decades. In many countries, natural monopolies were publicly-owned and publicly-managed but the EU has played an important role in changing this reality. Since the eighties, the situation progressively evolved to privatization and liberalization, together with the setting up of independent sectoral regulators in a context of technological developments that allowed for the entrance of new players.<sup>3</sup>

Following this trend, Portugal observed dramatic changes, both in competition and regulatory policies. Departing from public ownership for large firms after 1974, Portugal implemented a reprivatization program and gradually evolved towards liberalization and competition. The EU accession in 1986 lead to the progressive adoption of the European competition law. An independent Competition Authority was created in 2003 with the aim to promote competition, innovation and benefits to consumers, bearing responsibility for exercising all the powers that EU law confers to national authori-

social welfare subject to a profit constraint. The price that maximizes social welfare subject to a zero profit constraint exceeds marginal cost by a value that is inversely proportional to elasticity of demand.

 $<sup>^{2}</sup>$ Competition policy (anti-trust) has also a long tradition in the US. It emerged in 1890 with the adoption of the Sherman Act. At present, this task is performed by the Federal Trade Commission (FTC), which also acts in terms of consumer protection. The FTC also analyzes the economic impact of government regulation and provides Congress with policy recommendations relating to competition and consumer protection.

 $<sup>^{3}</sup>$ US tradition has always based on the existence of privately owned monopolies, controlled by independent regulatory bodies.

ties.<sup>4</sup> In addition, independent regulators were created for specific sectors, starting with telecommunications at the beginning of the eighties and followed by electricity and gas. In financial sector "Banco de Portugal", "Comissão do Mercado de Valores Mobiliários" and "Instituto de Seguros de Portugal" act as regulators with specific competencies. Media, water and residuals, wealth and transports regulators were also created.

# 3 Qualitative view on Portuguese competition setup

The conceptual and institutional aspects discussed in the previous section are important to highlight difficulties and set the stage for the analysis of competition developments. Pooled competition indices are one of the tools used in the assessment of competitive conditions in an economy, especially when institutional aspects are considered. These indicators have a qualitative nature and are policy-focused, departing from qualitative data on laws and regulations that may affect competition or opinion surveys conducted on firms and other market players. In a second stage, basic qualitative indicators are aggregated to produce a pooled competition index. The main strength of these approach is the ability to provide a picture of basic underlying conditions for competition that is comparable across countries. The major handicap is its inability to reflect market outcomes, i.e., a favorable competition index does not imply adequate competition if the laws and regulations are not enforced.

The OECD system of economy-wide and sectoral indicators of product market regulation (PMR) is the most cited.<sup>5</sup> In its present version, the OECD PMR index was computed with data for 1998, 2003 and 2008, covering general regulatory issues in fields such as public control and price controls, legal and administrative barriers to entry and barriers to trade and investment (see Wolfl et al. (2009)). The methodology assigns a numerical value to each of the possible responses to a given question and is defined over a scale of zero to six, reflecting increasing restrictiveness of regulatory provisions for competition. In parallel, the OECD developed a set of sectoral indicators covering network industries such as energy (electricity and gas), transport (air, rail and road transport) and communication (post and telecommunications), as well as retail trade

 $<sup>^{4}</sup>$ EC regulation 1/2003 provided the national competition authorities with important legal instruments to exercise their powers more efficiently. Under these regulations, the main powers of Competition Authority are the ability to pursue an investigation of cases relating to anti-competitive practices, demand that infringements cease, apply interim measures of protection, apply fines, periodic penalty payments or additional sanctions established in national law and cooperate with the Commission and the courts. Another key area is the approval of mergers and acquisitions at the national level. The action of the Competition Authority is framed by the Portuguese competition law. The first version of this law dates back to 1983-1984, the current version dates back to 2003 and a new law is being prepared for the course of 2012.

 $<sup>^{5}</sup>$ Other qualitative indices, which include elements related with competition, are the Global Competitiveness Index published by the Heritage Foundation (Miller and Holmes (2009)), the Global Competitiveness Index published by the World Economic Forum (Schwab (2010)) and the Doing Business Report of the World Bank.



Figure 1: Product market regulation

and professional services, covering regulatory issues like entry barriers, public ownership, market structure and price controls (see Conway et al. (2005)). It is important to assess regulation in non-manufacturing sectors because they represent a large share of economic activity and provide intermediate inputs in the production of other services and manufacturing. In addition, economic regulation is very much concentrated in services and other non-manufacturing sectors, which are also characterized by limited international competition.

Figure 1 presents the OECD economy-wide and sectoral regulation indices for Portugal. The general assessment is that in 2008 Portugal stood in an intermediate situation when compared with other OECD countries, though with a large margin to improve competition and reach what is designated as the best practice. The bottom-up approach used in the construction of these indices makes it possible to trace the indicator scores back to individual policies.

Figure 2 presents such detail for the economy-wide PMR index. It is observable that the largest contribution to the overall PMR index in 2008 (PMR = 1.43) is associated to "State control" (0.88), followed by "barriers to entrepreneurship" (0.39) and "barriers to trade and investment" (0.15). Within the largest contribution, "public ownership" shows the largest index, resulting from all its lower-level indices ("scope of public enterprise", "government involvement in network sectors" and "direct con-

Source: OECD.





#### Sources: OECD and author's calculations.

trol over business enterprises"). Progress from 1998 to 2008 is mainly related with improvement in "price controls and control regulation" and, to a lower extent, a reduction in "regulatory and administrative opacity". A future update of the OECD PRM index will be positively affected by the elimination of special voting rights held by the Portuguese State in energy and telecommunication firms and posterior privatization.

Figure 3 reports qualitative indicators of competition in services and other non-manufacturing sectors. In this context, except for the retail trade sector, important improvements occurred in Portugal from the mid-nineties to present. Nevertheless, several services and other non-manufacturing activities still present a relatively unfavorable competition setup. Within the set of services considered, "airlines", "gas" and "rail" in 2007 compare unfavorably with the OECD competition practices, mostly regarding public ownership. In professional services such as "architects", "engineers" and "legal professions", the Portuguese legislation was more restrictive than in the average of OECD countries. The next section turns to quantitative indicators of competition.







 $<sup>\</sup>label{eq:Restration} in commercial register - LI: Licences or permits needed to engage in commercial activity - LA: Specific regulation of large outlet PR - Protection of existing firms OP - Regulation of shop opening hours - PC: Price controls$ 





Sources: OECD.







#### (d) Retail - OECD countries



(f) Professions - OECD countries

# 4 Classical measures of competition: concepts and limitations

### 4.1 Herfindahl-Hirschman index

The index attributed to Herfindahl (1950) and Hirschman (1945) (HHI) is one of the most popular empirical indicators in the competition literature. This index adequately assesses competition when concentration is the result of both an unequal distribution of market shares and a reduced number of market players, as opposed to traditional concentration measures that are only sensitive to the inequality of the distribution, such as the Lorenz curve and the Gini's coefficient. The HHI links market concentration with competition, in the sense that the former leads to a higher likelihood of collusive behaviour and higher ability to set prices above marginal cost, thus a lower level of competition. Although facing some methodological limitations, the likelihood of collusion makes the HHI a classical tool for preliminary analysis by regulatory authorities. The HHI in industry j is defined as:

$$HHI_j \equiv \sum_{i=1}^N s_i^2 \tag{1}$$

where N is total number of firms in industry/market j and  $s_i$  stands for the market share of firm i. The HHI index ranges from close to 0 in perfect competition to 1 in monopoly.<sup>6</sup>. When there are n equal firms HHI equals  $\frac{1}{n}$ . The empirical literature usually defines HHI < 0.1 as the threshold for low levels of concentration,  $0.18 \ge HHI \ge 0.1$  as moderately concentrated markets and HHI > 0.18 as highly concentrated markets (see for example Scheffman et al. (2002)). In addition, authorities accept or block mergers depending on the level and magnitude of the change in the HHI.<sup>7</sup> The HHI index can be also rewritten as:

$$HHI_j = \frac{1}{N} + N\sigma^2 \tag{2}$$

where  $\sigma^2$  is the variance of firm size. In addition, there is a link between the HHI and the weighted sum of the PCMs in industry *j*:

$$\sum_{i=1,i\in j}^{N} \left(\frac{P_i - MC_i}{P_i}\right) s_i = \frac{HHI_j(1+v_j)}{\epsilon_j}$$
(3)

<sup>&</sup>lt;sup>6</sup>Alternatively, the index is scaled by 10000 if the market shares  $s_i$  are set in the interval [0, 100]

 $<sup>^7\</sup>mathrm{For}$  example, the 1982 US guidelines set critical HHI levels of concentration: 0.1 with a change of 0.01 and 0.18 with a change of 0.005.

where  $\epsilon_j \equiv -\frac{dQ}{Q}/\frac{dP}{P}$  is the elasticity of demand in industry j.

The HHI presents some conceptual and practical problems. Firstly, it fails to identify the reallocation and selection effects that may result from increased competition associated to increased incumbents' aggressiveness. In this case, the market shares of more efficient firms will increase at expense of the less efficient ones, leading to a positive reallocation effect.<sup>8</sup> In addition, less efficient firms may be pushed out of the market, leading to a selection effect. In the latter case, HHI increases conveys the wrong signal in terms of competition. The inability to capture the selection effect is extensive to all competition measures based on market shares. Secondly, the correct computation of the index requires information about all firms operating in the market, which is limitative if databases are sample based and if observed entry and exit of firms results from changes in coverage. Thirdly, information on firm's sales includes exports, thus affecting the assessment on internal market concentration. Another source of bias is the fact imports are not taken into account. Finally, as previously stated for other indicators, the level of the HHI strongly depends on the market definition. It should be stressed that in case of a homogeneous product and strong exposure to international trade, the relevant market may no longer coincide with the internal markets. Hence, HHI levels may become relatively uninformative.

#### 4.2 Concentration ratio

The *n*-firm concentration ratio  $C_n$  is a concentration indicator alternative to HHI.<sup>9</sup> It gives the cumulative market share of the *n* largest firms, that is:

$$C_n \equiv \sum_{i=1}^n s_i \tag{4}$$

with *n* typically equal to 4, 8 or 10. In contrast to HHI,  $C_n$  does not require information about all firms.<sup>10</sup> Nevertheless, contrary to the HHI, it disregards market share distribution across the *n* firms considered. As in the case of HHI, C10 levels may turn out to be relatively informative if the relevant market in not the internal market.

