Firms' wage policies: new evidence from Portuguese linked employer-employee data

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Abstract

The research on wage policies has been triggered by the question on whether labour market or institutional forces shape the wage settings inside firms. This paper draws on linked employer-employee data and uses a fuzzy c-means clustering analysis to identify typical wage policies of medium and large firms in Portugal. Empirical evidence suggests that firms are segmented into four clusters that can be labelled according to wage rules as "*regulated*", "*asymmetric*", "*hierarchical*" and "*discretionary*". The first two clusters comprise low wage firms, and are highly responsive to market conditions. The employers belonging to the later clusters use monetary incentives to differentiate the workforce. Our findings therefore illustrate different dimensions of wage flexibility. Furthermore, we noticed that employment flexibility and wage adjustments can coexist within firms.

1. INTRODUCTION

The way wages are allocated across individuals within firms reflects the influence of factors that are beyond human capital predictions (Prendergast, 1998). Employers tend to design and implement compensation systems to accomplish specific goals and needs (Dulebohn and Werling, 2007). The perception that firms seek to achieve a purposive wage policy, that allow employers to develop specific skills, economise transaction costs and at the same time guarantee efficient governance, should be traced back to the internal labour market model (Doeringer and Piore, 1971). A further contribution on the subject is due to Baker, Gibbs and Holmstrom (1994) who offer an empirical picture of wage policy of one single firm. Their most relevant conclusion is worth of note in that "none of the three leading theories – on-the-job training, learning and incentives, alone can explain the data" and thus wage theories expectedly overlap (Levine et al., 2002). Despite the relevance of that research, it suffers the limitations of a case study and neither makes clear how a theory takes precedence over others, if any.

Our empirical research draws on the Portuguese linked employer-employee data (LEED), known as Quadros de Pessoal (Cardoso and Portugal, 2005, Cardoso and Portela, 2009), and examines the wage policy of N = 2220 medium and large sized firms which account for more than 800 thousand workers, and it is reported to the year of 2009. We aim to construct typical wage policies that prevail in the Portuguese economy, and subsequently to ascertain how they interact with workplace characteristics. In the same way as in Lazear and Shaw (2006), our data on wages provided by LEED were coarse grained into firm level data to be used as potential indicators of wage policy.

The transformation of LEED was aware of different dimensions and the associated rules of wage policy reported in economic literature. It includes equity concerns as is the case of ILM model (Doeringer and Piore, 1971) and collective bargaining models (OECD, 2004); response to market conditions studied in wage cyclicality models (Devereux and Hart, 2006); and incentive devices detailed in performance related pay models (Medoff and Abraham, 1980). We focus on the

way firms combine different rules and procedures by taking into account wage levels, hierarchy, growth and flexibility that could crystallise a wage policy.

The resulting data on firms were submitted to a fuzzy clustering analysis. We decided for such an approach to decompose firm data because it allows to operationalise concepts that underline theoretical models, to configure the concepts into wage determination theories (Kvist, 2007) and to assess how each firm positions itself in the context set out by actual wage policies. In practice, typical wage policies are intended as labels that allow linking estimated prevalent conditions or fuzzy clusters to one or more wage theory.

In the subsequent data analysis, we focused on the workplace characteristics that might be associated with fuzzy clusters that have been emerged from the first empirical stage. While the effects of size and industry affiliation on wage differentials have been largely explored in literature (Groshen, 1991; Brown and Medoff, 1989), little attention has been given however to the relationship between wage policy and employment contracts (Bhandari and Heshmati, 2008; Dias, Marques and Martins, 2012). The originality of our research lies in the use of an adequate analytical tool to describe the diversity of wage policies and eventually to link them to workplace characteristics.

The following questions have guided our research. How do firms combine wage rules that shape their wage policy? How is the wage structure of a firm? Are wages responsive to market conditions? Are wages more rigid/flexible in those firms that make more intense use of standard/flexible contracts? Do particular groups of workers are benefited/penalised through specific wage and contracts rules? The answers to these questions presuppose that wage policy at firm level is far from a random choice.

We have organised this paper in the following manner. In Section 2 we frame our research in the theoretical context it was conducted. Section 3 describes the data, while Section 4 is devoted to the discussion of empirical results. Finally, some concluding remarks are given in Section 5.

