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WORKERS OR EMPLOYERS: WHO IS SHAPING WAGE INEQUALITY?

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ABSTRACT

An extensive micro data set matching firms, establishments and their employees, is used to study the determinants of earnings inequality in Portugal and its evolution from 1983 to 1992, with the Theil index, its decomposition, and the decomposition of its change as tools of analysis. The relevance of both worker and employer attributes in shaping earnings inequality and its trend is quantified. The impact of the firm on wage inequality in a European country is compared to the situation in the USA, where a different institutional framework is often believed to grant firms more autonomy in wage setting. The impact of the firm is indeed slightly lower in Portugal than in the USA, suggesting that a more centralised and regulated European bargaining system might reduce the scope for firm action. A profile of an economy undergoing modernisation, where rising labour market inequality signalled the lack of an adequate labour force, can be drawn. An *upgrading* of the *quality* of the labour force, accompanied by rising returns to skill and schooling and declining returns to age is detected, while firms shifted towards more *flexible* structures.

Key-words: wage structure; inequality decomposition; Portugal; firm.

JEL: J31, J51, D21.

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1. INTRODUCTION

Evidence on growing wage inequality within industrialised economies began to be reported in the empirical literature in the 1980s, contradicting previous evidence and challenging economic theory. There is now wide consensus over the idea that this trend was widespread, having hit economies with contrasting wage setting institutions. As in most other OECD countries, rising inequality characterised the evolution of labour returns in Portugal (see OECD [1993]). Moreover, inequality in the Portuguese labour market increased very sharply, from the already high values of early 1980s. Indeed, the Gini index of hourly wages increased by 16%, from 0.32 to 0.38 between 1983 and 1992, while the coefficient of variation reported a more pronounced change of 26%, as the wage distribution reinforced one of its characteristics of the beginning of the decade – a very stretched upper half (see CARDOSO [1996]).

This study looks at both worker *and* employer attributes as sources of wage dispersion and of its rising trend in Portugal during the 1980s and early 1990s, a period initially marked by an economic crisis, and after 1985 characterised by high economic growth, low unemployment and rising activity rate. Three main reasons contribute to the relevance of this topic, and each will be dealt with separately.

Studies of earnings inequality have concentrated mainly on worker attributes, encouraged by an economic theory dominated by the human capital approach and by the development of household surveys providing detailed data on household attributes and rewards. The growing awareness of the fact that labour economists have disregarded the demand side of the market (see namely HAMERMESH [1993] and FREEMAN [1989]) led to the study of the role of the firm in wage inequality (see GROSHEN [1986] and DAVIS and HALTIWANGER [1991]), having been detected that inequality among firms accounts for a major share of the wage dispersion. Bringing together worker and employer attributes in a study of the determinants of earnings inequality thus seems a fruitful line of research.

However, most of the work quantifying the impact of the firm on earnings inequality has dealt with the USA, a labour market characterised by institutional arrangements quite different from those prevailing in Europe, where firms are thought to be granted less autonomy when bargaining over wages. In fact, the decentralised bargaining mechanisms, the low *safety net* and the traditionally lower unionisation rates characterising the *deregulated* and *flexible* American labour market contrast with the more centralised bargaining system and the relatively higher minimum wage levels enforced in Europe and its traditionally higher unionisation rates. "I found it inconceivable that European style national collective bargaining or extension of labor contracts from some employers to their competitors would work in the US, outside of a mass mobilisation war

environment." [FREEMAN, 1995: 11] In particular this practice of extension of contracts is thought to have a major direct impact on the role of the firm in wage inequality – "[introduction of] [e]xtension of contracts [in the USA] would reduce wage inequality among firms." [FREEMAN, 1995: 14] To the extent that Portugal shares with its European counterparts their framework of industrial labour relations, namely the contract extension mechanism, analysis of the country can provide evidence on the relevance of the firm in shaping wage inequality under an institutional setting that diverges from that of the USA.

A particularly appropriate data set for the study of this issue is available for Portugal, which matches data on the firm, the establishment, and each of the workers. This extensive data set is gathered annually by the Portuguese Ministry of Employment and Social Security (MESS), based on a questionnaire that *every* establishment with wage earners has, since 1982, been legally obliged to fill in. Reported data cover the *establishment* itself (its location, economic activity and employment), the *firm* (location, economic activity, employment, sales, ownership structure), and furthermore *each of the workers* (gender, age, skill, occupation, schooling, tenure, earnings – split into base-wage, tenure-related subsidies, other regular subsidies, irregular subsidies and overtime pay –, duration of work – normal and overtime –, as well as the mechanism of collective bargaining). Appendix A provides more detailed information on the data set and the sampling procedure used.

Section 2 discusses the degree of centralisation in the Portuguese collective bargaining system and the constraints imposed on the firm wage setting behaviour by the minimum wage legislation. Sections 3 and 4 explain the methodology followed and the results obtained. In particular, they justify the choice of the Theil index and its decomposition as tools of analysis. Presentation of the results distinguishes between the determinants of inequality and of its trend, with a wide range of possible causes evaluated in a systematic way – shifts in the employment structure, relative changes in the wage of different groups of workers, and changes in inequality within those groups, defined according to either worker or firm attributes. Concluding remarks are presented in section 5.