#### 4.3 Price-cost margin

From a theoretical point of view market competition is close to market power. Market power is the ability of a firm to set prices above marginal cost. The classical measure

<sup>&</sup>lt;sup>8</sup>Assuming that incumbents have positive PCM.

<sup>&</sup>lt;sup>9</sup>The *entropy index* is another example of a concentration index, though it is not computed in the article.

 $<sup>^{10}</sup>$ Nevertheless, the correct selection of the largest n firms is only possible if firms' universe is observable.

of market power is the Lerner (1934) index, also referred as mark-up ratio. For a profit-maximizing firm, it is defined as the difference between price and marginal costs divided by price or, equivalently, the inverse of the price elasticity of demand in the case of monopoly. The first order condition of the profit maximization problem of the firm is:

$$P(Q) + \frac{dP}{dQ}(1+v)q_i = MC(q_i)$$
(5)

where  $q_i$  is the production of firm *i*, *MC* is the marginal cost, *Q* and *P* stand for total production and price, respectively, and (1 + v) is the common conjectural variation.<sup>11</sup> The Lerner index for firm *i* is:

$$L_i \equiv \frac{P_i - MC_i}{P_i} = \frac{s_i(1+v)}{\epsilon} \tag{6}$$

where  $\epsilon$  is the elasticity of demand and  $s_i$  is the market share of firm *i*. Equivalently, in terms of price wedge:

$$\frac{P_i}{MC_i} = \frac{1}{1 - PCM_i} \tag{7}$$

The Lerner index equals 0 in the polar case of perfect competition, increases with market power and it is lower than 1 in monopoly. Detailed information on prices is generally not available and marginal costs are unobserved, thus price-cost margin (PCM) is used as an approximation to the Lerner index. PCM for firm i is considered as:

$$PCM_i = \frac{\text{Sales}_i - \text{Variable Costs}_i}{\text{Sales}_i} \tag{8}$$

Sales consist of incoming revenue from goods and services and variable costs consist of wage bill (including other benefits) and cost of materials and services (e.g., subcontractors, electricity and fuels). More specifically, labour costs comprise wages, other compensations and social security contributions. Capital is assumed to be a fixed input,

<sup>&</sup>lt;sup>11</sup>The conjectural variation defines how a firm anticipates the response of a competitor to changes in its production. Depending on the values of v, the first order conditions for various competitive models emerge. When the Cournot quantity model is considered v = 0, i.e., each firm believes the other firm's choice is independent from its own; when the perfectly competitive model is considered v = -1, leading to price equal to marginal cost; when v equals the slope of the reaction curve of the other firm, the Stackelberg model emerges, i.e., the first firm chooses its output on the basis of how it conjectures the other firm will respond. Finally, when a monopoly is considered the conjectural variation does not exist as total production is attached to one firm.

thus its cost is not included in variable costs.<sup>12</sup> Therefore, rents should be excluded from variable costs, though this was not the case in this article. The reason is that the response rate for this variable is small in the database, thus its exclusion from total costs of services introduce another might introduce another type of bias in the results.

There are several sources of bias that distort firms' market power when measured by PCM. Firstly, as marginal costs are unobserved, average costs are used as a proxy. In case of constant returns to scale, both measures coincide but in the presence of decreasing (increasing) returns to scale, there is an upward (downward) bias in the level of PCM. Secondly, PCM also reflects product quality and efficiency levels. In fact, more efficient firms or those producing higher quality goods present higher PCM, though not necessarily higher market power. Thirdly, market PCM is a measure not monotone in competition. The reason for the lack of theoretical robustness is its inability to capture reallocation and selection effects. If efficient incumbents adopt more aggressive pricing strategies, there is a market share transfer towards those firms (reallocation effect), which may force inefficient firms to exit the market (selection effect). In this case, market PCM may increase associated to market share transfer, suggesting that there was a competition reduction when in fact the opposite has occurred. Finally, PCM evolution also reflects the business cycle. In periods of expansion, firms have scope to increase the PCM and the reverse tends to happen in recessions, i.e., the indicator has been identified as mildly pro-cyclical in some empirical studies.

The computation PCMs at market level involves two steps. The first step is the definition of markets, i.e., the implicit selection of firms relevant within each market. The standard approach in the literature is to use NACE classification as a market segmentation criterion. The underlying assumption is that firms sell one good and compete in only one market. Therefore, multi-product firms are a source of bias, especially if products are not close substitutes. A different market segmentation criteria could yield different results. The second step is the aggregation of firm-level PCMs using a set of weights. Assuming that all firms have the same weight, market PCM corresponds to the unweighed average of firm level results. However, this approach can yield a distorted scenario of market PCM because there is significant heterogeneity across firms within a market. Alternatively, it is possible to assign weights according to firm's market shares, turning the relevant distribution to  $s_i PCM_i$ , which is the standard approach in the literature. Weights can be either time dependent or fixed in a selected year. The former option implies the evolution in market PCM results both from changes in firm-level PCM and changes in the market structure.

<sup>&</sup>lt;sup>12</sup>In the literature, alternative definitions are used. Some authors include taxes and subsidies, others argue that R&D expenses and intangible goods depreciations relate to efficiency, thus they should be included in variable costs.

In order to uncover the drivers of changes in PCM, the Laspeyres breakdown is generally used (see for example Altomonte et al. (2010)). Accordingly, market PCM changes between t and t + 1, can be obtained as the sum of "within", "reallocation", "interaction", "entry" and "exit" effects. In formal terms for industry j:

$$PCM_{j}^{t+1} - PCM_{j}^{t} = \sum_{\substack{i \in j_{t,t+1} \\ \text{Within effect}}} ms_{i}^{t}(PCM_{i}^{t+1} - PCM_{i}^{t}) + \sum_{\substack{i \in j_{t,t+1} \\ \text{Reallocation effect}}} PCM_{i}^{t}(ms_{i}^{t+1} - ms_{i}^{t}) + \sum_{\substack{i \in j_{t,t+1} \\ \text{Interaction effect}}} ms_{i}^{t+1} PCM_{i}^{t+1} - \sum_{\substack{i \in j_{t,i} \notin j_{t+1} \\ \text{Entry effect}}} ms_{i}^{t+1} PCM_{i}^{t+1} - \sum_{\substack{i \in j_{t,i} \notin j_{t+1} \\ \text{Exit effect}}} ms_{i}^{t} PCM_{i}^{t} \quad (9)$$

The "within effect" captures the aggressiveness of pricing strategies of incumbent firms, i.e., those that are active in t and t + 1. It consists on the change in incumbents PCM, assuming that market shares are constant. A negative sign implies a fall of margins, signalling more aggressive pricing behaviour and higher market competition. The "reallocation effect" captures incumbents' change in market shares, assuming that PCMs are constant. A positive term is associated to higher market shares for firms with positive PCM or a lower market share for firms with a negative PCM. The "interaction effect" reflects changes in market structure. A positive sign implies that PCM and market shares move in the same direction. In a context of homogeneous product, firms exhibiting higher PCM are expected to be punished and hence their market shares are predicted to fall. For this reason, the "interaction effect" is expected to be negative. Finally, the set of firms operating (considering positive sales) changes in each year, thus an "entry effect" and an "exit effect" are considered. The former term concerns the PCM of firms that operate in t + 1, but not in year t and the latter concerns those firms that are not operating in t+1, but not in t. These two effects can be added and referred as firm dynamics.

There are some caveats in the empirical use of the above mentioned decomposition. Firstly, the breakdown is conditional on market definition, i.e., different sector classifications (e.g. digit level in NACE) may yield different results. Secondly, the treatment of entry and exit is affected by the coverage of the database. When the database changes as a result of different coverage, the entry and exit pattern does not convey firm dynamics. Similarly, when firms change their sector classification due to statistical procedures this counts as an entry in one market and exit in another, while it may not reflect a relevant change in activity.

### 4.4 Labour-income ratio

The labour-income ratio (LIR) is also a classical indicator of market competition, defined as the share of labour costs in net value added.<sup>13</sup> The underlying intuition is that a higher LIR signals stronger competition because a larger share of net value added is accrued to workers and thus a lower share is associated to profits. The LIR is inversely related to PCM under the assumption of a stable ratio of sales to net value added.

Firm level LIR is computed as:

$$LIR_{i} = \frac{\mathrm{wl}_{i}}{\mathrm{NVA}_{i}} = \frac{\mathrm{Sales}_{i} - \mathrm{Non-labour \ costs}_{i} - \mathrm{Profits}_{i}}{\mathrm{NVA}_{i}} = 1 - \left(\frac{\mathrm{Sales}_{i}}{\mathrm{NVA}_{i}}\right) PCM_{i} \quad (10)$$

where  $Profits_i$  is the product of  $Sales_i$  times  $PCM_i$ .

Market LIR is obtained as:

$$LIR_j = \frac{\sum wl_j}{\sum NVA_j} \tag{11}$$

One source of bias is the fact that workers bargaining power may be changing throughout the sample period.

### 5 Database and market classification

### 5.1 Database description

Data used in this article draws on annual information for Portuguese firms reported under *Informação Empresarial Simplificada* (Simplified Corporate Information, Portuguese acronym: IES). IES data exists from 2006 onwards and it covers virtually the universe of Portuguese non-financial corporations.<sup>14</sup> Although IES began in 2006, there was a report including information for 2005, which was taken into account in this analysis. The last year included in this study is 2009 comprising around 350.000

<sup>&</sup>lt;sup>13</sup>As referred by Creusen et al. (2006), self-employees should be considered in the labour cost in order not to bias results. However, due to the lack of data, this was not considered in this article. Similarly to Polder et al. (2009) observations where labour costs are above sales are not taken into account

<sup>&</sup>lt;sup>14</sup>Activities as "financial intermediation", "public administration and defence; compulsory social security" and "extraterritorial organizations and bodies" are not part of both IES and CB universe.