2. THE WAGE POLICIES IN ECONOMIC LITERATURE

Economists interested in the regulation of the employment relationship claim that wages are determined by institutional processes where market forces play a rather minor role (Doeringer and Piore, 1971). They assume that the labour market cannot be compared to any other market and that the trade in labour services is by far more complex than are the spot market transactions. For instance, trade unions and management undertake joint process of regulation to set pay and conditions of employment including wage levels, wage growth, wage dispersion and wage rigidity (Martins, 2011). Moreover, firms set explicit wage rules that allow for dealing with the complexity of employment contracts related to incentive devices, training investments in specific skills and transaction costs. Explicit individual or group-based incentive schemes may be used to induce workers effort, productivity and cooperation. Firms may develop long-term employment relationships and develop rules that commit workers to certain behaviours (Abraham and Prosch, 2000), or allow wage adjustments on the basis of information on worker skills (Holmstrom, 1982). For instance, Lazear (1979) points to the deferred compensation as a motivator for developing long-term relationships. Internal labour market (ILM) model follows the same rationale of promoting long-term relationship between employees and organisations and, at the same time, aims to protect investments in firm-specific skills. In an ILM the wages are attached to jobs rather than to workers, and shielded from the competition of external labour market. The scope for employer discretion is limited (Grimshaw et al, 2001), while incentives proprieties arise from differences in pay between levels, and competition is linked with internal promotion

Related to wage decisions, there is a fair amount of research that focuses on the relationship between wage rules and procedures, and some distinctive characteristics of firms, such as the firm size and industry affiliation effects (Groshen, 1991); position on the labour market (Brown and Medoff, 1989; Fisher, Schoenfeldt and Shaw, 1996); international competition (Nordas, 2004); workforce composition (Abowd, Kramarz and Margolis, 1999); and employment management (Bhandari and Hesmati, 2008)

Despite the relevance of the reported literature, the focus has been the individual worker. The way that firms combine different rules and procedures regarding wage level, hierarchy, growth

and flexibility that crystallise a wage policy is quite unexplored in the literature. The research efforts reported has given rise to two research hypotheses that should be submitted to empirical test, namely:

a) Firms make specific combinations of wage rules and procedures that position them closer or far from a pure model;
b) Wage policy model is associated with internal factors including skill needs and workforce characteristics, firm size, production technology, and external pressures especially industry product market competition.

3. THE DATA AND METHODOLOGY

The potential of LEED in deeper understanding of the labour market and its policy relevance is well-documented in the literature (Bryson, Forth and Barber, 2006). The usual way researchers who address LEED adopt some kind of earnings equation models to explain individual wage differentials. These econometric models include specific person and firm effects and are estimated by a variety of statistical techniques (see e.g. Abowd and Kramarz, 1999). However, less attention is paid on the potential features provided by LEED on wage differentials across firms. In this case, the unit of analysis should be a firm rather than an individual. Our aim is to explore wage structure that underlies the way firms set wages for their employees, i.e. their wage policy. Lazear and Shaw (2006) followed this line of reasoning to compare firm wage structures and mobility patterns as well as the patterns of promotion and hiring of eight European countries.

We follow this later approach to examine Portuguese medium and large sized firms' wage policy, and worked on Quadros de Pessoal, which is a longitudinal LEED compiled by the Ministry of Economy and Employment. These data are collected annually by means of a standard inquiry, and it is mandatory for every firm with wage-earners (for details, see Cardoso and Portugal, 2005; Cardoso and Portela, 2009). The Portuguese LEED include information on employers regarding location, industry, firm age, turnover, number of employees, capital stock amount and composition, and number of local units. Information on employees concerns employer, age, gender, education, occupation based on national dictionary of occupational titles, job and job grade coded according to the labour agreement in force, recruitment date, basic wage, overtime pay, additional regular and irregular pay, type of job contract, regular working hours, overtime, and labour collective agreement in force.

The dataset has already been used to check the impact of firms' characteristics on several labour market outcomes. Cardoso (2000) shows that Portuguese firms reward human capital differently; Lima and Pereira (2003) suggest that employer learning impacts on workers' careers in large firms; Cardoso and Portugal (2005) offer evidence on employers' discretionary power using wage cushion to individualise wages; Carneiro, Guimarães and Portugal (2009) point out the procyclicality of real wages; Cardoso and Portela (2009) focus on wage flexibility related to market shocks and explore wage insurance arising from collective bargaining and minimum wages; and Portugal (2008) offers evidence on rent sharing schemes. Firms also segment their workforce on the basis of labour contract, differentiating workers by age (Martins, 2007) and tenure (Carneiro, Guimarães and Portugal, 2009). These studies have a common denominator as they use the worker as the unit of analysis rather than the firm, and thus focus on a particular dimension of wage policy. Our study puts the firm at centre of analysis, and attempts to offer a comprehensive picture of firms' wage policies of medium and large sized firms in Portugal.