2. INSTITUTIONAL SETTING IN THE PORTUGUESE LABOUR MARKET: CENTRALISATION VS. DECENTRALISATION

Collective bargaining

Features of a centralised wage bargaining system can be found in the Portuguese industrial labour relations system as in several other European countries, in contrast with the *American model*. Indeed, trade union confederations, employers' federations and the Government meet at the national

level to set each year a guideline for wage increases. Also, massive wage bargaining contracts predominate in the economy, in the sense that one or several employers' *associations* are involved, subscribing together to an agreement that often applies to an entire economic activity (see the impact of *collective bargaining contracts* in table 1). Compulsive extension mechanisms are another feature shared by Portugal and many European economies, as the Government can apply a *mandatory regime*, extending the application of existing documents (or in other instances enforcing a contract with an original contents), when workers are not covered by trade unions, when one of the parties refuses to negotiate, or bargaining is obstructed in any other way (see *mandatory regime* in table 1). Voluntary extensions are also found, when one economic partner – workers' representative or employer – decides to subscribe to an agreement which it had initially not signed. Also in contrast to the American practice is the fact that employers who sign an agreement with a trade union(s) usually extend its application to all of their workforce, irrespective of the worker's union membership status. As such, the impact of collective bargaining goes far beyond union membership and the distinction between unionised and non-unionised workers (or firms) becomes meaningless.

Table 1 – Share of the wage-earners covered by each type of collective bargaining mechanism, 1992

massive wage setting mechanisms		decentralised wage setting mechanisms		not covered	TOTAL
<i>collective bargaining contract</i> (CBC)	<i>mandatory regime</i> (MR)	<i>collective bargaining agreement</i> (CBA)	<i>firm agreement</i> (FA)		
82.9	4.5	4.0	7.3	1.3	100

Source: Portugal, MESS [1993a].

Nonetheless, certain aspects of decentralisation can also be highlighted, clearly setting this system apart from the very centralised ones, among which Sweden has deserved most attention in the literature. Employers may choose to negotiate individually with trade union(s) (yielding *firm agreements*, when one single employer is involved, or *collective bargaining agreements*, when several employers, though not organised into a formal association, are involved) (see decentralised wage setting mechanisms in table 1). Furthermore, freedom of union creation and union affiliation are recognised in the legal system and have resulted in a fragmented union structure, where overlapping unions often coexist, to a great extent competing and to a lesser extent cooperating. As the parties involved in collective bargaining may choose the level of negotiation (regional, occupational, industrial or national) and several unions can enter negotiation for an agreement, separately or together, just as employers can be united to varying

extents, the system can become extremely diffuse, with negotiation fragmented and agreements multiplied.

Further contributing to some flexibility in the system is the fact that wages actually paid by the firms often drift from their contractual levels, especially in periods of unexpected high inflation or changing economic conditions. Most agreements in fact address specifically the issue of the base monthly wage, the normal duration of work and overtime pay. Wage drift has been gradually increasing in the Portuguese economy during the 1980s (see APERTA *et. al.* [1994]).

Minimum wage

A *safety net* for low wage workers is provided by the minimum wage, which in 1983 represented a stringent 55% of the economy's average wage, having declined to 47% by 1992.¹

Table 2 – Minimum wage (1)

WAGE LEVEL	1983	1986	1989	1992
min wage / av. monthly earnings (%)	55.0	56.1	50.6	46.5
WAGE GROWTH	average annual growth rate (%)			
	1983-86	1986-89	1989-92	
real minimum wage	0.1	-0.4	2.5	
average real monthly earnings	-0.5	3.1	5.4	
consumer price index	19.9	10.5	11.2	

Sources: CPI – computations based on Banco de Portugal, *Relatório do Conselho de Administração*, 1992, 1990, 1988.

Wages – MESS, *Quadros de Pessoal*, 1983, 1986, 1989, 1992.

Minimum wages – regulations enforced in each of the years.

Notes: (1) Minimum wage of activities other than domestic work and agriculture.

$$(2) \text{ Av. real earnings} = \frac{\text{average nominal earnings (index base 1983)}}{\text{CPI (index base 1983)}} \quad (\text{BIT [1980: 243-254]})$$

summarises this widely used procedure).

A certain space for firm manoeuvre was nonetheless allowed during most of the period under analysis. While nowadays minimum wage reductions apply only to youngsters below the age of 18, trainees aged 25 or less and handicapped workers, small firms were until recently allowed to pay wages below the minimum set for their activity² – if they employed fewer than 6 workers (a possibility revoked in 1991) or, on request, if they employed fewer than 50 workers (a benchmark gradually lowered until it was revoked, in 1990).

¹ The minimum wage for activities other than domestic work and agriculture was considered. The economy's average wage computed from *Quadros de Pessoal* does not include agriculture and Public Administration (see appendix A on the data set).

² And equal to the agriculture minimum wage.

3. WHAT REASONS FOR INEQUALITY? WORKER VS. FIRM ATTRIBUTES

International comparisons suggest that inequality in the Portuguese labour market reaches a high value, similar to that of the United Kingdom; that is, slightly lower than the USA, which is usually taken as the paradigm of an unequal labour market, but higher than other countries most often included in comparative studies (the Gini coefficient for monthly earnings was in 1983 equal to 0.295, while the 90/10 wage ratio was 3.17) (see CARDOSO [1996]). The first question to be answered is therefore: What determines earnings inequality in Portugal?

The inequality measure to be used should be additively decomposable, to enable the detection of the contribution of different variables to overall earnings dispersion, yielding some insight into the causes of earnings differentials. This property, together with that of scale invariance and computational burden considerations, generates a certain consensus in the literature regarding the most appropriate measures to be used – the entropy family, to which the Theil index belongs (see namely SHORROCKS [1984: 1383], BOURGUIGNON [1979: 901] or COWELL [1985: 201]). While beginning by the more common procedure of inequality decomposition, which considers the gross contribution of the variable(s) to total inequality, the analysis proceeds to use Cowell's proposal to compute marginal contributions of firm and worker attributes to total inequality (see COWELL [1985]), in a procedure less often found in the empirical literature.