	Centra	al de bala	anços (C	B)		Info. en	Info. empresarial simplificada (IES)				
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Nb. of firms with sales &	15.794	16.136	16.011	16.085	16.675	299.588	300.490	312.278	317.191	307.205	1.617.453
var. $costs > 0$	15.154	15.422	15.200	15.077	15.591	238.571	259.241	266.731	268.577	258.987	1.368.551
with $GVA > 0$	14.399	14.597	14.303	14.139	14.602	215.088	230.289	235.598	236.032	228.711	1.217.758
% of $GVA > 0$	95,0	94,7	94,1	93,8	93,7	90,2	88,8	$^{88,3}$	87,9	$^{88,3}$	89,0
with $PCM < 0$	2.755	2.919	3.208	3.361	3.376	65.890	76.600	77.868	85.024	83.125	404.768
% of $PCM < 0$	18,2	18,9	$^{21,1}$	$^{22,3}$	$^{21,7}$	27,6	29,5	29,2	$^{31,7}$	$^{32,1}$	29,5
Nb. firms in											
consecutive years		13.405	13.661	13.079	13.355	14.640	226.223	233.884	236.064	230.665	
Years of registries	1	2	3	4	5	6	7	8	9	10	$\mathbf{Sum}$
Nb. of firms	40.935	45.862	40.739	38.349	160.147	2,438	2.218	1.786	2.341	7.949	342.764
% of Sum	11,9	13,4	11,9	11,2	46,7	0,7	0,6	0,5	0,7	2,3	100

Table 1: Databases

firms. The almost universal coverage of IES emerges from its nature, as it is the system through which corporations report mandatory information to the tax administration and the statistical authorities. Under IES, firms provide detailed balance sheet and profit and loss account information, as well as additional information on variables like number of employees and value of exports.

Prior to 2006, information on the annual accounts of Portuguese firms was collected under a non-compulsory survey "Central de Balanços" (CB), presenting lower coverage in terms of number of firms and GVA (Gross value added) and exhibiting a bias towards large firms.<sup>15</sup> IES covers approximately 20 times more firms than CB but the latter represents a significant share of GVA (around 60 per cent in the period 2000-2004). Note that, given its non-compulsory nature, CB data is potentially affected by a spurious market entry-exit pattern.<sup>16</sup> Data collected under CB begins in 2000 given that prior 2000, CB coverage does not included all sectors in the economy. Table 1 reports some general descriptive statistics.

In this article, only a subset of data was used. Firstly, public sector related activities such as education and health care were not included. Moreover, "Agriculture, hunting and forestry" along with "Mining and quarrying" were not considered given their low weight in total GVA. Secondly, markets not containing at least one firm, in all the years, were not considered. Markets are defined according to NACE 1.1 classification at 3 digit level, comprising a total of 166 markets, of which 99 are manufacturing and 67 non-manufacturing. In terms of GVA, they represent in terms of average GVA in the period 2005-2009, 26 and 74 per cent respectively.<sup>17</sup> Thirdly, firms with null sales or

<sup>&</sup>lt;sup>15</sup>The sales distribution is log normal under IES and negatively asymmetric during CB period.

<sup>&</sup>lt;sup>16</sup>More than 81 per cent of the firms observed in 2004 (last year for CB) are present in 2005 (first year of IES).

<sup>&</sup>lt;sup>17</sup>In 2006, there was a change from NACE 1.1 to NACE 2. In order to ensure comparability, an equivalence table was used. In addition, as significant reclassification of firms was prevalent in the database in the years before 2005, when possible, the classification resulting from the conversion from NACE 1.1 to NACE 2 was applied backwards.



Figure 4: Weighted PCM and market share at firm level in 2009



variable costs were excluded but those reporting null labour costs were not. The final data set includes 1.368.551 firms/years, from 2000-2009, comprising 342.764 different firms. Almost half of the firms have at least 5 observations and around four fifths are present in two consecutive years, which implies a significant level of firm dynamics.

Table 1 reveals that the percentage of firms with negative PCM, per year, is above 18 and 27 per cent in CB and IES, respectively. In the short-run, firm profit maximization is consistent with the existence of non positive PCM. If revenues cover at least fixed costs, firms incur in lower losses than those registered if they exit the market. For this reason, losses do not immediately determine an exit, thus firms with negative PCM were included in the analysis. Nevertheless, the lowest 1 per cent observations in the pooled distribution of PCMs was eliminated, consistent with negative PCM. In the long-run, profit maximization is inconsistent with negative PCM.

It is useful to complement the characterization of the database with the market shares and PCMs distribution across markets. The main result is a high degree of heterogeneity amongst firms in each market and across markets. Figure 4 presents the distributions of PCMs weighted by market shares across individual markets (panel a) and the distribution of market shares (panel b). Distributions of weighted PCMs across sectors are generally positively skewed. The non-manufacturing sector appears associated to higher average PCM and higher dispersion than the manufacturing. Average and median market shares are very low in non-manufacturing markets.

### 5.2 Classification of tradable and non-tradable markets

One of the main restrictions to firms' market power is exposure to international competition. Markets with strong international exposure are likely to follow the law of one price and are commonly classified as tradable. A rough proxy used in the empirical literature is to consider manufacturing markets as tradable and services as non-tradable. The problem with this proxy is that technological progress and trade liberalization brought international competition to many services activities, moving the line between tradable and non-tradable markets.

The empirical literature on this issue is scarce. Gregorio et al. (1994) use the export to production ratio as a measure of international exposure and set a threshold at 10 per cent. Under this approach, the use of manufacturing as a proxy for the tradable sector seems to be quite accurate but the analysis is conducted at a high level of aggregation. Using a different methodology, Jensen and Kletzer (2010) provide a distinction at a detailed market classification, uncovering a significant level of heterogeneity in service related markets. At odds with Gregorio et al. (1994), several services markets were classified as tradable.

The export to sales ratio is one of the measures to evaluate exposure to international competition. Nevertheless, a bias may exist as imports are ignored and it is assumed that firms in one market account for all the exports in that same product. Panel a) of figure 5 plots the distribution of the export to sales ratio in Portuguese markets for the average of period 2006-2009, distinguishing between manufacturing and non-manufacturing markets. It is clear that several non-manufacturing markets exhibit high export to sales ratios. Some examples are "Sea and coastal water transport" (CAE 611) and "Scheduled air transport" (CAE 621), presenting export to sales ratios of 70 and 50 per cent, respectively.<sup>18</sup>

 $<sup>^{18}\</sup>mathrm{CAE}$  2.1, which is the Portuguese acronym for "Classificação das actividades económicas", is equivalent to NACE 1.1.



(a) Distribution of export to sales ratio in 2006-2009

(b) Threshold sensitivity: Accumulated distribution of non-manufacturing markets by export to sales ratio

In this article, markets with an export to sales ratio above 15 per cent are considered as tradable, along with all manufacturing markets.<sup>19</sup> The choice of a 15 per cent threshold for the exports to sales ratio is consistent with figures found in similar studies (Knight and Johnson (1997) and Dixon et al. (2004)) and it is quite robust for Portuguese data. Panel b) of figure 5 shows that the percentage of non-manufacturing services classified as tradable would not change for thresholds between 14 and 19 per cent. Using this criterion, around 23 per cent of non-manufacturing markets are considered as tradable. Therefore, in this article, the tradable sector includes all manufacturing markets, some transport related markets and some business services. The tradable sector includes 115 markets and the non-tradable 51 representing in terms of average GVA in the 2005-2009 period, 44 and 56 per cent, respectively. The list of tradable and non-tradable markets considered in the article is available in the Appendix.

### 6 Competition in the Portuguese economy

This section reports results for concentration and profitability measures in the Portuguese economy. At this point, it is useful to remember the basic limitations of the analysis. Firstly, levels of concentration and profitability across markets reflect not only competition intensity but also technological differences, entry barriers, sunk costs and international trade. Therefore, the analysis of competition trends tends to be more robust than the comparison of levels across markets. Secondly, competition trends are discussed in two sub periods (2000-2004 and 2005-2009) to account for the break in the

<sup>&</sup>lt;sup>19</sup>Market's exports are proxied by the sum of exports of firms within that market. Statistical aggregate data for exports of services are not available at the disaggregation level used in this article.

database and a higher relevance is given to the latter period. Thirdly, the identification of lower competition in specific markets does not directly translate into needed public intervention. Although, our analysis may provide a useful road map to further investigation, it differs from the detailed market analysis typically carried out by competition authorities.

### 6.1 Concentration measures

#### 6.1.1 Levels of concentration

Unweighed HHI kernels suggest that there is high density in relatively low concentration levels, i.e., HHI distributions are positively skewed, specially in the non-tradable sector. Average HHI, in 2009, in the non-tradable sector is 0.098, significantly lower than the 0.16 in the tradable sector, suggesting than the non-tradable sector is characterized by more fragmented markets structures. However, there is still substantial density for HHI levels above 0.18, the threshold typically set to identify highly-concentrated markets, notably in the tradable sector (13 per cent of non-tradable markets and 38 per cent of tradable markets are highly concentrated). Nevertheless, weighted kernels are more likely to convey robust information regarding concentration levels in the economy.

Figure 6 presents weighted kernels according to average GVA in the 2005-2009 period. Weights correspond to average values of GVA in the 2005-2009 period. The figure plots weighted Gaussian kernels for HHI and C10 in 2009, adopting both the classification of tradables and non-tradables and the classical manufacturing vs non-manufacturing division. When markets are weighted according to GVA, tradable and non-tradable distributions become more alike and density in low concentration increases. Nevertheless, the non-tradable sector is still associated to more fragmented market structures. The use of non-manufacturing vs manufacturing classification does not substantially change the results in terms of market structures.

The C10 analysis offers a complementary view on market concentration. Using unweighed or weighted C10 kernels, results are very similar. The non-tradable sector still appears associated to more fragmented market structures than the tradable sector. In addition, it should be mentioned that C10 levels are high for both sectors considered. Density in high concentration ratios, in the unweighed distribution, is higher in the tradable sector (65 per cent of tradable markets have C10 above 50 per cent) compared with non-tradable (37 per cent of non-tradable markets have C10 above 50 per cent). Therefore, the role of the biggest firms must be taken into account when assessing the competition environment. Results are compatible with the shape of market shares' distributions presented in panel b) of figure 4.

As previously mentioned, one should bear in mind that as previously mentioned, HHI



along with C10 levels for the tradable and manufacturing sector are less meaningful as the relevant market is unlikely to coincide with the internal market.

Figure 7 plots HHI and C10 distribution for the two sectoral classifications, overlapping 2005 and 2009, i.e., focusing on the change in the shape of the distribution. As before, distributions are weighted according to average values of GVA in the 2005-2009 period. Regarding HHI, distributions present slightly more density in low concentration values, particularly in the non-manufacturing sector, which results points to higher competition intensity. From 2005-2009, there is a movement towards a higher relevance of the ten biggest firms in the non-tradable sector, but not in the non-manufacturing sector. In the tradable sector, the distribution moved in the opposite direction pointing to lower market concentration and thus higher competition. Nevertheless, nothing is said regarding the intra-distribution from 2005 to 2009.