Following the theoretical framework, we constructed a set of variables associated with rules and procedures of different dimensions of wage policy. Explicitly, we considered four dimensions of wage policy, namely wage level, hierarchy, growth and flexibility, for every firm. In so doing, we were able to simultaneously examine wage distribution; whether wages are linked to occupational structure; how wages raise; and whether firms use wages as adjustment process. Table 1 details the 17 variables constructed to address each of four dimensions referred above. Hypothetically, the variables account for pay practices at firm level and, on the whole, allow to potentially labelling the underlying wage policy.

Variable short name	Variable and indicators specification	Information provided
Wage levels		
Hourly wage	Average total wage: firm average hourly wage	Distribution of wages Position of firm vis-à-vis the competition in general labour market
Firm/industry wage	Average total wage comparatively to industry: Proportional difference between firm's average total hourly wage and the average wage in the industry	Position of firm vis-à-vis the direct competitors in industry labour market
90/10	Wage dispersion: Proportional wage gap between the 90th and the 10th percentiles	Inequality between high-wage and low-wage earners Wage differentials to reward skills
Gini	Wage dispersion: Gini coeficient	Overall inequality of wage distribution
Skewness	Wage asymmetry: Skewness of total wage	Degree of asymmetry of wages Wage differentials to reward skills
Entry-wage	Entry level wage: Wage differential between newly hired and incumbents	Competition around general skills or value of specific or general skills
Insiders/outsiders	Entry-level wage: Wage differential between insiders in the core job and outsiders that go to the core job	Competition around general skills or value of specific or general skills
Education premium	Education premium: correlation between years of schooling and hourly wage	Value of general skills
Wage hierarchy		
Wage hierarchy	Pay structure: Spearman correlation between job and wage	Wages tied to job hierarchy
Intra job dispersion	Within job dispersion: coefficient of variation (CV) of total wages in core job	Internal equity controlling for job level Incentive devices within job
Wage growth		
Wage growth	Average wage growth: wage increase in last four years	High and low wage growth firms
Growth dispersion	Growth dispersion: standard Deviation (SD) of average wage growth	Distribution of wage growth Wage growth used as incentive
Intra job growth	Growth dispersion in core job: SD of wage growth in core (modal) job	Internal equity controlling for job level Wage growth used as incentive within job
Growth skewness	Selection in wage growth: skewness of wage growth	Selective incentive devices
Tenure profile	Wage growth and tenure: Pearson correlation between wage and tenure	Value of firm-specific skills
Wage flexibility		
Wage cushion	Wage cushion: difference between total wage and bargained wage	Incentive devices: employers' discretion to individualise wages
Wage adjustment	Cyclicality of wages: elasticity of wages to unemployment rate	Wages used as adjustment process
Rent sharing	Rent sharing: correlation between wages and firm' sales	Incentive devices: employers' discretion to obtain cooperation, weaken unions power

Each variable in Table 1 supports different theoretical predictions. As we might expect, some variables do overlap. Here are some examples. Pay variations among employees holding the same job suggests that employers reward individual-level merit but, at the same time, gives evidence on the distance between regulated wage hierarchy and effective wages paid to employees. The same holds for the new/old wage gap. If the wages of newly hired are higher than those of incumbents, we can assume there is a competition around general skills thus leading to wage compression. On

the contrary, lower wages of new workers illustrate their allocation to a pay structure that includes lower entry level wages, suggesting that firms are aware of career progression and internal equity considerations.

We selected a sample of firms according to specific criteria. Each firm has at least 80 employees and 30 observations. Given the different size of sampled firms, weighted mean approach seemed to be more appropriate (Lazear and Shaw, 2006). In addition, firms are recorded in Quadros de Pessoal for five years, from 2005 to 2009, which is period used to evaluate wage dynamics, especially growth and flexibility. The firms' wage policy is, however, reported to the dataset of 2009, which was the latest available year.

