

Patterns of employment relationships: the association between compensation policy and contractual arrangements

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Abstract

This study examines the employment relationship in large-sized firms in Portugal using linked employer-employee data. It starts with a fuzzy clustering approach to identify typical compensation policies. Three major segments emerge from this analysis: *Competitive*, *Internal Labor Markets*, and *Incentive*. The *Competitive* segment is highly responsive to market conditions and comprises low-wage firms. The other segments reveal properties of internal labor markets, although the incentive-based firms reinforce the use of discretionary power to differentiate the workforce. Subsequently, a regression model is estimated to analyze the association between compensation policies and contractual arrangements. Empirical evidence confirms the segmentation predictions, that is, low, flexible wages and flexible contracts prevail in the same firms. Furthermore, vulnerable categories like young workers and female workers tend to be over-represented in firms belonging to the *Competitive* cluster.

Keywords: compensation policy; contractual arrangements; fuzzy clustering; Tobit regression.

1. Introduction

The compensation policies and practices vary across firms and among employees within organizations (e.g. Milkovich, 1988). There is substantial empirical evidence indicating that the neoclassical prediction of one wage rate in a perfect competitive market is unrealistic, and that the variability is far from being random noise (Doeringer & Piore, 1971; Gerhart & Rynes, 2003). In this regard, employers do have discretion to use compensation policy from a strategic perspective. So what makes compensation policies vary across firms?

A number of theoretical models in the personnel economics and human resource management literature have been used in an attempt to answer this question. These models examine the way firms deal with the internal and external environment to design a compensation policy and to decide how to assign workers to jobs (Bidwell, Briscoe, Fernandez-Mateo & Sterling, 2013). Kalleberg (2011), for example, notices the polarization of firms by *low-road* strategies, which combine cost cutting strategies with numerical flexibility, and *high-road* strategies using functional flexibility and performance pay. In turn, Bidwell et al. (2013) emphasize the consequent growing inequality within firms.

This study is in line with that literature and aims to empirically examine the association between compensation policy and contractual arrangements at firm level. It assumes that firms differ in the use and configuration of pay and contractual flexibility. While human resource management literature has progressed towards bundle of practices to predict high performance (Delery & Doty, 1996; Lepak & Snell, 2002), the labor market segmentation approaches assume that good (bad) job characteristics cluster together (Tilly, 1996). So firms are put at the heart of the segmentation process (Baron & Bielby, 1980; Kallerberg, 2003).

The empirical analysis draws on linked employer-employee data (LEED), namely *Quadros de Pessoal* (see Cardoso & Portugal, 2005), of large-sized Portuguese firms (i.e. 250 or more employees) for the year 2009 and it is performed in two steps. In the first step, the firms are arranged in segments according to practices associated with pay level, pay structure, pay growth, pay flexibility and pay penalty to unveil the configuration of compensation policies. For this purpose, a fuzzy cluster analysis is performed to deal with both the imprecision and the expected overlapping of those policies (Baker, Gibbs & Holmstrom, 1994; Suleman, Lagoa, Suleman & Pereira, 2013). Subsequently, there is an attempt to analytically identify the factors that might be associated with a compensation policy, notably the contractual arrangements. The study then strives to answer the following questions. Do flexible compensation policies interact with flexible contractual arrangements? Does this interaction affect particular groups? Is there a pure duality across firms or is it a matter of degree in each segment? The plea for increasing flexibility in European labor markets and the growing competitive pressures that affect firms worldwide makes this a timely debate.

2. Compensation policies and contractual arrangements

The association between wages and contractual arrangements has been particularly explored in the context of labor market segmentation theory. It rejects the prediction of a single perfect competitive market in which buyers and sellers meet to transact a wage rate. The concept of the segmented labor market gained prominence to address the division into submarkets or segments and to deal with the duality of job characteristics. The primary submarket involves job stability, high wages, skills acquired through on-the-job training and job ladders and is characterized by internal labor markets. The secondary market with its high turnover and scarce job ladders has

the opposite features (Reich, Gordon & Edwards, 1973). It would be interesting to examine why employers combine some employment practices, namely compensation policy and contractual arrangements.