Figure 7: Distribution of HHI and C10 across markets in 2005 and 2009, weighted according to GVA

Market concentration trends are assessed in two ways. Firstly, the percentage of markets that record higher HHI or C10 is presented, inferring on possible competition reductions. Secondly, the magnitude of those changes is detailed, based on classes for high, moderate and low concentration levels. In fact, if concentration rises in highly concentrated markets, there is an increased likelihood of collusive behavior among incumbents, which is more worrying from a policy point of view.

Table 2 presents the percentage of markets that record higher HHI or C10 in the two sub-periods. Results are reported in relative terms, i.e., cases of potential lower competition are adjusted for total number of markets, total GVA, sales or employment in the selected sector, depending on the weighting option.

In the 2005-2009 period, 51 and 49 per cent of markets in the economy registered increases in concentration measured through HHI and C10, respectively.<sup>20</sup> If these markets are weighted according to their GVA, sales or employment, market concentration increases become significantly more relevant in the economy. Overall, higher concentration is relatively widespread across markets and significant in terms of resources involved. In the previous period (2000-2004), the percentage of markets associated to higher concentration is lower (44 and 30 per cent in HHI and C10, respectively), as well as its representativeness in terms of resources involved. Nevertheless, the database coverage in this period is substantially lower, which may have a particularly strong impact when concentration measures are computed. In addition, due to incomplete coverage, GVA, sales and employment weights always refer to the 2005-2009 period, thus there is no structure effect when comparing the two sub-periods.

Overall economy results hide a substantial degree of heterogeneity across sectoral aggregates. In fact, tradable and non-tradable sectors exhibit distinct results. In the period 2005-2009, although the share of markets where concentration increases is slightly below 50 per cent in non-tradables or non-manufacturing, the share of resources involved in terms of sectoral GVA, sales and employment is substantially larger. In the tradable sector, increases in concentration are substantially less relevant in terms of resources though more generalized across markets comparatively to the non-tradable sector.

 $<sup>^{20}</sup>$ Since several markets present C10 = 1 (the upper bound of the indicator), upward movements are non existent, thus no signal in terms of competition is conveyed. If markets where C10 is 1 are excluded, competition reductions account for 52 per cent of markets.

	Central	de Bal	anços 20	00-2004		IES 200	5-2009	
Type of weight	Markets	GVA	Sales	Employ- ment	Markets	GVA	Sales	Employ- ment
Overall Economy								
ННІ С10	$\frac{44}{30}$	43 27	$\frac{44}{31}$	57 39	$51 \\ 49$	$63 \\ 58$		$\begin{array}{c} 69 \\ 64 \end{array}$
Aggregates								
<b>HHI</b> Manufacturing Non-manufacturing	52 32	51 40	45 44	59 56	52 48	$59\\64$	62 66	58 75
Tradable Non-tradable	50 31	52 37	$\begin{array}{c} 46 \\ 43 \end{array}$	61 53	53 45	57 67	60 68	62 76
C10 Manufacturing Non-manufacturing	38 18 26	50 19	43 27 27	65 26	49 50	50 61	47 66	55 69
Non-tradable	18	42 16	28	20	47	69	40 70	30 76
Non-manufacturing detail								
HHI Electricity and Water Supply Construction Trade Transports and Communications Other Services	25 60 38 8 33	0 97 27 21 47	0 98 39 22 53	$egin{array}{c} 0 \\ 98 \\ 32 \\ 54 \\ 36 \end{array}$	$25 \\ 100 \\ 46 \\ 50 \\ 43$	12 100 78 42 51	6 100 73 58 44	58 100 72 72 47
<b>C10</b> Electricity and Water Supply Construction Trade Transports and Communications Other Services	$egin{array}{c} 0 \\ 40 \\ 29 \\ 86 \\ 14 \end{array}$	$egin{array}{c} 0 \\ 19 \\ 27 \\ 21 \\ 10 \end{array}$	0 15 39 22 10	$egin{array}{c} 0 \\ 21 \\ 32 \\ 54 \\ 10 \end{array}$	$egin{array}{c} 0 \ 100 \ 58 \ 33 \ 52 \end{array}$	$0 \\ 100 \\ 82 \\ 40 \\ 41$	$egin{array}{c} 0 \ 100 \ 79 \ 42 \ 33 \end{array}$	$egin{array}{c} 0 \ 100 \ 76 \ 21 \ 49 \end{array}$

Table 2 presents also a more detailed sectoral classification for non-manufacturing. The most striking result appears in "Construction", where all markets recorded increases in HHI and C10 in the period 2005-2009. In "Trade", about half of the markets recorded increases in concentration and they represent about three quarters of resources involved in the sector. In the period 2000-2005 the numbers are lower, especially for the "Trade" sector. At the opposite extreme is "Electricity and water supply", where the percentage of markets with higher concentration is small and totally unrepresentative in terms of total resources used in the sector.

Higher concentration trends are particularly worrying if they occur in highly concentrated markets, especially if they assume a non-tradable nature. Figure 8 breaks down increases in concentration along the three referred categories (high, moderate and low). In addition, the two sub-periods and different sectoral classifications are used. It should be noted that the decomposition within each sector does not adjust for the structure in terms of concentration categories, i.e., the fact that each concentration category has a different share within each sector is disregarded. The aim of the analysis is to assess



Figure 8: Breakdown of increases in concentration (HHI)







(c) CB

manufacturing

(2000-2004):

(b) IES (2005-2009): Tradable vs non-tradable



Manufacturing vs non- (d) IES (2005-2009): Manufacturing vs nonmanufacturing

the relevance of competition reductions in the economy and not to draw conclusions in terms of incidence of competition reductions by concentration category. Therefore, we analyse whether increases in concentration take place in highly concentrated markets, while keeping their relevance in the total distribution of markets in the sector.

The figure shows that most of the markets where concentration increased present low average levels of HHI, both in 2000-2004 and 2005-2009 periods.<sup>21</sup> This is especially the case in the non-tradable and services sectors. In tradables and manufacturing about one fifth of markets that increased concentration in the second sub-period belong to a high concentration category, being also relevant in terms of GVA and sales involved.

A complementary approach consists in computing the percentage change in the HHI and C10 for each market in the two sub-periods. Figure 9 ranks markets according to these rates of change and signals non-tradables with black bars. The first result is

 $<sup>^{21}</sup>$ The classification of markets basing on average levels of concentration is naturally affected by the change observed in the indicator. Although this option may increase the percentage of markets classified as highly concentrated, it is more robust than classifying a market basing on a single year of HHI. Robustness tests confirmed that, under the current approach, the number of markets transiting to higher categories is insignificant.

Figure 9: Concentration trend per market



that both tradable and non-tradable markets stand amongst those with the highest and lowest rates of change, implying again an heterogeneous scenario. Several non-tradable markets stand amongst those with the lowest (negative) percentage changes in concentration in the period 2000-2004. The highest percentage increases in the 2005-2009 period are related to more capital intensive manufacturing sectors such as "Manufacturing of other chemical products" (CAE 246) but also "Manufacture of jewelery and related articles" and services like (CAE 362), "Architectural and engineering activities and related technical consultancy" (CAE 742). Strongest concentration falls in this period include "Legal, accounting, book-keeping and auditing activities; consultancy" (CAE 741), "Manufacture of rubber products" (CAE 251) and "Forging, pressing, stamping and roll forming of metal; powder metallurgy" (CAE 284).

#### 6.2 Profitability measures

#### 6.2.1 Levels of profitability

The competition assessment based on profitability measures follows the same structure adopted in the previous subsection. Figure 10 presents weighted Gaussian kernels for market PCM (firm-level PCM weighted according to its market share) and LIR, in 2009, using the sectoral classifications previously presented. Weights correspond to average GVA in the 2005-2009 period. The distribution is substantially more concentrated for tradables and manufacturing sectors, i.e., tails are heavier in the non-tradables and non-manufacturing distributions, particularly the right tail. Moreover, the average PCM is higher in the non-tradable and non-manufacturing sectors.



Figure 10: Distribution of PCM and LIR across markets in 2009, weighted according to GVA



#### Figure 11: Distribution of PCM and LIR across markets in 2000, 2005 and 2009, weighted according to GVA







(c) PCM - Manufacturing



(e) LIR - Tradable











Considering unweighed distributions, the non-tradable sector presents an higher average that the tradable sector (11 and 8.1 per cent, respectively in 2009). Considering manufacturing and non-manufacturing, the numbers are 7.4 and 11.5 per cent, respectively. In 2009, 90 per cent of tradable markets and 92 per cent of manufacturing markets present PCM between 0 and 20 per cent. For non-manufacturing and non-tradable sectors, this density is substantially lower, reaching 65 and 62 per cent, respectively. There is also significant heterogeneity in PCMs across markets in the economy, mostly in non-tradables and non-manufacturing markets, both in unweighed and weighted distributions. LIRs are concentrated slightly below 100 per cent in all sectors, but more markedly in the tradable sector and manufacturing.

Figure 11 plots the PCM and LIR distribution for the two sectoral classifications in 2000, 2005 and 2009, i.e., focusing on the change in the shape of the distribution.<sup>22</sup>

The shape of the distribution has changed considerably in non-manufacturing and in non-tradable sector. Density in low and positive PCM faced a sharp decline in the nontradable sector. The non-manufacturing sector exhibits the same pattern although in a lower magnitude. This result suggests a reduction in competition. The tradable and manufacturing PCM distributions do not change substantially. LIR distributions do not exhibit a clear pattern in terms of changes from 2000 to 2009.

#### 6.2.2 Trends in profitability

Table 3 presents the percentage of markets that record higher PCM or lower LIR in the two sample sub-periods, signalling potential lower intensity of competition. Results are reported in relative terms, i.e., cases of potential lower competition are adjusted for the total number of markets in the selected sector. In addition, as markets have different relevance within sectors, GVA, sales and employment are also used as weights.

In the 2005-2009 period increases in profitability are relatively generalized across markets (46 per cent) and significant in terms of resource allocation in the overall economy (57, 57 and 52 per cent of GVA, sales and employment, respectively). The main difference relatively to concentration measures is that increases in market profitability are somewhat less widespread across markets and less relevant in terms of sales, GVA and employment.