Taking i to be an income³ receiver in a population of N individuals, y_i to be the share of income he/she earns, such that $y_i \geq 0$ and $\sum_{i=1}^N y_i = 1$, the Theil index can be computed as

$$T(y) = \sum_{i=1}^N y_i \log(N y_i) . \quad (1)$$

The measure ranges between 0 (maximum equality) and $\log N$ (maximum inequality).

Consider now the following notation for inequality decomposition:

- $y_i, i=1 \dots N$ – income share earned by individual i ;
- $S_g, g=1 \dots G$ – mutually exclusive and exhaustive population subgroups, defined according to some selected attribute(s);
- $N_g, g=1 \dots G$ – size of each subgroup, with $\sum_{g=1}^G N_g = N$;

³ The word *income* will be used when talking about the Theil index, even though the analysis deals with *earnings*, because the language is somewhat easier and more immediately understandable (for instance, referring to *total income* instead of *total wage bill*).

$$- Y_g = \sum_{i \in g} y_i, \quad g=1 \dots G - \text{share of income earned by the individuals in subgroup } g;$$

$$\sum_{g=1}^G Y_g = 1.$$

It can be proven (see THEIL [1967:93-96]) that:

$$T(y) = \underbrace{\sum_{g=1}^G Y_g \log\left(\frac{Y_g}{N_g}\right)}_{TB} + \underbrace{\sum_{g=1}^G Y_g \cdot \sum_{i \in g} \frac{y_i}{Y_g} \log\left(\frac{y_i}{N_g}\right)}_{TW} \quad (2)$$

$$TW = \sum_{g=1}^G Y_g \cdot TW_g$$

TB captures the inequality *between* the different G groups defined, as it considers the income *per capita* of each group. It can be interpreted as the degree of inequality that would exist if the selected attribute(s) were the only determinants of inequality, i.e., if everyone earned the mean income of his/her group and all the inequality within the groups had thus vanished [THEIL, 1967: 95] [THEIL, 1972: 101]. TW_g expresses the inequality that exists *within* a certain group g . Notice that y_i/Y_g is the share of income of individual i in his/her group, whereas $1/N_g$ expresses his/her weight in the group. Y_g are the weights used to compute overall *within-groups* inequality, TW . Following the reasoning used to interpret TB , TW is that share of the earnings dispersion *not explained*. Indeed, if *every* attribute determining inequality had been considered, then each group would be made up of homogeneous individuals, and inequality within each of the groups would have vanished.

Decomposition of hourly earnings⁴ inequality in the Portuguese labour market yields the results reproduced in table 3.

⁴ See appendix B for further information on the concept of earnings used.

Table 3 – Contribution of worker and employer attributes to earnings inequality, 1992

	TB between-groups component of inequality		TW within-groups component of inequality		T total inequality	
	value	%	value	%	value	%
<i>worker attributes</i>						
skill	.0985	34.7	.1853	65.3	.2838	100
schooling	.0765	27.0	.2073	73.0	.2838	100
gender	.0126	4.4	.2712	95.6	.2838	100
age	.0368	13.0	.2470	87.0	.2838	100
tenure	.0220	7.8	.2618	92.2	.2838	100
occupation	.1381	48.7	.1457	51.3	.2838	100
<i>firm</i>						
	.1770	62.4	.1068	37.6	.2838	100
<i>establishment</i>	.1832	64.6	.1005	35.4	.2838	100
<i>employer attributes</i>						
economic activity (6-digit)	.1209	42.6	.1628	57.4	.2838	100
location	.0494	17.4	.2344	82.6	.2838	100
ownership structure	.0493	17.4	.2345	82.6	.2838	100
size	.1093	38.5	.1745	61.5	.2838	100
type col. barg. mechanism	.0444	15.6	.2394	84.4	.2838	100

Source: Computations based on MESS, *Quadros de Pessoal*, 1992.

Note: See appendix C for the definition of the groups defined by each variable.

Considering each variable separately, innate worker attributes seem to have little relevance in shaping earnings inequality. In fact, *gender* accounts only for 4% of inequality, while a much more detailed partition of the workforce, according to *age*, is associated with only 13% of total wage dispersion; a major share of inequality thus remains *within* the groups defined by each of these variables. On the contrary, worker choices⁵ concerning the career to follow and the investment in human capital are more relevant determinants of earnings inequality – the *schooling* level, the *skill* and the *occupation* account for 27%, 35% and 49% of inequality, respectively.⁶

Gross contributions to inequality suggest that the demand side imposes strict constraints on wages. Indeed, wage inequality among firms accounts for 62% of total inequality. The fact that the contribution of the establishment is 65% indicates that it adds little to the explanation of inequality, confirming the idea

⁵ Whether constrained or not, a point which is beyond this discussion.