When deciding on their employment system, employers may develop protected employment relationships and implement specific pay structures. The internal labor market (ILM) model follows the rationale of fostering a long-term relationship between employees and organizations while simultaneously protecting investments in firm-specific skills (Doeringer & Piore, 1971). Wages in the ILMs are determined by institutional processes and are attached to jobs rather than to workers; the scope for employer discretion is limited; the incentive mechanisms arise from differences in pay between levels and internal promotion; wages are expected to grow with tenure rather than relying on performance evaluation or any other form of incentive pay; wages are shielded from the competition of the external labor market and therefore do not adjust to the business cycle or other external factors. In contrast, the external labor market (ELM) is characterized by a weak attachment between worker and employer but the behavior of the market is comparable to that of the classical competitive market. Therefore, wages play a large role in the adjustment process in the ELM, in that firms adjust nominal or real wages according to supply and demand shocks (Baker et al., 1994; Devereux & Hart, 2006).

However, employers can pay higher wages for the non-wage characteristics of jobs, especially to compensate workers for undesirable working conditions, or do so as an incentive mechanism (Rosen, 1986). Recent empirical research on compensating wage differentials has been stimulated by the question on whether individuals engaged in flexible working arrangements earn higher wages. This stream of literature focuses on wage differentials among flexible and stable contracts (Mertens & McGinnity, 2004;

Mertens, Gash & McGinnity, 2007). While some research notes that employers compensate flexible workers with higher wages to face uncertainty (Weeden, 2005; Graaf-Zijl, 2009), other studies argue that flexible contractual arrangements entail wage penalties (Booth, Francesconi & Frank, 2002; Hagen, 2002; Kalleberg, 2011). In particular, there is evidence of the association between flexible work arrangements and low pay and low-quality jobs.

The analysis of wage differentials between flexible and regular workers therefore seems more appropriate in the context of labor market segmentation. The basic assumption of such an approach is that good (bad) job characteristics tend to cluster together (Tilly, 1996). The rise in temporary jobs has led to greater earnings inequality by imposing a severe wage penalty on non-standard jobs (Kalleberg, 2011). Firms tend to combine flexible pay and flexible contracts. Kalleberg suggests that firms with *low-road* strategies combine cost cutting strategies with numerical flexibility, while firms with *high-road* strategies use functional flexibility and incentive pay schemes. Cost cutting strategies also explain wage differentials between permanent and flexible workers as reported by Bhandari & Hesmati (2008) in their study on Indian factories/manufacturing plants. Ultimately, employment practices vary according to industries and firms (Groshen, 1991).

This duality impacts general inequality within firms as well as inequality among different segment of workers (Bidwell et al., 2013) and women in particular (Meng, 2004). Indeed, patterns in the segmentation show some categories of workers are over-represented and locked in secondary segments. Human capital offers considerable insights into these sorting effects by highlighting how firms shape inequality through stratifying and rewarding employees by skills levels (Becker, 1964; Prendergast, 1998). Accordingly, employees endowed with higher general and specific skills are more likely

to be employed in high-wage firms (Levine, Belman, Charness, Groshen & O'Shaughnessy, 2002)

Efficiency wage models predict that firms benefit from paying higher wages by attracting more productive candidates (Akerlof, 1970), and also to avoid shirking (Shapiro & Stiglitz, 1984), or reduce turnover (Salop, 1979). Firms may also use other incentive devices to generate higher effort from employees and reward high-performers through individual or group incentives (Gerhart & Rynes, 2003). However, employers may use a wage cushion, that is, the difference between the pay level regulated by collective agreements and the wage earned (Cardoso & Portugal, 2005), as a further incentive device in the context of regulated labor markets.

The reported literature has drawn attention to different employment practices associated with the management of wages and contracts. This study assumes that the reductive duality based on high wage - low wage (Abowd, Kramarz, & Margolis, 1999) is unable to provide an accurate picture of the decision on pay practices, and consequently prevents an appropriate segmentation of firms. As a result, compensation policies involve at least five dimensions that help to configure a policy, namely pay level, pay structure, pay growth, pay flexibility, and pay penalty based on innate characteristics such as the gender wage gap, while contracts are mainly approached through stable and flexible arrangements. So we submit to empirical test the two contrasting hypotheses to predict the patterns of employment relationships: *segmentation - firms combining low and flexible wages with poor incentives make large use of flexible work arrangements;* and *compensating wage differentials - flexible workers prevail in firms adopting high-wage and incentive-based compensation policies.*

3. Data analysis

3.1. Fuzzy clustering

The Portuguese LEED is a longitudinal dataset compiled annually by the Ministry of Economy and Employment on the basis of a standard inquiry, and is mandatory for every firm with wage-earners (see Cardoso & Portugal, 2005; Cardoso & Portela, 2009 for details). The data used are for the year 2009 and refer to large-sized firms (≥ 250 workers). This narrow focus attempts to reduce any additional heterogeneity associated with firm size (Brown & Medoff, 1989).