The firm data can be arranged in a N×J matrix, where N=2220 is the number of firms entered in the analysis, and J=17 wage related continuous variables. The columns of such a matrix are the variables constructed artificially to assess the way firms set wages. Each line defines the pattern of individual firm which virtually describes its wage policy. In any case, each indicator is a weighted mean and represents the average indicator by firm.

Though some indicators are self-descriptive, as is the case of static dispersion indicators, others deserve further explanations. Hourly wage represents employee's real wage[1] that includes base pay generally set in collective agreements, additional payments paid regularly and payment of overtime. Simple correlation appeared suitable to obtain the wage hierarchy that relates the eight levels job hierarchy (Lima and Pereira, 2003) with wages; the education premium represents the correlation between years of schooling and wages; while the tenure profile corresponds to the correlation between years at same employer and wages. Entry-level wages considers the wages of newly hired (tenure up to one year) comparatively to others. Wage cushion is the log difference between individual current wage and the current contractual wage that is set for each category in a collective agreement (Cardoso and Portugal, 2005:881). Note that all variables used in further analysis are averages of individual firm data.

In order to produce wage dynamics variables, calculations from wage changes were developed, for a time lag of four years (2005-2009). More precisely, wage growth represents the average growth between those years for firm stayers, i.e., workers that stayed in the same firm at least two consecutive years. The same strategy revealed fruitful for other variables that entail variation including employment growth. The elasticity of wages to unemployment rate is the proportional change of wages divided by the proportional change of the unemployment rate. The estimates used in further analysis correspond to average elasticity for the defined time-lag.

Table 2 reports descriptive statistics of indicators related to wage structure, wage growth and wage flexibility.

Table 2:
Descriptive statistics

Variables	Sample N = 2220	
	Mean	SD
Hourly wage	4.75	2.55
Firm/industry wage	0.14	0.43
90/10	1.63	1.06
Gini	0.23	0.08
Skewness	3.68	2.08
Growth	0.04	0.04
Growth dispersion	0.11	0.06
Growth skewness	2.15	1.34

[1] The wages were deflated using price index from 1994. The total amount was then divided by total working time including overtime.

Wage hierarchy	-0.65	0.19
Tenure profile	0.18	0.23
Intra job dispersion	0.25	0.16
Entry-wage	-0.12	0.24
Insiders/outsiders	0.02	0.03
Education premium	0.37	0.19
Wage cushion	1.86	0.93
Elasticity of wages	-0.30	1.39
Rent sharing	0.10	0.55

In a second stage of firm data analysis, we used a set of variables related to workplace characteristics such as workforce characteristics, firm size, industry affiliation, capital stock, and regulations through collective bargaining, and aimed to examine how they interact with a particular wage policy.

4. EMPIRICAL EVIDENCE

4.1. Fuzzy partition and typical wage policies

Unlike the traditional clustering methods, fuzzy clustering allows cases, i.e. firms, to be partial membership of more than one cluster at the same time. As an output of such a data analysis is a unit sum vector of non-negative membership degrees in each cluster, for every firm in the sample. Table 3 displays the distribution of 2220 firms on the estimated fuzzy partition. The different groups were constructed on the basis of a level of similarity of 0.75 or more (Normander and Prosser, 2000). So, we define 0.75 as the threshold of strong agreement (Bezdek, 1974) with either one or any group of fuzzy clusters. In Table 3, we deliberately used the letters V, E and F (vertex, edge and face) to denote different groups in fuzzy partition to mimic its geometrical counterpart, that is, the tetrahedron, as represented in Figure 1. For example, V_2 is the set of prototypes of fuzzy cluster 2; $E_{3,4}$ contains the firms that were estimated to apply a wage policy that is a mix of wage policies labelling fuzzy cluster 3 and 4; and $F_{1,2,3}$ is set of firms that mixture three wage policies.