⁶ One should however keep in mind that such population partitions differ widely in their fineness – whereas the variable *gender* defines two groups, *schooling* defines five, *skill* eight, and the *occupation* defines 1207 groups (see appendix C). The latter, much more detailed partition, is likely to capture a higher share of total inequality. Also, such a detailed occupational classification is likely to capture firm characteristics, and not simply worker attributes.

that wage bargaining decisions are mainly taken at the firm level. Considering just the manufacturing sector, the contribution of the establishment to overall inequality reaches 48%, a result slightly lower than that detected by DAVIS and HALTIWANGER [1991:133-135], who reported a 51% to 58% contribution of the establishment to total earnings inequality in manufacturing in the USA. Such values provide preliminary evidence suggesting that firms may be allowed more freedom when setting wages in the USA than in Portugal. The *economic activity* of the firm and its *size* stand out as the attributes most closely associated with inequality. The *ownership structure*, the *location* (in a country known to be characterised by sharp regional contrasts) and the *institutional setting* have similar impacts on inequality – 16% to 17%.

The analysis should progress to quantify marginal contributions to inequality. Whereas TB/T evaluates the impact on inequality due to the attribute selected to define the groups, it disregards the interactions that might exist with other variables, reporting *gross* contributions to inequality. In fact, if we take j and k to be two variables chosen to partition the population, the conditions $T = TB_j + TW_j$ and $T = TB_k + TW_k$ hold, but most often the *joint* contribution of both variables is not equal to the sum of their individual contributions. Instead,

$$TB_{jk} = TB_j + TB_k + I_{jk} \text{ ,} \quad (3)$$

where I_{jk} stands for the interaction existing between the variables j and k , which, unless the variables were perfectly independent, can be positive or negative. The impact of variable k , controlling for variable j , can be computed as [COWELL, 1985]:

$$C_k^j = TB_{jk} - TB_j = TB_k + I_{jk} \text{ .}^7 \quad (4)$$

The decomposition given by equation 2, together with equation 3, enable us to write

$$T = TB_{jk} + TW_{jk} = TB_j + TB_k + I_{jk} + TW_{jk} \text{ .} \quad (5)$$

Also, it follows from equation 4 that

$$TB_k = C_k^j - I_{jk} \text{ .} \quad (6)$$

Plugging this result and its equivalent for variable j into equation 5 and simplifying yields

$$T = C_j^k + C_k^j - I_{jk} + TW_{jk} \text{ .} \quad (7)$$

Particularly interesting is that decomposition which highlights the impact on inequality *exclusively* due to the firm, plus that exclusive to the worker

⁷ We would in fact be *deducting* the interaction if, as it is most often the case, it were negative.

characteristics, plus the interaction between the firm and the type of worker. Total inequality in the Portuguese labour market was thus decomposed into:

$$T = C_w + C_f - I_{wf} + TW_{wf}$$

$$\Leftrightarrow .28379 = .10411 + .03351 + .14351 + .00266$$

$$(100\%) \quad (36.7\%) \quad (11.8\%) \quad (50.6\%) \quad (0.9\%)$$

where w stands for all the worker attributes taken jointly (skill, schooling, occupation, sex, age, tenure), f stands for firm, C evaluates the marginal contribution of each of these two factors, controlling for the other one, and I is the interaction between the firm and type of worker. The percentage contribution of each term is highlighted.

A very fine partition of the population was implemented – each group is defined simultaneously by the firm in which the worker is engaged, his/her gender, age, tenure, skill, schooling level and occupation. With such finely defined groups, we would expect to have captured most sources of wage dispersion, and in fact less than 1% of total inequality remains *unexplained*, in the sense that it remains within these *homogeneous* groups. Once the impact of the firm is controlled for, the contribution of all the worker attributes reported in the first panel of table 2 is 37% of total inequality. Economy-wide, human-capital type of variables account for over one third of total inequality and thus human capital explanations of earnings differentials can by no means be dismissed. The contribution exclusive to the firm (firm-wide impact on wages) is 12% of total inequality. Comparison with the results of the second panel in table 2 reveals that a strong (negative) interaction between the firm and types of workers had been disregarded. The interaction term accounts for half of the existing inequality, stressing the impact of the different pay and recruitment policies across firms. Two different mechanisms may be embodied in the interaction term, a *recruitment policy* mechanism and a *pay system* mechanism – *good firms* recruit *good workers*, who are thus granted an extra-premium for their attributes (reinforcing the inequality that would be exclusively due to the firm plus that exclusively due to worker attributes); on the other hand, *some* types of workers may get an extra premium in *some* types of firms, stressing the relevance of differences in internal labour markets across firms. Empirical studies relying on the decomposition of the Theil index have stressed the first type of interpretation and we will follow them (see namely ALTIMIR and PIÑERA [1982] or FISHLOW [1972]).

Table 4 – Interactions between the firm and each worker attribute, 1992

	interactions between the firm and				
	occupation	skill	school	sex	tenure
value	-.0767	-.0492	-.0452	-.0035	.0074
share of total inequality (%)	27.0	17.3	15.9	1.2	2.9

Source: Computations based on MESS, *Quadros de Pessoal*, 1992.

Negative values for the interaction between variables j and k reveal that the inequality exclusively due to attribute j , plus that exclusively due to attribute k is reinforced once we take both attributes into account (see equation 7), meaning that *high wage j's* are associated with *high wage k's*; positive interactions, instead, mean that the combination of both variables *lowers* the inequality that would be given by summing their marginal contributions. Looking at the interactions between the firm and each worker attribute separately, one can conclude that the match between (high wage) firms and (high wage) occupations is particularly pronounced, accounting for 27% of inequality, which could lend support to the idea that such a detailed occupational classification is likely to capture firm characteristics, and not just worker attributes. Sorting mechanisms also operate with respect to skill and schooling levels and, to a lesser extent, with gender. The opposite happens with age and tenure, with a positive interaction indicating that different age and tenure levels coexist within the firm.