A set of $n = 15$ variables associated with practices of a compensation policy are grouped around the five wage dimensions referred above (Table 1). These variables represent drivers of pay as suggested by theoretical models of compensation policies. For example, the association between pay and job hierarchy conforms the ILM model; or the ability to attract high-skilled candidates through pay has been highlighted by human capital and efficiency models. In addition, there are pay practices that may penalize workers. For example, the wage adjustment explains how firms react to labor market conditions, while the gender wage gap accounts for the impact of in-born factors. It should however be stressed that the findings are constrained by the limited information available in source data.

The LEED are coarse grained into firm level data and subsequently used to construct potential indicators of compensation policy, similarly to Lazear & Shaw (2006). The factorized fuzzy c -means algorithm (Suleman, 2014) is used to decompose the transformed data into fuzzy clusters. This algorithm is simpler than the standard fuzzy c -means algorithm (Bezdek, 1981) as it omits the weighting exponent parameter, whilst still proving effective. In addition to cluster centers or prototypes, the fuzzy approach provides a distribution of data points (i.e. firms) in form of membership degrees (Kvist, 2007). This latter feature allows to overcome the criticisms raised

against crisp segmentation of the labor markets (Watcher, 1974). The optimal number of clusters is obtained through an exhaustive search by varying the number of clusters c from 2 to \sqrt{N} , where $N = 669$ is the sample size. Here it is found to be equal to three (i.e. $c = 3$) under the Xie & Beni (1991) criterion. So the data is modeled by a fuzzy 3-partition which can be represented geometrically by an equilateral triangle.

Table 1 here

The emerged fuzzy clusters (i.e. prototypes) show that large-sized Portuguese firms are segmented by pay setting decisions, and can be labeled *Competitive*, *Internal Labor Market* or *Incentive*, (Table 2) for the following reasons. *Competitive* firms have the lowest levels of wages and seem unable to pay at the market rate. However, the strongest asymmetry of wages is a distinctive feature here, indicating that firms in this cluster might use incentive devices to differentiate a small proportion of workers with higher wages, while a large proportion earn low wages (skewness = 7.57). Some evidence suggests that firms also adhere to the rules stipulated in collective agreements, especially the lowest value of wage cushion (1.62) and the lowest within-job dispersion (0.23). However, wages are particularly procyclical as they fall in response to an increase in unemployment (elasticity of wages = -0.48). Finally, the estimates suggest there is a non-negligible wage differential between male and female workers within *Competitive* firms.

Table 2 here

The firms associated with the second cluster show proximity with the internal labor market model: they pay high wages, that is, slightly above those paid by direct competitors; they use pay growth to differentiate workers (skewness of growth = 2.60), protect their investments in specific skills by benefiting stayers with higher wages than newly hired workers (entry-level wage = -0.12), and adopt seniority-related pay

schemes (tenure profile = 0.19). However, while *Internal labor market* firms are unlikely to protect workers more than other firms when labor market conditions worsen (elasticity = -0.32), they seem to protect female workers more than others (gender wage gap = 0.20).

Firms belonging to the *Incentive* cluster pay the highest wages. These firms evidence properties of the ILM model, namely there is a large correlation between job and wages (0.67), a correlation between tenure and wages (0.18), the differences between the wages of newly hired and incumbents are the largest (-0.16), and there is lower wage adjustment (elasticity of wages = -0.24). However, the largest within-job dispersion (0.32), growth dispersion (growth skewness = 2.63), wage cushion (2.67), and rent sharing schemes illustrate a substantial erosion of ILM properties, thus indicating a strong presence of individualized pay strategies.