In sectoral terms, in the 2005-2009 period, the percentage of non-tradable and nonmanufacturing markets that registered an increase in PCM is higher than in tradable

 $<sup>^{22}</sup>$ Contrary to concentration measures, the scale of PCM is not affected by a large increase in the number of firms considered. Therefore, the break in the database is less disturbing for the comparability of the indicator between the two sub-periods, i.e., it allows for the comparison of 2000 with 2005 and 2009.

	Central	de Bala	anços 20	00-2004		IES 200	5-2009	
Type of weight	Markets	GVA	Sales	Employ- ment	Markets	GVA	Sales	Employ- ment
Overall Economy								
PCM LIR	$50 \\ 54$	$56 \\ 56$	$54 \\ 52$	$\begin{array}{c} 64 \\ 64 \end{array}$	46 48	57 56	57 53	$52 \\ 49$
Aggregates								
PCM Manufacturing Non-manufacturing	$\begin{array}{c} 46\\ 56\end{array}$	60 58	58 53	65 63	39 58	31 67	29 65	25 66
Tradable Non-tradable	46 59	51 64	$50 \\ 57$	54 71	41 59	44 67	42 65	$37 \\ 64$
<b>LIR</b> Manufacturing Non-manufacturing Tradable Non-tradable	58 49 53 58	70 51 48 62		77 57 59 68	46 50 48 47	35 63 54 58	35 59 50 55	31 58 44 53
Non-manufacturing detail								
<b>PCM</b> Electricity and Water Supply Construction Trade Transports and Communications Other Services	$75 \\ 40 \\ 46 \\ 58 \\ 67$	21 92 41 72 60	19 95 45 61 58	64 91 37 33 77	$50 \\ 100 \\ 50 \\ 42 \\ 67$	91 100 55 39 73	87 100 56 39 82	93 100 48 65 45
LIR Electricity and Water Supply Construction Trade Transports and Communications Other Services	$75 \\ 40 \\ 45 \\ 56 \\ 47$	21 92 39 53 44	19 95 39 50 39	$64 \\ 91 \\ 34 \\ 20 \\ 57$	$50 \\ 80 \\ 42 \\ 50 \\ 52$	91 99 43 57 63	87 100 46 49 70	93 100 31 73 31

and manufacturing and also more significant in terms of the relative share of resources involved. In fact, 59 per cent of non-tradable markets report an increasing PCM, in contrast with 41 per cent in the tradable sector. The corresponding numbers for non-manufacturing and manufacturing are 58 and 39 per cent, respectively. In terms of resource allocation, non-tradable markets where profitability has increased, during 2005-2009 period, account for about two thirds of GVA, employment and sales in this sector. In contrast, only about 40 per cent of tradable GVA, employment and sales is associated to increases in PCM. This scenario is corroborated by the analysis of decreases in the LIR. The analysis of the first sub-period shows a similar pattern, though the percentage of markets and the share of resources associated to manufacturing and tradable markets where profitability increased is somewhat higher. Similarly to concentration measures, average market weights in period of IES were used to aggregate profitability increases in the period of CB, eliminating the structure affect. It should be recalled that under IES, market weights are based on the universe of firms, thus adequately reflecting the economic structure.

The bottom panel of table 3 considers a more detailed sectoral classification for non-



(a) CB(2000-2004) Tradable vs non-tradable



(b) IES(2005-2009) Tradable vs non-tradable

NT

т

GVA

I ow

High

NT

т

Sales

NT

т

Employment

Moderate



(c) CB(2000-2004) Manufacturing vs non-manufacturing



manufacturing. As in case of concentration measure, the most striking result lies at "Construction", where virtually all markets recorded increases in PCM and decreases in LIR in the period 2005-2009. "Electricity and water supply" and "Other Services" also exhibit lower competition as suggested by higher profitability, though in the latter sector the share of resources involved is comparatively smaller. In the first sub-period, "Construction" shows a lower percentage of markets with increases in profitability, though the percentage of GVA, sales and employment is already very high.

Similarly to concentration measures, it is relevant to breakdown the changes in market profitability according to different categories, while keeping in mind the remarks on the interpretation of results. In this case, we define low, moderate and high profitability, according to the 25th, 50th and 75th percentiles of the 2000-2009 overall PCM distribution (low profitability: PCM < 4.6%, moderate:  $11.8\% \ge PCM \ge 4.6\%$ , high: PCM > 11.8%). In this sense, higher profitability in highly profitable markets may signal a higher probability of collusive behavior among incumbents, thus deserving

100

90

80

70

60

50

40

30

20

10

0

NT

т

Markets

Per cent

higher concern from a policy point of view. High PCMs are generally associated to markets with higher sunk costs and consequently higher entry barriers.

Figure 12 presents this breakdown and shows that, in both subperiods, the increase in profitability occurs mostly in moderately profitable markets. Nevertheless, there is a significant percentage of non-tradable and non-manufacturing markets where these changes take place in cases of high average profitability, mainly in the period 2005-2009 and involving a significant share of GVA.

Profitability trends by market were also estimated for the period 2000-2009. Although there is a break in series for profitability due to different coverage of CB and IES databases, assuming that CB is representative by markets, it is possible to compute trends on the overall period.<sup>23</sup> Figure 13 ranks estimated profitability trends measured in PCMs (panel a) and LIRs (panel b), identifying significant estimates at 10 per cent with light grey bars.<sup>24</sup> In panel a), it is particularly clear that many non-tradable markets present high positive and significant profitability trends, which confirms the analysis carried before. In addition, the share of non-tradable markets that observe a decreasing trend is lower than in tradable markets. This is visible in table 4, which computes the percentage of positive and negative bars in the two figures above, taking only significant estimates.

As previously mentioned, market PCM is not always driven by PCM of incumbents. In the presence of strong reallocation effect, market PCM is less likely to provide correct information. At this point it is important to disentangle the effects that explain changes in PCM across markets, as proposed in equation 9. The change in market PCM between two periods is due to the interaction between incumbents and entry and exit effects. In the former case, there is a "within effect", associated to the change of PCM for given levels of market share and a "reallocation effect" associated with changes of market share for given levels of PCM. There is also a structure effect known as "interaction effect", whose sign is positive when market shares and profitability move in the same direction.

Figure 14 presents this decomposition for all changes in PCM in all markets form 200 to 2009 and some important results arise.<sup>25</sup> Firstly, in panel a) the large majority of observations lie in the first and third quadrants (78 per cent), implying that increases in market PCM are generally associated to an increase in incumbents PCM, assuming

 $<sup>^{23}</sup>$ Concentration trends were not estimated because the break in the database severely affects the level of these indicators. Trends were computed using Newey-West standard errors assuming first order autocorrelation. Note also that PCM series may be non-stationary but low degrees of freedom do not allow to test or correct for potential non-stationarity.

 $<sup>^{24}</sup>$ In the estimation of LIR trends, a small number of observations with unrealistic low values was eliminated.

 $<sup>^{25}</sup>$ In this analysis, considering separate subperiods, associated with the two databases, does not significantly change results.



constant market shares. There is a positive correlation between market PCM changes and the within effect. The interpretation of the "reallocation effect" must take into account the existence of firms with negative PCM. A positive "reallocation effect" can be associated to an increase of market share if PCM is positive or a fall in market share if PCM is negative. Panel b) reveals negative "reallocation effects", i.e., observations lie mostly in the second and third quadrants, meaning that firms with positive profits decreased market share and those running losses increased their share. The interpretation of this result in terms of competition is not straightforward. If changes in PCM signal competition pressures, the reallocation of market share towards less profitable

Table 4:	Significant	$\mathbf{PCM}$	and LIR	trends	(2000-2009)	)
----------	-------------	----------------	---------	--------	-------------	---

	PC	CM	LIR			
Sector	Nb.	Increasing	Decreasing	Increasing	Decreasing	
	Markets	trend (%)	trend (%)	trend (%)	trend (%)	
Tradable	$     \begin{array}{l}       115 \\       51     \end{array}   $	29	71	52	48	
Non-tradable		44	56	65	35	
Manufacturing	99	23	77		39	
Non-manufacturing	67	50	50		46	

Figure 14: Breakdown of PCM change by market



firms could be interpreted as the result of higher competition. On the contrary, the "reallocation effect" may be the result of a competitive environment where less efficient firms are gaining market share.

Entry and exit effects are presented in panels c) and d) of figure 14, respectively. The results are consistent with what economic theory would predict. The observations in panel c) lie mostly in the first and fourth quadrants, meaning that firms mostly entre with positive PCM either in markets where the change in PCM is positive or negative. In addition, observations in panel d) lie mostly in second and third quadrants, meaning that firms exit with negative PCM both in markets where the change in profitability is positive or negative.



#### 6.3 Consistency of indicators and illustration with selected markets

In the previous section, concentration and profitability measures were analyzed separately and consistency between measures across markets was not taken into account. As refereed in section 4, LIR is expected to present a negative correlation with PCM; C10 and HHI should present a positive correlation and HHI and PCM should be positively correlated. Figure 15 tests these priors by plotting PCM changes on LIR changes (panel a), HHI changes on C10 changes (panel b) and HHI changes on PCM changes (panel c) in the 2005-2009 period. Panel a) shows that in 84 per cent of markets, PCM and LIR convey the same message in terms of competition developments. Concentration measures, C10 and HHI present a positive correlation as 76 per cent of markets stand in the first and third quadrants (panel b). Nevertheless, the relation between the PCM and HHI is only mildly consistent (panel c), the correlation coefficient is positive, though very small.

Consistency of competition indicators for specific markets can be checked by pooling the different indicators and commenting their change over time. In this subsection, three individual markets were selected, though the analysis remains distinct from the one typically performed by competition authorities. The three individual markets selected are "Textile weaving" (CAE 172), "Sale of motor vehicles" (CAE 501) and "Restaurants" (CAE 553). The criteria for selection based on representativeness across broad economic sectors.