Data for further international comparisons are available if the relevance of the employer is evaluated as its impact on inequality after controlling for the economic activity. Within each Portuguese manufacturing industry defined at the 2-digit level⁸, the establishment still accounts for 31% of total inequality, compared to 40% to 46% detected by DAVIS and HALTIWANGER [1991: 134-135] in the USA. The impact of the establishment (all activities) on inequality becomes 6% once we control for the 2-digit industry *and* all the worker characteristics, as compared to 7.9% detected by GROSHEN [1986:70].⁹

Evidence on Portugal therefore lends support to the idea that firms have more autonomy in wage setting in the USA, a labour market characterised by a high degree of decentralisation, than in a more regulated and centralised European bargaining system. However, the results are not as far apart as the existence of features such as the mechanism of extension of contracts in Europe, and its absence in the USA, would let us foresee. The European diversity should be acknowledged, to highlight certain aspects of decentralisation in wage setting

⁸ To obtain a number of industries comparable to that used by other studies.

⁹ Even though the controls used by Groshen are not strictly comparable to the ones used here. In fact, she controlled for the industry, the detailed occupation of the worker, the sex and the pay system. Both studies control for the industry, but while this study explicitly controls for several worker attributes, Groshen used the detailed occupation and the sex as proxies for such characteristics; her study, on the other hand, controls for the pay system, on which no data is available in QP.

which are, in some cases, common to several European countries, while in other cases they are specific to Portugal, a labour market with an intermediate degree of centralisation.

Guidelines set centrally by representatives of the economic partners provide a merely indicative benchmark for wage bargaining and moreover they relate only to wage increases and not wage levels. Also, collective bargaining is fragmented, as overlapping unions often coexist and agreements are multiplied with employers having the choice to negotiate individually with trade unions. The considerable impact of wage drift on the wages actually paid is also common to most European country experiences.

Portugal presents other features that are not common to the *European model*. While minimum wage legislation is enforced, during most of the period under analysis it was a *flexible* benchmark, that firms could to some extent overcome. Regarding vocational training, the links between the educational system and the labour market are traditionally weak, reflected namely in the low share of blue-collar holding a technical diploma – 20% in Portugal as opposed to 90% in Germany (according to RODRIGUES and LOPES [1993: 17]) –, which may contribute to grant firms a certain discretionary power when setting wages, as external constraints (e.g. a diploma) are weak.

Though the Portuguese case may illustrate that a pattern is at work – a slightly lower impact of the firm on wage inequality in Europe than in the USA –, the European diversity should not be disregarded. Indeed, to cite a few examples, the degree of centralisation of the bargaining system varies widely (see the extreme case of Sweden), the links between the educational system and the labour world differ (see the extreme situation of Germany) and the minimum wage achieves contrasting levels in the different countries, covering different shares of the workforce.

4. WHAT REASONS FOR *RIISING* EARNINGS INEQUALITY?

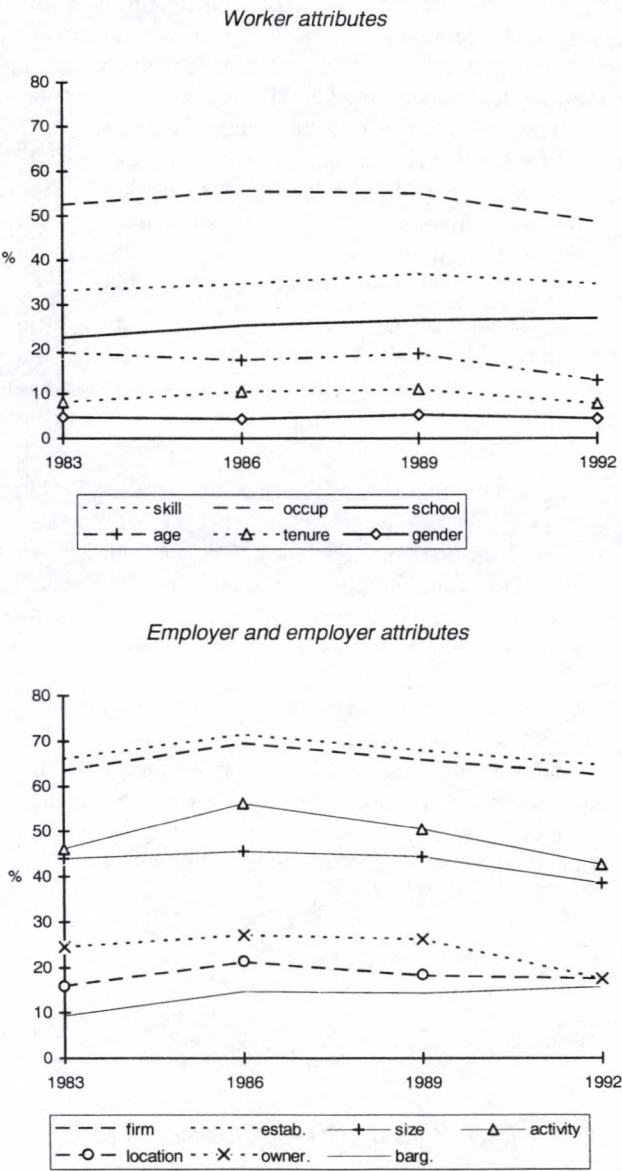
The sharp rise in wage inequality in Portugal was particularly marked after 1986 (see CARDOSO [1996]), when the economy began to recover and real wages were rising (see table 2). Declining real wages were associated with a slight increase in inequality, whereas the benefits of rising real wages were more unequally distributed. What drove this rise in labour market inequality?