Table 3 here

3.2. Analysis of heterogeneity

The estimates of membership degrees are used to provide a notion of how firms are distributed across fuzzy clusters (see Fig. 1a and Table 3 for numerical values). These estimates show low heterogeneity among large firms as more than 97% have membership of 0.8 or more in either one or two fuzzy clusters; in particular, 91% are positioned in the path of edges *Competitive* → *Internal Labor Markets* → *Incentive* (Fig. 1b). This distribution of firms makes it possible to fairly use the result established in Suleman and Suleman (2012) that, under certain conditions, assigns a single number to each firm that represents its position in the fuzzy partition; and this corresponds here to the firm's individual compensation policy. Consequently, this identifier may also be used to examine how the compensation policy is affected by other firms' characteristics. Formally, if μ_{ik} is the membership degree of firm k in fuzzy cluster i , the function

$$pos(k) = \sum_{i=1}^3 \eta(i) \times \mu_{ik}, k = 1, 2, \dots, N \quad (1)$$

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increases from $\eta(1)$ to $\eta(c)$ along the path of edges referred above, provided that $\eta(i)$ is a strictly increasing sequence of real numbers. The major difficulty in applying (1) is to find an appropriate sequence $\eta(i)$ that reflects the operational context of the subject under discussion. Here a 0 – 1 normalized version of the mean hourly wage of the prototypes is used (i.e. 3.77, 4.00 and 8.53, Table 2), leading to $\eta(1) = 0$, $\eta(2) = 0.05$, and $\eta(3) = 1$. The results based on the function $pos(\cdot)$, in (1), should be interpreted with caution as they depend on the sequence $\eta(i)$ chosen.

Figure 1 here

4. Compensation policy and contractual arrangement

Following on from the empirical distribution of firms on the fuzzy 3-partition, a Tobit linear regression model (Amemiya, 1984) is estimated to explore the association between compensation policies and contractual arrangements. The function $pos(\cdot)$ above, calculated for each firm, is used as the dependent variable and the proportion of fixed term contracts by firm is used to proxy contractual arrangements. In addition, some other workplace characteristics are used as control variables: workforce composition, size and growth of the firm, type of collective bargaining agreement, type of shareholders, and industry affiliation according to EUROSTAT (2009). Table 4 reports the estimates from Tobit regression.

Table 4 here

The estimates suggest that the model has good predictive power with 63.1% of the variance of compensation policies being explained by contractual arrangements and workplace characteristics. More importantly, the estimates associated with job flexibility indicate that firms using fixed-term contracts tend to adopt compensation policies closer to the *Competitive* model. Low-wage firms characterized by a high gender wage gap and high skeweness tend to hire workers on a flexible basis, while high-wage firms, characterized by mixing internal labor market properties with incentive devices, use less flexible work arrangements. In other words, good (bad) wage characteristics are clustered together with good (bad) working conditions and the latter is assessed by the quality of contractual arrangement. This evidence corroborates Tilly's (1996) labor market segmentation assumption. The findings achieved are also consistent with those reported by Booth et al. (2002) and Hagen (2002) that favor segmentation arguments instead of compensation wage differentials predictions. *Competitive* firms seem to adopt so-called *low-road* strategies associating numerical flexibility with low wage and pay flexibility, while *Incentive* firms are closer to *high-road* strategies suggesting the tie between pay and both individual and organizational performance.

It is also interesting to explore how other workplace characteristics are linked to the compensation policy patterns. The estimates from the Tobit regression suggest that workforce composition correlates with pay decisions and indicate that female, blue-collar and young workers are more linked to the *Competitive* model. In other words, these categories of workers tend to prevail in low wage firms that put special emphasis on low cost competitive strategies (Bhandari & Hesmati, 2008). In turn, white-collar

workers tend to benefit both from good working conditions and high-wages, probably due to firm-specific skills. Indeed, as reported above, incumbents are more protected in the *Incentive* model than in other models (entry level wage is one of the lowest). Once again, this evidence corroborates segmentation predictions suggesting that some categories are over-represented in specific segments of firms.

The estimates from industry-affiliation deserve special attention. Positive signs suggest proximity to the *Internal Labor Market* model and the *Incentive* model, and a deviation from the *Competitive* compensation policy. The largest coefficient estimates are associated with high technology knowledge intensive services (KIS) and knowledge intensive financial (KIF) services, indicating that firms in these industries are closer to the *Incentive* model. Banks and other firms within KIF services seem to operate as structured labor markets but also use incentive devices (Treble, Gamen, Bridges & Barmby, 2001).

It is interesting to note that while there are no significant differences between manufacturing sectors, a duality emerges in the service sectors. The less KIS are closer to the *Competitive* model, while high technology KIS and KIF services tend to be near the *Incentive* model.

The firms vary according to their bargaining system. Not surprisingly, decentralized bargaining, involving multiple firms or a single firm, tends to be associated with *Incentive* firms. Herein, firms are able to use monetary incentives negotiated at firm level to encourage cooperation and productivity. This evidence suggests that the bargaining system influences the scope for pay flexibility at firm level so that firms can retain skilled and matched workers.