Table 3:
Distribution of Portuguese firms on the fuzzy 4-partition
(level of similarity $\alpha = 0.75$)

Membership in				Total = 2220
One Fuzzy Cluster				
V_1	V_2	V_3	V_4	844
405 (18.2%)	185 (8.3%)	103 (4.6%)	151 (6.8%)	(38.0%)
Two Fuzzy Clusters				
$E_{1,2}$	$E_{2,3}$	$E_{3,4}$		
386 (17.4%)	41 (8.3%)	124 (5.6%)		1198
$E_{1,3}$	$E_{1,4}$	$E_{2,4}$		(54.0%)
606 (27.3%)	40 (1.8%)	1 (0.0%)		
Three Fuzzy Clusters				
$F_{1,2,3}$	$F_{1,2,4}$	$F_{1,3,4}$	$F_{2,3,4}$	178
141 (6.4%)	7 (0.3%)	28 (1.3%)	2 (0.1%)	(8.0%)
Four Fuzzy Clusters				0

The figures in Table 3 indicate considerable heterogeneity of Portuguese medium and large sized firms. We found 38% of firms assigned to typical patterns, while the model allowed more than 62% of firms to be classified into two and three fuzzy clusters. Therefore the *fuzzification* of cluster configuration offers a large amount of information to interpret. For the sake of simplicity and clarity, we will first focus on firms that are full members or prototypes of fuzzy clusters, which identify typical patterns, and later briefly explore between cluster cases. In Table 3 they have membership in only one cluster and are labelled as V_1, V_2, V_3 or V_4.
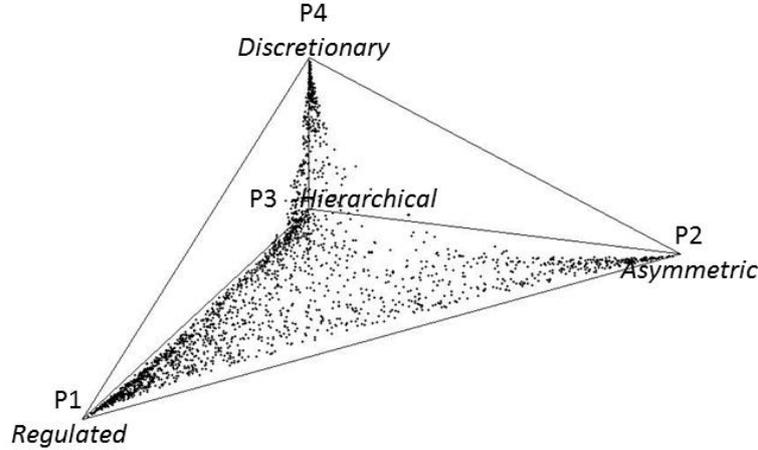
Figure 1: Distribution of firms in a fuzzy 4-partition.

The four fuzzy clusters resulted from the application of a fuzzy c-means clustering show that Portuguese medium and large firms can be segmented by wage setting decisions. Table 4 reports the estimates used to examine the similarities and dissimilarities among firms, and ultimately indicates the patterns underlying each wage policy. We first label prototypes according to more distinctive features and then qualitatively describe specific wage rules and procedures that characterise a wage policy. Prototypes are termed, in Table 4, P1, P2, P3 and P4 and were a posteriori ordered by mean hourly wage. Prototype P1 can be labelled as "*Regulated*"; P2 as "*Asymmetric*"; P3 as "*Hierarchical*"; and finally P4 as "*Discretionary*" (see also Fig.1)

Table 4:
Fuzzy C-means estimates of prototypes

Wage rules	P1 Regulated	P2 Asymmetric	P3 Hierarchical	P4 Discretionary
Hourly wage	3.39	3.47	5.18	10.01
Firm/industry wage	-0.04	-0.01	0.23	0.74
Gini	0.20	0.20	0.27	0.27
90/10	1.29	1.01	2.11	2.41
Skewness	3.00	6.57	3.15	2.54
Growth	0.03	0.03	0.04	0.05
Growth dispersion	0.10	0.11	0.13	0.13
Growth skewness	1.91	2.22	2.26	2.33
Wage hierarchy	0.66	0.58	0.69	0.65
Tenure profile	0.20	0.17	0.17	0.19
Intra job dispersion	0.20	0.21	0.28	0.35

Entry-level wage	-0.12	-0.10	-0.14	-0.18
Insider/outsider	0.02	0.01	0.02	0.03
Education premium	0.40	0.31	0.40	0.30
Wage cushion	1.49	1.56	2.04	3.10
Elasticity of wages	-0.34	-0.35	-0.20	-0.32
Rent sharing	0.09	0.08	0.11	0.13

"*Regulated*" firms pay the lowest wages compared to their competitors but at the same time, compete for general skills and pay high education premium (correlation education-wage = 0.40). Some pieces of evidence suggest that firms adhere to the rules stipulated in collective agreements, namely the relationship between wages and job hierarchy as measured by the correlation job-wages (0.66); the correlation tenure-wages (0.20); the lowest value of wage cushion (1.49); and, the lowest within job dispersion (0.20). However, the wages are particularly procyclical indicating that employers strongly adjust wages to market conditions (elasticity of wages = -0.34).