A clear chronological pattern emerges from the analysis of the contribution of each variable to overall earnings inequality (see figure 1). Whereas until the mid-'eighties the available worker and firm attributes were responsible for the overall rise in inequality, the 'nineties witnessed the emergence of a new pattern – in some cases already foreseeable in the late 'eighties – as wage disparity *within*

groups of workers took the lead in shaping the evolution of aggregate inequality. Indeed, from 1989 to '92, all the variables except schooling and the bargaining mechanism reduced their contribution to total inequality. But let us look at each variable in more detail.

The decline in the relevance of innate worker characteristics – sex and age – was foreseeable in the early 'eighties, as these were the only two variables whose contribution to total inequality showed signs of a decline between 1983 and 1986. After 1986, the relevance of employers' attributes as sources of wage dispersion began to decline – its economic activity, size, location, type of ownership, as well as the firm and the establishments themselves –, decreased their contribution to total inequality. The workers' occupation followed a similar pattern. After 1989 this trend was widespread, affecting all the variables, with two notable exceptions, the schooling level and the institutional setting represented by the type of bargaining mechanism. As a result, from 1983 to 1992, only a few variables managed to increase their importance as sources of wage dispersion – the skill and schooling levels of the workers, the location of the firm and the type of collective bargaining contract.

Figure 1 – Contribution of worker and employer attributes to earnings inequality (TB/T)



Source: Computations based on MESS, *Quadros de Pessoal*, 1983, 1986, 1989, 1992.

While the contribution of the schooling level was rising from 23% to 27% during the decade, that of age was declining most sharply, from 19% to 13%. Wage inequality among schooling levels thus became more pronounced, whereas inequality among age levels became less pronounced. This idea of increasing returns to schooling and decreasing returns to age or labour market experience fits the sociological portrait by Rodrigues and Lopes, who analyse the growing dualism of the Portuguese labour market, defined as "une économie et une population 'à deux vitesses'" [RODRIGUES and LOPES, 1993: 28]. An older labour force, holding specific skills mainly acquired on the workplace and relying on seniority rules to be promoted, coexists with a younger labour force, holding more general skills and a diploma, and relying on economic modernisation and the associated shortage of some skills, as its allies shaping the wage profile at the beginning of the career (see RODRIGUES and LOPES [1993: 17,20,28]).

The relevance of the institutional setting is stressed by the growing share of inequality associated with the type of collective bargaining mechanism. This was brought about by the fact that decentralised bargaining mechanisms reinforced during the decade their early 1980s position of high wages relative to the rest of the economy. This issue will deserve further comments below.

The sharp increases in within-group inequality that have so far been stressed should not disguise the fact that inequality between the groups also increased during the decade, for every variable except age. Though both forces contributed to rising inequality, the within-group component outweighed the impact of changes in inequality between the groups. Decomposition of the changes over time in the Theil index provides a more rigorous framework for detecting the sources of changing inequality, quantifying the impact of changes in inequality within the groups, of changes in the average wage of the groups and of shifts in their employment shares. Changing population shares have implications on both *within*-group inequality (depending on the level of inequality within the groups whose population changes) and *between*-group inequality (depending on whether the average income of the groups whose population changes is close or far apart from the rest of the distribution). Changes in inequality will thus be decomposed into [TSAKLOGLOU, 1993: 55-56,67-68,72]:

$$\begin{aligned} \Delta T = & \sum_{g=1}^G Y_g \Delta TW_g + \\ & + \sum_{g=1}^G k_g (TW_g + \log(k_g)) \Delta \frac{N_g}{N} - \sum_{g=1}^G Y_g (TW_g + \log(k_g) + I) \left(\sum_{g=1}^G k_g \Delta \frac{N_g}{N} \right) + \\ & + \sum_{g=1}^G Y_g (TW_g + \log(k_g) + I) \left(\Delta \log(\bar{m}_g) - \sum_{g=1}^G Y_g \Delta \log(\bar{m}_g) \right), \end{aligned} \quad (9)$$

where $k_g = \frac{Y_g}{N_g \bar{m}}$ represents the average income of group g relative to the overall average, and \bar{m}_g stands for the average income of the group. On the right-hand side, term 1 measures the impact on T resulting from changes in within-group inequality (ΔTW_g), terms 2 and 3 evaluate the impact of changes in the population shares ($\Delta \frac{N_g}{N}$) while term 4 measures the impact resulting from relative changes in the mean income of the groups ($\Delta \bar{m}_g$).¹⁰ For the weighting variables, the mean values of the initial and final periods were considered, following TSAKLOGLOU [1993: 69] and MOOKHERJEE and SHORROCKS [1982: 894]. The results are described in table 5.

¹⁰ *Relative changes* because if all the groups' mean income changed by the same proportion, term 4 would become zero. Note that it does not evaluate the impact of changes in the *relative income* of the groups: even though the decomposed Theil index may be written as $I = f(N_g/N, TW_g, \bar{m}_g/\bar{m})$, a function of the population shares of the groups, their internal inequality and their mean income *relative to the economy*, the impact of $\Delta \bar{m}_g$ is considered (instead of $\Delta(\bar{m}_g/\bar{m})$). According to MOOKHERJEE and SHORROCKS [1982: 896], this must be done to avoid ambiguity in the results, since changes in \bar{m}_g/\bar{m} reflect changes in both the mean income of the groups and their population shares, such that it would not be possible to disentangle these two impacts.