Finally, the firm size estimate corroborates findings in recent literature in that size has no statistically significant association with compensation policies (Levine et al., 2002).

5. Concluding remarks

This study examined the association between compensation policies and contractual arrangements of large-sized firms in Portugal. It contributes to the debate on increasing labor market flexibility that is expected to help address growing competitive pressures in the globalized economy. Fuzzy clustering proved a suitable way of grouping firms according to predominant characteristics of their compensation policy while preventing segmentation in crisp categories.

Empirical evidence pointed towards a segmentation of firms into three fuzzy clusters of prevailing compensation policies. While the *Competitive* firms are characterized by low and flexible wages, the *Internal Labor Market* and *Incentive* firms show characteristics of a protected employment relationship but also seek incentive devices. This evidence suggests that both collective and individualized management of wages prevail in some firms. Furthermore, the distribution of firms supports a coherent combination rather than simple miscellany of wage practices, and shows evidence of a continuum among segments.

However, there is a striking similarity in the use of wages as an adjustment process. This evidence supports Cardoso & Portela (2009), in that wages in Portugal are highly responsive to macroeconomic conditions. The findings illustrate that flexibility in Portuguese firms is not limited to wage adjustment but covers practices that reveal employers' discretionary power to individualize wages. Some employers use wage adjustment and cut wages; others combine both incentives and adjustments. However, it

is the association between pay and contracts that is of greatest relevance in this research. The estimates from the Tobit regression show the relevance of segmentation predictions in that firms using low and flexible pay tend to offer flexible contracts. This is the case of *Competitive* firms in particular as they associate wage adjustment with numerical flexibility. This secondary segment prevails in firms operating in labor intensive sectors that hire some traditionally vulnerable categories like young and female workers. The financial services firms, which target the development of firm-specific skills, meet the characteristics of the primary segment. In this case, high-wages are associated with incentive devices that benefit white-collar employees in particular.

Despite their relevance, the findings of this study should be read with caution as the data used herein were not collected for the purpose of studying compensation policies and therefore lack important elements of employers' decisions. For example, this dataset does not include information on flexible payments and fringe benefits, which are crucial to the study of incentive devices and identifying unequal access to benefits among workers.

Nevertheless, the results allow us to question the role played by firms' decisions on the management of pay and contracts in the growing inequality of the labor market. In this regard, more detailed research should be conducted into how firms design staffing strategies and compensation policies, so as to inform policy makers on how these combinations fuel the polarization of the labor market.

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Table 1. Variables used to define compensation policy

Variable short name	Variable specification	Information provided by the variable
Pay levels		
Hourly wage	Average total wage: firm average hourly wage	Position of firm vis-à-vis the competition in the 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 at industry level
Gini	Wage dispersion: Gini coefficient	Overall inequality of wage distribution
Skewness	Wage asymmetry: Skewness of total wage	Degree of asymmetry of wages
Entry-wage	Entry level wage: Wage differential between newly hired (tenure up to one year) and incumbents	Competition around general or specific skills
Education premium	Education premium: correlation between years of schooling and hourly wage	Value of general skills
Pay structure		
Wage hierarchy	Pay structure: Spearman correlation between job level and wage	Wages tied to job hierarchy
Intra job dispersion	Within job dispersion: coefficient of variation (CV) of	Internal equity controlling for job level

	total wages in core job	Incentive devices
	Pay growth	
Wage growth	Average wage growth: wage increase in last four years	High and low wage growth firms
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
	Pay flexibility	
Wage cushion	Wage cushion: difference between total wage and bargained wage	Incentive devices
Wage adjustment	Cyclicalities of wages: elasticity of real base wage to unemployment rate	Wages used as adjustment process
Rent sharing	Rent sharing: correlation between mean wage and firm sales of previous year	Incentive devices
	Pay penalty	
Gender wage gap	Wage difference between women and men	Wage penalty of female workers