"*Asymmetric*" firms pay low wages but try to match the competition. The strongest asymmetry of wages is here a distinctive feature. In other words, a small proportion of workers earn high wages, whereas low wages are allocated to a large proportion (skewness = 6.57). Firms within this cluster are the most flexible (elasticity of wages = -0.35) and seem to be far from collective settings. For instance, the correlation between job and wages, and tenure and wages were found to be the lowest in the sample.

On the other hand, "*Hierarchical*" firms show the largest correlation between job and wages (0.69) unveiling some typical properties of internal labour markets. The firms pay high wages, which are slightly higher than those of their direct competitors; use wage growth to differentiate workers (skewness of growth = 2.26); and protect their investments in specific skills by benefiting stayers through low wages of newly hired comparatively to incumbents (entry wage = -0.12). Moreover, firms tend to protect more their workers during labour market worsening conditions than other firms in the sample do (elasticity = -0.20). However, the dispersion of wages within job, education premium, and wage cushion reveal the presence of incentive devices.

Firms clustered as "*Discretionary*" pay the highest wages, which are substantially higher than the wages of their direct competitors. These firms want to be attractive employers, so that they can select skilled candidates and at the same time discouraging current workers to leave. In addition to the highest wage rate and lead policy, other estimates suggest that these firms are aware of the role compensation system in achieving performance goals, in underpinning organisational values and beliefs and in meeting business needs (Armstrong, 1999). Some pieces of evidence indicate closeness to ILM model, namely the large correlations between job and wages (0.65), as well as the correlation between tenure and wages (0.19); and the strongest differences between newly hired and incumbents wages (-0.18) and growth (0.05). However, the wage adjustment (elasticity of wages = -0.32), the largest within job dispersion (0.35) and wage cushion (3.10) illustrate substantial erosion of ILM properties and indicate strong presence of individualised pay schemes. Not surprisingly, the gap 90/10 (2.41) is the highest among the sampled firms as well as the skewness of wage growth (2.33) and the rent sharing bonuses (0.13).

The reported evidence is suggestive of two broad models of managing wages. While "*Regulated*" and "*Asymmetric*" firms try to meet the standards stipulated by collective agreement (lowest wage cushion), "*Hierarchical*" and "*Discretionary*" firms use the compensation system to gain competitive advantage and to achieve major goals. Additions made to base wage and dispersion indicators suggest that individual total earnings include schemes that may be contingent on some factors. In this regard, the estimated fuzzy clusters also offer evidence on different dimensions of wage flexibility undertaken by firms. Within "*Regulated*" and "*Asymmetric*" firms, flexibility is related to the use of wage as adjustment process, whereas "*Discretionary*" firms seem to adopt employer scope to differentiate workers. The later model includes also wage adjustment that, together with individualised rules, is suggestive of segmented human resource management.

So far, the analysis has focused on typologies of wage policies. However, *fuzzification* of cluster configuration contributes to position firms between clusters. In order to illustrate the

potentialities of fuzzy clustering, we analysed the subset of firms positioned between typologies thus sharing two clusters. We therefore proceed with detailed examination of wage rules involving "*Regulated*" and "*Hierarchical*" firms which represent 30% of our sample (N = 606). It is fairly easy to show from descriptive statistics that incentive devices contribute to place firms closer to "*Regulated*", while wage level and other wage dynamic variables move firms towards "*Hierarchical*" model. It appears that wage skewness, growth dispersion skewness, entry wage, and rent sharing are on average similar to firms clustered in the former typology, while all other wage rules are somehow closer to "*Hierarchical*" firms.

4.2. Firms' characteristics linked to wage typologies

Now the matter being raised is the characteristics of firms that may be linked to their decisions regarding wage settings. Our empirical evidence focuses on workforce composition, labour regulations, social capital composition and industry affiliation. Following the same strategy, we will describe in the next paragraphs the characteristics of firms associated with emerged fuzzy clusters.