Table 5 – Decomposition of the change in aggregate inequality, 1983-92

	changes in inequality due to						total change in inequality	
	change in within- groups inequality		change in population shares		change in mean wage of the groups			
	value x 100	%	value x 100	%	value x100	%	value x 100	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
worker attributes								
skill	4.8	57.0	1.1	13.0	2.5	30.0	8.4	100
schooling	4.6	54.7	2.0	24.4	1.8	20.9	8.4	100
gender	8.4	99.9	-0.1	-1.7	0.1	1.8	8.4	100
age	8.2	97.7	3.4	40.3	-3.2	-38.1	8.4	100
tenure	7.7	91.7	0.4	4.7	0.3	3.6	8.4	100
employer attributes								
eco. activity (6-digit)	5.1	59.8	0.1	2.0	3.2	38.2	8.4	100
location	7.1	84.2	-0.7	-8.3	2.0	24.2	8.4	100
ownership structure	7.9	93.9	-1.0	-11.9	1.5	18.0	8.4	100
size (7 categories)	8.7	104.0	-0.8	-10.1	0.5	6.1	8.4	100
type col. barg. mech.	5.8	68.6	...	0.2	2.6	31.2	8.4	100

Source: Computations based on MESS, *Quadros de Pessoal*, 1983, 1992.

Notes: Only those partitions of the population that generated groups present both in 1983 and 1992 were retained for analysis. Otherwise, some groups would not be considered when computing the change in w_g , N_g/N or \bar{m}_g , biasing the computation of the three components, and thus of the aggregate change in inequality (changes affecting those groups of workers would be discarded, but the weights would still reflect their presence, due to the smaller weights attached to the other groups). As an example, many firms were present in just one of the two years, such that the partition of the population into firms cannot account for the overall change in inequality; also, some variables included a category *missing*, in just one of the years.

Consider first the skill and the schooling levels of the workforce. For either variable, all three components revealed a positive contribution to rising earnings inequality. First of all, increasing returns to skill and schooling are confirmed by data in column 7 – changes in the mean wage of the groups are associated with 21% to 30% of the change in inequality. Additional information reveals that the wage increases were particularly pronounced for workers with a University diploma, for top managers and professionals and for highly skilled personnel. Secondly, shifts in the employment structure also operated to increase inequality (see column 5). In fact, groups with high internal inequality increased their shares in employment – in particular, professionals, managers and highly skilled personnel, those with a University diploma and those with 9 years of education – while their average wages (which have an impact on inequality *between* the groups) do not seem to have counteracted the effects that one would expect by looking at their within-group inequality. Finally, increasing inequality within groups contributed the most to the trend in overall inequality (57% and 55%). This tendency was more pronounced among highly skilled personnel and holders of a University diploma.

The *upgrading* of the quality of the labour force noticed by looking at its skill and schooling composition should be stressed (see the rising share of University graduates, highly skilled personnel and managers and professionals). Moreover, it is interesting to notice the correspondence between groups with rising employment shares, rising wages and rising internal inequality. This increase in the returns to worker qualifications, in the presence of rising relative supply, indicates that sharp demand shifts have favoured qualified workers, with wage adjustments bringing about a rise in inequality.

Turning now to the gender variable, the increasing participation of women would have had, *ceteris paribus*, a slight equalising effect on the wage structure (column 5, table 5). Nonetheless, it is noticeable that increasing inequality within gender groups – especially women – had the most relevant role in shaping the inequality trend, while wage inequality between the sexes remained roughly unchanged (compare columns 3 and 7).

The previous results on declining inequality among age levels are confirmed by table 5, as changes in the mean wage of age groups would have led, *ceteris paribus*, to a decline in inequality (38% of its actual change, according to the data in column 7). However, the rise in within-group inequality was sharp, and furthermore young workers, whose employment shares increased, are paid low wages relative to the rest of the economy (and thus their lower within-group inequality level was not sufficient to generate a negative impact on overall inequality – see the positive contribution reported in column 5).

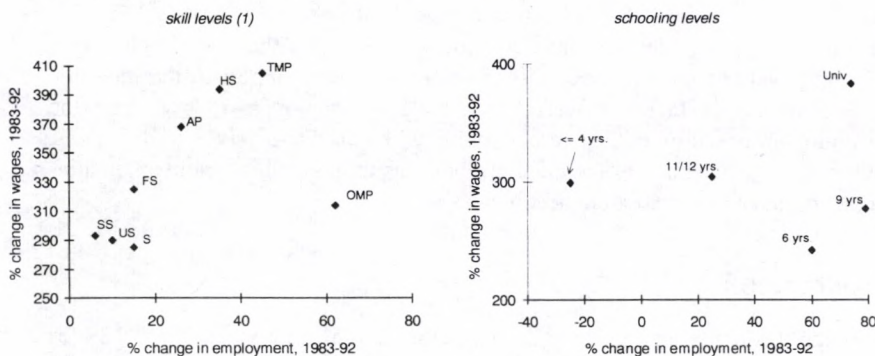
An interesting result emerges from the analysis of firm attributes. As opposed to the situation in the USA, where the displacement of workers from high wage / low inequality activities (manufacturing) to lower wage / higher inequality activities (services) was found to be a major determinant of rising inequality (see for example BLUESTONE [1990]), industrial restructuring was not a major force shaping rising inequality in the 1980s in Portugal (see the very low contribution of changes in the industrial composition of the working population reported in column 5). Instead, wage increases differed markedly across economic activities (38% contribution to the increase in inequality, as reported in column 7), revealing that different activities exhibited contrasting capacities to adapt to the changes taking place. In particular, one finds (for the two-digit level) that wages in finance, cultural services and wholesale, chemicals, machinery and wood, increased sharply, whereas in more traditional activities – textiles and construction –, but also in public utilities and insurance, wage growth was slow. The two-digit activities where wages rose the most can roughly be identified with those within which inequality increased the most (the correlation between the variables indeed reaching 80%).