Table 2. Estimates of fuzzy 3-partition prototypes

Variables	P1 Competitive	P2 ILM	P3 Incentive
Hourly wage	3.77	4.00	8.53
Firm/industry wage	-0.09	-0.07	0.31
Gini	0.20	0.24	0.27
Skewness	7.57	3.50	3.35
Entry wage	-0.10	-0.12	-0.16
Education premium	0.29	0.39	0.32
Wage hierarchy	0.59	0.66	0.67
Intra-job dispersion	0.23	0.23	0.32
Wage growth	0.04	0.04	0.05
Growth skewness	2.41	2.60	2.63
Tenure profile	0.18	0.19	0.18
Wage cushion	1.62	1.70	2.67
Wage adjustment	-0.48	-0.32	-0.24
Rent sharing	0.08	0.06	0.12
Gender wage gap	0.24	0.20	0.20

Table 3. Empirical distribution of firms on the fuzzy 3-partition (threshold for full membership: 0.8)

Membership in:			Total = 669
One Fuzzy Cluster			364
P_1	P_2	P_3	(54.4%)
93 (13.9%)	163 (24.4%)	108 (16.1%)	
Two Fuzzy Clusters			286
$P_1 - P_2$	$P_2 - P_3$	$P_1 - P_3$	(42.8%)
138 (20.6%)	107 (16.0%)	41 (6.1%)	
Three Fuzzy Clusters			19
			(2.8%)

Table 4. Predictors of compensation policy: Tobit regression model estimates

Model	Coefficient Estimate	Standard error
% of fixed term contracts	0.1999***	0.05
% female workers	-0.1664***	0.04
% of young workers	-0.6204***	0.07
% of blue collar workers	-0.5420***	0.04
Firm's dimension (number of workers)	-0.0004	0.04
Firm's age	-0.0001	0.00
Firm's growth	0.0644	0.04
Collective bargaining level ^a		
Several firms agreement	0.2598***	0.05
Single firm agreement	0.2504***	0.04
Others	0.1364***	0.03
Share holding ^b		
Public	0.0965**	0.05
Foreign	0.0441	0.03
Mixed		0.04
Others	0.1442***	
Others	-0.0914*	0.05
Industry affiliation ^c		
Less Knowledge Intensive Services (KIS)	-0.1539***	0.04
Medium-High Technology Industry	-0.0473	0.05
Low Technology Industry	-0.0236	0.05
High Technology KIS	0.2019***	0.07

Market KIS	-0.0257	0.05
Knowledge Intensive Financial Service	0.3148***	0.07
Other KIS	-0.0754	0.06
High Technology Industry	-0.0081	0.09
Other Less KIS	-0.0950	0.08
Primary Sector	-0.2504*	0.13
Construction	0.1208**	0.05
Constant	0.7832***	0.05

N = 669; LR $\chi^2(25) = 644.40$; p-value=0.0000; $R^2 = 0.63$

Dependent variable = compensation policy [$pos(k)$]; ^a Reference category = industry-level bargaining; ^b Reference category = National private capital; ^c Reference category = Industries of Medium Low Technology; *significant at 10%; ** significant at 5%; and *** significant at 1%.

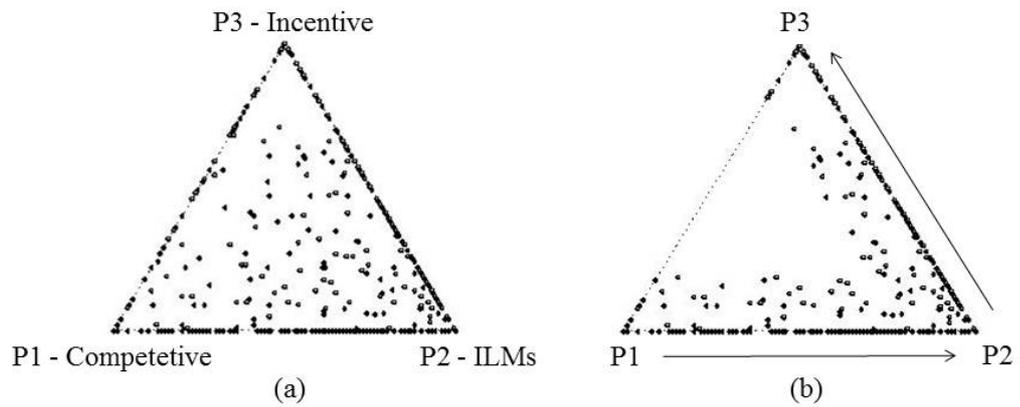


Figure 1. (a) Estimated distribution of firms on a fuzzy 3-partition; (b) Firms that have membership of 0.8 or more in the path of edges *Competitive* \rightarrow *Internal Labor Markets* \rightarrow *Incentive* (91%)