The estimates reported in Table 5 indicate that despite the radical difference in size, "*Regulated*" and "*Asymmetric*" share relevant characteristics. Actually, the later are the largest firms in sample, while "*Regulated*" firms are the smallest ones. However, firms in these clusters employ large proportion of women, young or blue collar workers. Not surprisingly, both types of firms prevail in low-technology industries. In addition to this, these firms make large use of flexible work arrangements, such as fixed term contract. Finally, they are expected to be private and domestic firms.

Nevertheless, a closer look at the estimates is suggestive of particular characteristics of "*Regulated*" firms. For instance, alongside with industry-based collective agreements, firms adopt multi-firms agreement to regulate the use of labour services. Another distinctive characteristic is the highest proportion of other knowledge and less knowledge intensive industries, "*Asymmetric*" firms cluster aggregate additionally foreign firms from less knowledge intensive market services.

While "*Hierarchical*" and "*Discretionary*" firms are mostly foreign, they prevail in different industries. The former groups firms from medium and low technology industries, but also from market-intensive services. It should be stressed that industries like extractive or construction, as well as primary sector firms are predominant in this fuzzy cluster. On the other hand, "*Discretionary*" firms are expected in both knowledge intensive financial services, as well as, less knowledge intensive market services.

An additional dissimilarity between these types of firms is related to the regulation of employment relationship. "*Discretionary*" firms make large use of firm-level agreement either multiple or single employer agreement. The large proportion of "other" types of agreement is also suggestive of decentralisation of regulation process.

In summing up, the findings suggest that there are no clear differences in wage policies related to firm size and industry-affiliation. However, some of our findings meet the one reported in the literature. For instance, cost lowering efficiency wage rules are widespread in low technology industries employing blue collar and accommodating large proportion of female employees (Nordas, 2004). Cost cutting strategies also interact with job flexibility as is the case of "*Regulated*" and "*Asymmetric*" firms.

There is also evidence on the relationship between decentralised bargaining and employers' scope to individualise wages (OECD, 2004; Bastos, Monteiro and Straum, 2009). For instance, "*Discretionary*" firms, ruled by firm-level agreements, appear as the ones with the highest wage cushion and within-job dispersion. This is the case of financial services that have faced with the challenge between internal labour markets and incentive devices.

Table 5:
Firms' characteristics linked to wage policies
(*bold figures represent values above the sample means)

Variables		Sample N = 2220	P1 Regulated N1 = 405	P2 Asymmetric N2 = 185	P3 Hierarchical N3 = 103	P4 Discretionary N4 = 151
Number of workers	M	360.75	180.06	**801.84**	293.07	**624.81**
	S D	933.11	122.41	2225.55	390.66	1522.10
Firm's age (years)	M	37.75	**53.09**	28.31	**35.76**	32.30
	S D	55.53	88.54	36.75	28.55	29.45
Proportion of workers with fixed term contract	M	0.23	**0.24**	**0.30**	0.19	0.10
	S D	0.22	0.21	0.25	0.17	0.15
Proportion of part-time workers	M	0.04	0.03	**0.09**	0.01	0.01
	S D	0.12	0.10	0.19	0.02	0.03
Proportion of women	M	0.45	**0.56**	**0.50**	0.31	0.38
	S D	0.29	0.32	0.32	0.22	0.15
Proportion of young workers	M	0.21	**0.22**	**0.26**	0.19	0.14
	S D	0.15	0.17	0.18	0.11	0.11
Proportion of blue colour workers	M	0.46	**0.50**	**0.60**	0.41	0.08
	S D	0.33	0.32	0.36	0.25	0.14
Unions						
Collective labour contract (1)	C %	77.07	**82.47**	**90.27**	**82.52**	37.75
Collective labour agreement (2)	C %	5.72	**10.62**	2.16	0.00	**21.85**
Firm's agreement (3)	C %	4.14	0.49	3.24	3.88	**9.93**
Others (4)	C %	13.06	6.42	4.32	**13.59**	**30.46**
Capital owners						
100% domestic and private (1)	C %	66.31	**71.60**	**71.89**	58.25	37.75
100% national and state owned (2)	C %	3.20	0.99	0.54	2.91	**8.61**
100% foreign (3)	C %	13.74	6.67	**18.92**	**18.45**	**28.48**
Mixed: State. private and foreign (4)	C %	0.50	0.00	**0.54**	0.00	**3.97**
Mixed: State and private (5)	C %	0.72	0.49	0.00	0.00	**1.32**
Mixed: public and foreign (6)	C %	0.09	0.00	0.00	**0.97**	0.00
Mixed: private and foreign (7)	C %	5.18	0.74	3.78	**14.56**	**13.25**
Others (9)	C %	10.27	**19.51**	4.32	4.85	6.62