The textile sector is an example of a traditional sector that is subject to intense international competition (see for example Amador and Opromolla (2009)). Within the textiles sector, the "textile weaving" market has the largest average share in total tex-



(e) C10 and moments of market shares distribution



(f) Herfindahl-Hirschman index

tile GVA in the period 2000-2009 (0.5 per cent of total GVA). Panel a) of figure 16 shows that there has been a sharp fall in PCM, from 10 per cent in 2000 to close to 2 per cent in 2009. The LIR presents an upward path, also pointing to an increase in competition. In addition, when compared with other EU countries in the 2000-2004 period, the PCM in the Portuguese market was relatively high. The evolution of the PCM was mainly driven by the "within effect", suggesting a fall in incumbents PCM (panel c). In addition, as it occurs in most sectors of the economy, the share of the 10 per cent largest firms is high, reaching about 50 per cent. There is no clear evidence of a different path for profitability according to firms' size as the unweighed PCM of both largest and smallest firms shows a decrease since 2000, except for some recovery in 2009. Nevertheless, profitability is higher for the largest firms (panel d). Finally, panels e) and f) of figure 16 report concentration measures, indicating a virtual stabilization in concentration from 2005 to 2009.

Figure 17 illustrates competition developments in the "sales of motor vehicles" market. This market is representative of the retail sector, which is non-tradable by nature. LIR has increased and PCM has decreased substantially in the last years, reaching negative figures in 2009. Contrary to the textiles sector, the reduction in profitability is unlikely to be a result of foreign competition, but probably from higher domestic competition, in a context of lower demand for automobiles. The evolution of profitability has been mostly explained by a negative "within effect", i.e., a drop on profitability of incumbent firms. The largest firms represent about 50 per cent of total GVA in this market and their level of profitability is higher than average (panel d). Finally, the number of firms operating in the market has increased, contributing to a decrease in concentration and reinforcing the notion that competition has increased in the last years of the sample.

The market for "Restaurants" has intrinsically a non-tradable nature and has increased its weight in the economy. The share in total GVA increased from 0.24 to 1.45 per cent between 2000 and 2009. Profitability has also decreased from 2005 to 2009, pointing to higher competition in a context of lower demand (see figure 18). As for the drivers in the evolution of profitability, the "interaction effect" partly counteracts the negative contributions from the "reallocation" and the "within effect", i.e., firms with decreasing PCM face also lower market shares while those with higher profitability tend to increase their share in the market. In addition, the unweighed profitability of the 10 per cent largest firms is higher than that of smaller firms and the latter has decreased more significantly. Furthermore, as in the other examples, the larger firms represent a large share of the market (about 50 per cent) in the IES period. Finally, in what concerns concentration, no significant changes exist, which is a normal result in a market with a very high number of firms and where the largest ones show only a moderate dimension.



(e) C10 and moments of market shares distribution



10 0 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 GVA of 10 per cent biggest firms Unweighted PCM of 10 per cent biggest firms (rh.s)

(d) Share and profitability of large firms



(f) Herfindahl-Hirschman index



(e) C10 and moments of market shares distribution



(b) PCM in EU countries



(d) Share and profitability of large firms



(f) Herfindahl-Hirschman index

## 7 Market aggregates

As it was said above, competition is best assessed at market level and HHI and PCM levels can not be directly compared across sectors mostly due to technological differences. Nevertheless, it is useful to compute aggregate competition measures both for policy analysis and calibration of macroeconomic models. This section proceed in this direction. Three levels of aggregation are considered: total economy; broad sectors and tradable vs non-tradable sectors. The aggregation variable chosen was the GVA share for the average period 2005-2009, which eliminates effects coming from changes in the structure of the economy. Other weighting possibilities include sales or employment.

The aggregation based on sales is an option taken in the literature, having the advantage of chaining with the aggregation of firms in a market. The disadvantage of this option is the non consideration of the true relevance of markets for each sector, for example, overstating a decrease in competition in a sector of high sales but very little GVA or employment. Nevertheless, is should be noted that the relevance of each market in terms of competition may not be truly perceived by its GVA share. In fact, specific markets with low GVA share can be extremely relevant as they may be important inputs in other markets. The aggregation were based on sales, results would be very similar with the exception of tradable and non-tradable sectors where average profitability rates in the period 2005-2009 would be 8.4 in 7.9 per cent, against 10.0 and 11.7 per cent using GVA. In any case, the annual path os qualitative the similar because fixed weights are used in the aggregation.

Figures 19 and 20 present the results obtained for concentration and profitability indicators, respectively. As mentioned previously, levels of both concentration and profitability measures reflect not only market competition but also a set of market features such as production technology, sunk costs and elasticity of demand. Therefore, a comparison of different sectors does not convey correct information in terms of competition assessment. Given the existence of a series break in 2005, due to the change in coverage associated with the transition from CB to IES database, a blank is inserted in this year. Figure 19 presents concentration indicators at the aggregate sectoral level and adopts the aggregation weights mentioned above. Panel a) reveals that there are substantial differences in concentration measures across sectors, reflecting different market structures. Construction and Services are the least concentrated, while Electricity and manufacturing show larger values. At the services level, "Trade" and "Hotels and restaurants" present a strongly fragmented market structure, as opposed to "Transports and communication". This pattern is consistent with information from C10 in panels b) and d). Taking tradables vs non-tradables, it is clear that there are no trends in the path of concentration but the level of the indices is higher in the former group.





The analysis of figure 20 reveals that PCM for the overall economy stood at near 11 per cent in the 2005-2009 period. Total profitability in the economy with an aggregation based on sales would be 8.1 per cent in this period. The Construction sector and Services recorded increases in PCM from 2005 to 2009, suggesting lower competition (panel a) of figure 20). In the 2000-2004 period a similar trend seems to exist. On the contrary, the Manufacturing sector shows a declining PCM in the period 2005-2009. The LIR offers a scenario consistent with profitability (panel b), though the Electricity sector shows a decline, which might reveal lower competition.

Considering a more disaggregated classification of services, it is visible that higher profitability in the period 2005-2009 is only sizeable in "Other services" and in "Hotels and restaurants" between 2005 and 2007. Finally, given the criteria for classifying tradable and non-tradable sectors, panel e) of figure 20 reveals that the latter group of sectors increased profitability while the tradable sector recorded a stabilization, leading to a slight increase in the overall economy in the period 2005-2009. In the 2000-2004 period, there seems to be an increase in profitability in both sectors. The LIR (panel f) shows a stable path, though there is a slight increase in the tradable sector in the last three years, pointing to higher competition.

### 8 Concluding remarks

This article offers an extensive overview of competition indicators in the Portuguese economy in the period 2000-2009. The existence of a break in the database in 2005 leads to a segmentation of the analysis for the periods 2000-2004 and 2005-2009. The paper covers qualitative competition indicators as well as classical profitability and concentration measures, focusing on the difference between tradable and non-tradable sectors. The analysis carried out is distinct from that of competition authorities. These institutions define relevant markets in a more accurate way and characterize firm's competitive behavior, while our purpose is to describe developments in the overall competition scenario.

The article concludes that, although there are no widespread problems, some sectors offer large room for improvements in the competition environment, notably in the nontradable area. Firstly, the qualitative analysis based on the OECD product market regulation indicators, shows that improvements existed in the last 10 years but Portugal still lags behind in term of best practices. Secondly, about half of total markets in the economy register increasing concentration or profitability. In terms of GVA, sales or employment involved in these markets, increasing profitability and concentration trends turn out to be more relevant. In addition, sectoral results are broadly robust to the alternative classifications of tradable vs non-tradable or manufacturing vs nonmanufacturing sectors.

Positive changes in concentration are more widespread in the tradable sector than in the non-tradable sector, though in the latter case they are more significant in terms of resources involved. In addition, markets where concentration increased are mostly those with low average levels of HHI, both in 2000-2004 and 2005-2009 periods, especially in the case of the non-tradable and non-manufacturing sectors.

Regarding profitability, positive changes are more widespread in the non-tradable sector than in the tradable sector. Similarly to concentration, the share of resources involved in these changes is relatively more relevant in the non-tradable sector than in the tradable sector. Another important result is that there are several non-tradable sectors amongst those with high price cost margin and many of them recorded increases in profitability in the period 2005-2009. In addition, several of these sectors also recorded increases in price cost margin in the period 2000-2004. Furthermore, changes in market's profitability are mostly driven by changes in the price cost margin of incumbent firms, the designated "within effect". The "reallocation effect" is negative in most markets, meaning that firms with positive profits decreased market share and those running losses increased their share, suggesting either an increase in competition or a reallocation of market share towards apparently less competitive firms.

The aggregate sectoral analysis, weighing individual market indicators with their share on total GVA, reveals that the non-tradable sector increased profitability while the tradable sector recorded a stabilization, leading to a slight increase in the overall price cost margin for the economy in the period 2005-2009. This conclusion seems to confirm that there is substantial room to improve competition in the non-tradable sector. A more efficient allocation of resources, favoring the correction of existing macroeconomic imbalances in the Portuguese economy, may be reached though higher competition in non-tradable markets.

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# Table 5: Competition indicators - levels and variation