Industries						
Less Knowledge-intensive market services (01)	C %	27.39	24.20	**42.70**	27.18	**27.81**
Medium-high-technology (2)	C %	5.86	4.94	4.32	**8.74**	3.31
Medium-low-technology (3)	C %	8.33	7.90	6.49	**11.65**	1.32
Low-technology (4)	C %	20.95	**24.20**	**25.95**	14.56	4.64
High-tech KIS (5)	C %	2.61	0.00	1.08	0.00	**15.23**
Market KIS (6)	C %	4.50	1.73	**6.49**	**4.85**	9.93
Knowledge-intensive financial services (7)	C %	2.97	0.00	0.00	1.94	**20.53**
Other knowledge-intensive services (8)	C %	14.82	**26.42**	4.32	8.74	11.26
High-technology (9)	C %	1.40	0.25	**1.62**	0.97	0.66
Other less knowledge-intensive services - KIS - (10)	C %	1.85	**2.22**	1.08	0.97	1.32
Primary Sector (11)	C %	0.72	0.49	0.54	**1.94**	0.00
Construction (12)	C %	8.60	7.65	5.41	**18.45**	3.97

CONCLUDING REMARKS

In this paper we attempted to unveil wage policies of medium and large firms in Portugal and to ascertain the workplace characteristics that influence those policies. From the outset, we were aware of the fact that firms do not operate as predicted by pure theoretical models; instead they are expected to being closer to one model. Therefore, fuzzy clustering revealed suitable for grouping firms according to predominant characteristics of their wage policies. Empirical evidence pointed towards a segmentation of firms in four fuzzy clusters that represent typical wage policies namely "*regulated*", "*asymmetric*", "*hierarchical*" and "*discretionary*". While the former are characterised by low and flexible wages, the "*hierarchical*" and "*discretionary*" firms show properties of internal labour market but puzzled by incentive devices.

There is to the greatest extent a duality between firms trying to manage their workers according to rules stipulated in collective agreement, and those using their compensation system to achieve major goals. However, a striking similitude between those broad clusters is the use of wages as adjustment process. This evidence corroborates Cardoso and Portela (2009) finding that wages in Portugal are highly responsive to macroeconomic conditions.

Moreover, the typology of wage policies enabled us to improve our knowledge of different dimensions of wage flexibility undertaken by firms. For instance, firms labelled as "*regulated*" and "*asymmetric*" represent a model of wage changes responding to (worsening) market conditions, whilst the flexibility of wages in "*discretionary*" firms is mostly used in the context of the probable link between workforce unobservable productive characteristics and earnings. This finding agrees with Duarte (2008) that wage flexibility is greater in large firms because of their ability to design

compensation schemes. Not surprisingly, employers in "*discretionary*" cluster use more intensively wage cushion, within-job wage and growth dispersion to differentiate employees. They also protect specific skills by paying lower wages to newly hired workers than to incumbents. However, these firms do not provide insurance to whole workforce. There is indeed a non-negligible reduction of adjustment of wages to market conditions. Whether there is a segmentation of the workforce within this type of firms is an open question that deserves further research. From here it stands that firms labelled as "*Asymmetric*" follow wage policies that are conditioned by external drivers, and "Discretionary" firms probably try to retain high skilled workers.

The empirical evidence pointed, in addition, to the interaction between wage flexibility based on wage adjustment and job flexibility. We realised that low wage firms that clustered together manufacturing labour intensive industries like textile and clothing, generally dominated by female young or blue collar workforce, use simultaneously flexible wages and flexible contracts. Further research is needed to clarify the relationship between female employment and flexible work arrangements.

Our study could be a part of a renewal debate on the labour market flexibility. While employment flexibility has been largely studied (e.g. Kalleberg, 2000), wage flexibility deserves further attention due to its political, social and economic relevance. We suggest the labour market policies and other initiatives should be differentiated according to the dimensions of wage flexibility reported in this study. Ultimately, the rationale of labour market regulations would not be the same for handling with wage adjustment as it would with wage differentials. Policy makers and other social actors should be aware of differentiated impacts of wage flexibility inside firms, and how it could affect some specific groups of workers.

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