CAE2.1	Market designation	HHI 2009	ΔΗΗΙ 2005- 2009	C10	ΔC10 2005- 2009	PCM	ΔPCM 2005- 2009	LIR	ΔLIR 2005- 2009
151	Prod., processing and preserving of meat and meat	197	7	36.1	0.4	4.5	-0.1	88.1	-0.3
150	products	250	7	40.5	0.1	4.9	0.0	00,-	0.2
152 152	Processing and preserving of fish and fish products	309	100	49,5	0,1	4,2	0,0	80,8	0,3
154	Manuf, of vegetable and animal oils and fats	004 1573	-109 17	87 0	$^{-1,2}_{0,1}$	2,9	-0,0	80.1	-9.4
155	Manuf, of dairy products	2260	-15	82.1	0.0	11.1	0.4	56.8	-1.1
100	Manuf, of grain mill products, starches and starch prod-		10	02,1	0,0		0,1		1,1
156	ucts	541	-11	60,1	-1,4	7,3	-0,1	51,7	-1,9
157	Manuf. of prepared animal feeds	349	7	50,3	$^{1,1}$	$^{5,4}$	-0,2	$^{62,3}$	-0,6
158	Manuf. of other food products	416	2	$^{42,4}$	-0,2	8,9	-0,5	84,5	1,9
159	Manuf. of beverages	635	67	60,4	2,9	12,6	$^{0,2}$	68,5	-2,4
160	Manuf. of tobacco	20.9	0	10 1	0.7	2.0	1.6	170.4	10.1
171	Textile weaving	317	9 7	46,4 46,4	-0,7	$^{-3,2}$	-1,0	114.9	3.1
173	Finishing of textiles	182	8	31.7	0,2	5.2	-0.9	110.6	-0.1
174	Manuf. of textile articles, except apparel	419	-23	51,6	-0,7	$^{4,2}$	-0,7	99,2	1,8
175	Manuf. of other textiles	270	7	45,1	0,7	8,4	-0,1	$91,\!6$	0,3
176	Manuf. of knitted and crocheted fabrics	259	10	41,8	0,8	$^{5,9}$	-0,3	$^{84,4}$	0,0
177	Manuf. of knitted and crocheted articles	174	13	$^{33,1}$	1,7	6,4	-0,1	92,4	-0,6
181	Manuf. of leather clothes	1164	-132	87,0	-0,3	-23,3	-5,7	116,8	2,8
182	Manuf. of other wearing apparel and accessories	30	1	13,5	$^{0,4}$	2,1	-0,5	97,3	0,9
191	Tanning and dressing of leather	503	11	56.6	-0.4	8.0	0.9	77.4	-4.0
101	Manuf. of luggage, handbags and the like, saddlery and	410			0,1	- 0	0,0	,1	1,0
192	harness	419	24	51,8	2,0	7,3	0,3	85,5	-1,2
193	Manuf. of footwear	54	-4	15,4	-1,1	5,7	-0,2	90,9	0,0
201	Sawmilling and planing of wood; impregnation of wood	111	-8	25,6	-0,6	$^{5,8}$	-0,4	97,7	3,6
202	and fibre board	3141	106	97,7	$^{0,5}$	$^{7,3}$	-0,9	$^{84,5}$	3,2
203	Manuf. of builders carpentry and joinery	139	-2	25,1	0,4	7,8	0,1	90,2	-0,2
204	Manuf. of wooden containers	518	-12	60,0	0,4	7,8	0,3	89,6	1,5
205	Manuf. of other wood products, cork articles, straw and	353	32	41.3	1.7	6.7	-0.3	88.7	3.2
011	plaiting materials	0520	<u> </u>	05.0	-,.	с,. Е 4	2.0	911 7	0,
211	Manuf, of pulp, paper and paperboard	2030	08 12	95,9 20.7	0,1	$^{0,4}$	-3,0	311,7	01,4
212	Publishing	277	-6	30,7 46.0	-0.3	4.7	-0.4	91.7	2.1
222	Printing and service activities related to printing	66	0	18,2	-0,1	14.0	-0,1	85.8	-0,1
223	Reprod. of recorded media	1913	-312	88,8	0,0	$^{4,4}$	-3,8	120,8	9,7
232	Manuf. of refined petroleum products								
241	Manuf. of basic chemicals	751	-122	65,7	-2,2	$^{5,8}$	-0,7	100,7	8,3
242	Manuf. of pesticides and other agro-chemical products	5606	42	100,0	0,0	9,9	1,9	64,5	-11,9
243	ing ink and mastics	646	12	67,8	$^{1,3}$	$^{9,7}$	$^{0,8}$	71,9	-3,5
944	Manuf. of pharmaceuticals, medicinal chemicals and	45.9	1.9	F0 0	0.0	10 5	0.0	OF F	1.4
244	botanical products	453	13	58,8	0,8	$^{13,5}$	-0,6	65,5	$^{1,4}$
245	Manuf. of soap and detergents and cleaning prepara-	1144	-22	73.2	-0.7	10.3	0.0	68.5	0.1
946	tions Manuf, of other chamical and ducto	1949	252	00.0	67	0.8	2.2	204.2	52.2
240	Manuf, of man-made fibres	1645	333	80,8	0,7	-0,8	-2,2	294,3	55,5
251	Manuf. of rubber products	448	-923	58.2	-6.3	5.8	-4.1	96.9	11.4
252	Manuf. of plastic products	114	2	24,8	$^{0,2}$	10,3	0,4	79,5	-2,1
261	Manuf. of glass and glass products	1161	118	76,3	0,8	20,9	1,1	56,2	-3,9
262	Manuf. of ceramic products	533	3	58,6	$^{0,4}$	$^{6,3}$	-0,6	107,0	2,2
263	Manuf. of ceramic files and flags	837	11	79,9	-0,2	12,4	-0,4	81,4	0,3
264	baked clay	541	28	61,9	$^{2,7}$	$^{0,3}$	-1,4	159,3	-0,2
265	Manuf. of cement, lime and plaster	3095	-68	99.1	-0,1	24,9	-0,7	35,7	0.0
266	Manuf. of articles of concrete, plaster and cement	275	13	$41,\!6$	$^{1,2}$	$^{8,1}$	$^{0,1}$	86,1	0,3
267	Cutting, shaping and finishing of ornamental and build-	45	0	14.2	0.0	7.3	-0.6	100.5	1.9
268	Ing stone Manuf, of other non-metallic minoral products	881	43	79.7	0.0	15.8	11	64.2	35
203	Manuf, of basic iron and steel and of ferro-alloys	3355	43 112	100.0	0,9	2.7	-0.1	115.3	-51.3
272	Manuf. of tubes	1969	-21	88,1	0,1	1,3	-2,0	137.1	15,6
273	Other first processing of iron and steel	1722	-17	93,2	-0,6	3,7	-2,0	80,4	11,2
274	Manuf. of basic precious and non-ferrous metals	861	-58	82,9	-2,0	$^{4,9}$	0,4	91,8	-3,5
275	Casting of metals	499	-25	58,0	-0,4	12,0	-0,5	$^{84,2}$	$^{2,1}$
281	Manuf. of structural metal products	80	-1	20,1	-0,2	$^{9,1}$	-0,4	$^{80,5}$	1,8
282	Manuf. of tanks, reservoirs, metal containers, central	1370	-48	73,1	$^{-1,7}$	7,9	-0,4	83,1	1,5
000	Manuf. of steam generators, except central heating hot								
283	water boilers								
284	Forging, pressing, stamping and roll forming of metal;	255	-357	36.8	-5.9	9.2	1.0	85.7	-4.9
201	powder metallurgy	200	501	55,0	0,0	0,2	1,0	00,1	1,0
285	ireatment and coating of metals; general mechanical engineering	67	3	19,2	$^{0,5}$	$^{9,6}$	-0,4	$^{85,5}$	$^{0,6}$
286	Manuf. of cutlery, tools and general hardware	176	1	$^{32,4}$	-0,2	10,0	-0,4	92,8	1,0
287	Manuf. of other fabricated metal products	189	-31	32,8	-1,9	10,4	-0,2	79,7	0,8
291	Manuf. of machinery for the prod. and use of mechani-	1970	219	80,3	3,7	9,0	-0,4	78,5	0,6
	cai power				-				

Note: In first column, nt identifies non-tradable sectors. HHI lies in the interval [0, 10000], while C10, PCM and LIR are expressed in percentage. Variations are expressed in p.p.. Due to confidentiality reasons, some results are not reported. 47

## Table 5: Competition indicators - levels and variation

CAE2.1	Market designation	HHI 2009	ΔΗΗΙ 2005- 2009	C10	$\Delta C10 \\ 2005 - \\ 2009$	PCM	ΔPCM 2005- 2009	LIR	ΔLIR 2005- 2009
292	Manuf. of other general purpose machinery	274	26	42,6	$^{2,5}$	9,3	0,2	76,0	-0,9
293	Manuf. of agricultural and forestry machinery	563	-60	63,0	-0,6	$^{5,6}$	0,1	93,8	0,0
294	Manuf. of machinetools	623	-35	63,7	$^{0,4}$	10,6	-0,5	84,6	0,8
295	Manuf. of other special purpose machinery	147	19	26,6	1,8	10,3	$^{0,5}$	$^{83,5}$	-3,1
296	Manuf. of weapons and ammunition								
297	Manuf. of domestic appliances n.e.c.	2472	-182	87,9	-0,1	12,9	-0,5	57,1	0,7
300	Manuf. of domestic appliances n.e.c.	6953	1099	99,5	$^{1,1}$	$^{6,4}$	1,1	37,6	-18,8
311	Manuf. of electric motors, generators and transformers								
312	Manuf. of electricity distribution and control apparatus	903	-29	73,5	-0,3	12,3	$^{1,0}$	65,5	-4,5
313	Manuf. of insulated wire and cable	1883	122	99,4	$^{0,1}$	$^{3,8}$	-0,1	$^{80,8}$	-2,5
314	Manuf. of accumulators, primary cells and primary bat-								
015	teries	107	1.77	50.0	1 1	10 5	0.0	00.0	1.4
315	Manuf. of lighting equipment and electric lamps	497	17	59,9	1,1	10,5	-0,3	80,3	1,4
510	Manuf. of electrical equipment n.e.c.	2540	-155	85,1	-1,5	4,2	0,1	105,0	-0,1
321	tropic components								
	Manuf of television and radio transmitters and appa-								
322	ratus for line telephony and line telegraphy	2068	168	$_{98,9}$	$^{1,5}$	$^{8,7}$	$^{0,2}$	77,3	-1,1
	Manuf of television and radio receivers sound or video								
323	equipments								
	Manuf, of medical and surgical equipment and or-								
331	thopaedic appliances	958	9	59,2	$^{0,1}$	12,4	0,6	76,8	-1,5
332	Manuf. of instruments and appliances for measuring	1766	-110	92,0	1,0	3,8	-0,5	116,2	6,2
333	Manuf. of industrial process control equipment	915	-268	65,0	-1,7	7,7	0,3	76,7	-1,0
224	Manuf. of optical instruments and photographic equip-	2519	94	08.0	0.2	15.9	0.4	61.9	1.0
əə4	ment	5512	-24	98,9	0,5	15,2	0,4	01,2	-1,0
335	Manuf. of watches and clocks	3546	-6	100,0	0,0	$^{5,9}$	11,6	98,1	-12,8
341	Manuf. of motor vehicles								
342	Manuf. of motor vehicles, trailers and semi-trailers	361	9	50,1	$^{0,5}$	$^{2,9}$	$^{1,0}$	101,7	-6,1
343	Manuf. of parts and accessories for motor vehicles and	364	-7	48.6	-0.1	47	-0.5	101.2	3.6
010	their engines	001		10,0	0,1	1,1	0,0	101,2	0,0
351	Building and repairing of ships and boats	1506	-27	73,1	-1,1	$^{8,9}$	1,1	$^{84,7}$	-2,6
352	Manuf. of railway and tramway locomotives and rolling								
050	stock								
353	Manuf. of aircraft and spacecraft		07	75.0	1.4	0.0	0.0	04.0	0.7
354	Manuf. of motorcycles and bicycles	758	27	75,0	1,4	8,2	-0,2	84,3	0,7
355	Manuf. of other transport equipment n.e.c.	4233	-427	99,6	0,0	-0,2	3,6	105,4	-67,6
361	Manuf. of furniture	41	-9	13,5	-1,8	5,8	-0,5	98,0	1,7
362	Manuf. of jewellery and related articles	544	100	$^{45,4}$	4,6	$^{5,2}$	0,3	82,1	-2,7
364	Manuf. of sports goods	1602	0.2	00.4	1 7	0.2	0.1	104.4	0.2
303 266	Manul. of games and toys	1005	92	90,4 20.6	1,1	2,3	-0,1	104,4	-0,5
371	Bocycling of motal waste and scrap	634	-29	59,0 64.6	-2,2	9,9 6.0	0,2	60.0	-0,0
371	Recycling of non-motal waste and scrap	351	-44	45.1	-2,4	12.5	-0,2	70.3	0.0
401 nt	Production and distribution of electricity	1732	153	80.4	-1,5	20.4	-0,0	78,5	17
401 110	Manuf of gas: distribution of gaseous fuels through	1102	-100	05,4	-0,5	20,4	0,4	20,1	-1,7
402 nt	mains	3002	-530	95,2	-0,7	$^{8,6}$	-3,1	21,8	0,6
403 nt	Steam and hot water supply								
410 nt	Collection, purification and distribution of water	530	12	52.0	-0.5	27.9	1.4	90.6	-2.6
451	Site preparation	774	110	44.6	2.5	34.9	5.9	46.0	-12.7
450	Building of complete constructions or parts thereof; civil		-	10.0	1.0	11.0	0,0	<u> </u>	, ,
452 nt	engineering	64	Э	19,8	1,2	$^{11,6}$	0,6	63,8	-0,8
453  nt	Building installation	55	3	18,0	$^{0,3}$	8,8	$^{0,3}$	77,7	-1,3
454  nt	Building completion	16	1	$^{7,3}$	$^{0,3}$	8,2	$^{0,4}$	$^{85,1}$	-1,2
455 nt	Renting of construction or demolition equipment with	1041	116	76.2	2.7	25.8	0.6	87.5	1.0
100 110	operator	1011	110	10,2	2,1	20,0	0,0	01,0	1,0
501 nt	Sale of motor vehicles	100	-8	25,9	-1,5	-0,8	-0,3	143,6	7,8
502 nt	Maintenance and repair of motor vehicles	12	-1	6,7	-0,4	3,9	0,1	97,9	-0,7
503 nt	Sale of motor vehicle parts and accessories	44	-1	15,3	-0,2	$^{4,6}$	0,0	82,8	0,0
504 nt	Sale, maintenance and repair of motorcycles and related	150	-20	27.4	-2,5	3,0	-0.2	87.6	2,9
FOF	parts and accessories	167		22.0	0.7	0.0		04.9	0.4
505 nt	Retail sale of automotive fuel	107	-2	33,0	0,7	0,8	0,0	94,8	0,4
011 519 nt	Wholesale of agricultural row materials and live arises	40 500	30	10,0	-0.3	2,0	-0,1	66.0	-0,1
512 nt	Wholesale of food boyorgros and tobacco	96	1	40,2 26.6	-0,3	2,0	0,1	76.7	-0,9
517 nt	Wholesale of household goods	90	5	20,0	1.9	5,0 6 1	0,2	62.2	-3,4
914 III	Wholesale of non-agricultural intermediate products	90	5	24,0	1,4	0,1	0,0	02,2	-0,2
515 nt	waste and scrap	181	6	$^{34,3}$	$^{1,5}$	$^{5,7}$	$^{0,3}$	$^{60,2}$	-1,6
518 nt	Wholesale of machinery equipment and supplies	93	2	25.2	0.4	5.0	0.0	76.2	0.5
519 m	Other wholesale	221	-10	28.5	0.4	5.8	0.2	66.1	-1.5
521 nt	Retail sale in non-specialized stores	941	59	69.4	1.2	-0.9	-0.2	157.6	5.4
521 110	Retail sale of food, beverages and tobacco in specialized				 	0,0	<i>, 2</i>	101,0	<u>,</u> ,
522 nt	stores	18	1	10,3	$^{0,6}$	$^{2,8}$	-0,2	94,7	1,3
500	Retail sale of pharmaceutical and medical goods. cos-	10	1	0.0	0.0	77.4	0.0	70.0	1.0
523 nt	metic and toilet articles	12	-1	6,9	0,0	7,4	-0,3	72,0	1,2

Note: In first column, nt identifies non-tradable sectors. HHI lies in the interval [0, 10000], while C10, PCM and LIR are expressed in percentage. Variations are expressed in p.p.. Due to confidentiality reasons, some results are not reported.

Table 5: Competition indic	cators - levels	and variation
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CAE2.1	Market designation	HHI 2009	ΔΗΗΙ 2005- 2009	C10	$\Delta C10 \\ 2005 \\ 2009$	PCM	ΔPCM 2005- 2009	LIR	ΔLIR 2005- 2009
524 nt	Other retail sale of new goods in specialized stores	53	7	18.0	1.5	4.4	0.0	88.8	0.2
525 nt	Retail sale of second-hand goods in stores	544	-1	44.3	0.2	-2.0	-0.2	130.8	4.6
526 nt	Retail sale not in stores	356	-11	50.3	0.8	1.8	0.1	110.2	-1.7
527 nt	Repair of personal and household goods	115	-14	27.3	0,0	23	-0.4	102.9	13
551 nt	Hotols	55	1	17.0	0,0	$\frac{2}{123}$	-0,4	102,5	1,5
551 III	Comping sites and other provision of short stay assem	55	T	17,0	0,2	12,5	0,2	100,8	0,0
552  nt	modation	226	-25	$^{34,5}$	-1,8	$^{14,5}$	$^{0,6}$	$^{93,2}$	-6,6
553 nt	Bestaurants	27	1	11.8	0.2	5 5	-0.3	98.0	0.7
554 nt	Bare	4	0	3.2	0,2	0,0	-0,5	108.0	2.0
555 nt	Contoons and actoring	1109	21	78.0	-0,2	6.2	-0,0	200,5	2,0
601 mt	The period of the residue of the res	1108	-21	10,2	-0,2	0,5	0,0	88,9	-0,2
COD III	Other land the new set	96	0	11 1	0.1		0.5	100.1	0.4
602	Other land transport	20	0	11,1	-0,1	5,5	0,5	109,1	-0,4
603 nt	Transport via pipelines								
611	Sea and coastal water transport	976	15	77,6	1,2	$^{1,6}$	-3,7	34,9	2,8
612 nt	Inland water transport	1741	-284	90,0	-1,0	-53,6	-0,7	110,4	-8,9
621	Scheduled air transport	4096	155	$^{92,2}$	-0,1	$^{7,2}$	$^{1,0}$	94,1	-4,7
631  nt	Cargo handling and storage	341	-36	49,7	-1,6	27,5	1,1	54,6	-2,0
632	Other supporting transport activities	761	-51	67,4	-1,0	35,8	-0,1	49,8	-0,7
633 nt	Activities of travel agencies and tour operators	230	2	36,7	-0,1	0,6	-0,2	107,4	2,7
634	Activities of other transport agencies	118	4	26,0	0,6	$^{3,2}$	-0,8	83,5	$^{3,7}$
641 nt	Post and courier activities			-					
642 nt	Telecommunications	1635	-26	96,6	0.3	27.3	-1,1	46,6	3,4
701 nt	Real estate activities with own property	22	0	9.4	0.0	34.2	4.3	15.2	-3.0
702 nt	Letting of own property	181	-121	33.4	-4.5	54.2	6.8	14.5	-3.1
703 nt	Beal estate activities on a fee or contract basis	666	-31	51.4	1.4	11.2	0.4	70.0	0.5
711 nt	Benting of automobiles	478	26	60.2	1.4	51.5	1.0	48.4	-24.8
712	Benting of other transport equipment	806	-19	79.9	1.2	48.5	0.5	206.3	33.5
712 nt	Benting of other machinery and equipment	226	2	37.2	1.2	24.7	-0.7	102.8	-9.0
714 nt	Bonting of personal and household goods n o c	416	57	51.1	1.2	24,1	1.0	140.0	53
714 110	Hendmana concultance	650	-57	51.6	1,2	20,2	1,0	140,5	0,0
721	Software consultancy	160	40	22.6	0,5	2,3	-0,2	99,2	0,0
122 722 mt	Dete pressing	2708	-40	32,0	-1,2	1,1	-1,7	95,0	3,9
723 nt	Data processing	2708	-30	89,0	0,1	17,3	1,1	71,9	-2,7
726	Other computer related activities	399	13	$^{51,4}$	0,6	3,5	-1,1	94,6	1,7
731	ences and engineering	618	-640	65,7	-4,6	$^{3,7}$	$^{3,5}$	113,0	-16,7
	Besearch and experimental development on social sci								
732  nt	ences and humanities	1760	174	77,7	-0,7	10,0	$^{7,6}$	79,0	-8,7
	Legal accounting book-keeping and auditing activities:								
741	consultancy	72	-244	$^{21,9}$	-6,9	12,2	$^{1,3}$	73,1	-2,3
	Architectural and engineering activities and related								
742	technical consultancy	1116	206	$^{43,6}$	$^{1,3}$	19,0	2,9	60, 6	-5,1
743 nt	Tochnical tosting and analysis	236	16	38.4	0.7	03.3	0.6	64.8	1.0
744 nt	Advortiging	105	10	38.1	0.7	20,0	0.4	71 4	-1,0
745 54	Labour recruitment and provision of personnel	215	17	46 5	1.3	0,0	0,4	06.0	-1,5
740 III 746 pt	Investigation and acquity activities	313 771	0	40,0	1,0	2,0 5.6	0,0	90,9	0,0
740 III 747 mt	Investigation and security activities	100	14	14,1	1,1	5,0	-0,5	35,0	0,0
(4) nt	Industrial cleaning	199	-14	30,3	-1,0	0,0	-0,1	94,3	0,2
748 nt	Miscellaneous business activities n.e.c.	94	-47	$^{23,4}$	-4,3	5,0	0,1	92,6	$_{0,2}$

Note: In first column, nt identifies non-tradable sectors. HHI lies in the interval [0, 10000], while C10, PCM and LIR are expressed in percentage. Variations are expressed in p.p.. Due to confidentiality reasons, some results are not reported.

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