On the other hand, firms were shifting towards structures usually considered more *flexible* – smaller units, some relocation out of the Lisbon region; under the impact of privatisations, the role of public firms in total employment declined, in favour of partnerships. The changes in the size, location and type of ownership of firms would have, *ceteris paribus*, led to a decline in inequality, as illustrated by their negative contribution to the change in inequality reported in column 5. However, the wage gap between the groups defined by any of these three variables widened, in particular the gap between locations and ownership types (column 7).

The relevance of the collective bargaining mechanism is confirmed by data in table 7. The rising distance between the average wage of types of collective bargaining led to an increase in inequality (31% contribution to the rise in total inequality). This result is strongly influenced by the situation and the evolution of labour returns in the financial sector. Indeed, less than 10% of the labour force is covered by FA or CBA; they are found mainly in the financial sector, where they cover virtually all the workers, in transportation and, to a much lower extent, in the food, paper or glass industries. The developments of the Portuguese financial sector are compatible with rent-sharing type of explanations of its high and rising wage levels. Indeed, after 1985 the economy entered an expansion period, especially marked in finance, where a deregulation programme opened the sector to private initiative, but where regulations persisted concerning the definition of interest rates, yielding high profits (that have motivated the entry of national and foreign firms into the market). Part of the high profitability of the sector may have *trickled down* to its workforce. The mechanism was probably enhanced by the extremely high unionisation rate prevailing in the sector (98-99% in 1985/86 [CERDEIRA and PADILHA, 1990: 40]).

The previous analysis can be organised into a more coherent explanation of changes in wage inequality. With a record of high rates of economic growth after 1985, the Portuguese economy motivated a rising share of its population, specially women and youngsters, to join the labour force. The activity rate indeed increased during the decade, while unemployment was declining. But this growth process was associated with some modernisation of the productive structure, illustrated namely by the shift towards more *flexible* firm structures, and the rise in the demand for labour was quite selective. The wages for workers with upper skills and schooling levels increased rapidly, despite the increase in their relative supply. Moreover, groups with sharp wage increases were themselves characterised by rising inequality, which may have reflected the different capacity revealed by the economic sectors to promote changes.

Figure 2 - Changes in employment and changes in nominal wages, 1983-92



Source: Computations based on MESS, *Quadros de Pessoal*, 1983, 1992.

Notes: (1) Skill levels: TMP - top managers and professionals; OMP - other managers and professionals; FS - foremen and supervisors; HS - highly skilled personnel; S - skilled personnel; SS - semi-skilled personnel; US - unskilled personnel; AP - apprentices.

This link between rising demand and rising wages is illustrated in figure 2. A sharp increase in employment is reported – 1.7% as the average annual growth rate, resulting in a 17% increase from 1983 to 1992¹¹ –, with a clear positive relationship between changing employment and changing wages being observed for skill as well as schooling levels. However, workers with a very low schooling level (four years of education or less) seem to escape the pattern, having seen their wages increase by more than would have been expected considering their declining employment share (and indeed, the declining employment level itself). The impact of institutions – minimum wage and trade union action – may have been one of the reasons for such a situation.

Indeed, the interaction between supply and demand is, especially in the labour market, mediated by institutions. Indirect evidence can be gathered to comment on the impact of trade union action on inequality, in a country where collective bargaining is extensively applied and trade-unions claim to follow an inequality-reduction strategy (not just equal pay for equal work, but a more compressed wage distribution are explicitly demanded – see SNESUP [1995] for a recent example). The analysis by APERTA *et. al* [1994] highlights the relevance of wage drift in the Portuguese economy. While in 1987 wage drift by economic activity ranged from a low 0.3% in a clay industry to a high 68% in a wood activity, in 1991 it ranged from 4.4% to 79%. In an era of rising wage inequality, the use of

¹¹ Other data sources confirm this information. Computations based on NEVES [1993] for the period 1982-91 yield precisely the same values.

wage drift as a mechanism of wage adjustment increased markedly. Furthermore, wage increases above the collectively bargained level are a very selective mechanism, applied predominantly to groups of workers that have high wages and high levels of internal inequality. Such results lend support to the idea that wage drift was in fact a powerful tool used by employers to overcome the constraints imposed by collective bargaining with *equality-oriented* trade unions. Such may have been one of the main mechanisms through which trade union aims and action have to some extent been neutralised.

5. CONCLUSION

Wage inequality among firms accounts for 62% of total inequality – 12% as the firm-wide impact on wages, and 50% resulting from the interaction between firms and types of workers. Evidence on Portugal therefore corroborates the findings by DAVIS and HALTIWANGER [1991] and by GROSHEN [1986], according to which "between-plant wage dispersion is a large component of overall wage dispersion" [DAVIS and HALTIWANGER, 1991: 172].

Nonetheless, support is found for the idea that firms are allowed more autonomy in wage setting in the USA, a labour market characterised by a high degree of decentralisation, as opposed to the more regulated and centralised European systems. Indeed, in Portugal as in most of its European counterparts, guidelines for wage increases are set at the national level, certain wage bargaining agreements apply industry-wide, contract extension mechanisms are common and relatively stringent minimum wage levels are enforced. Still, the results on the relevance of the firm in shaping wage inequality are not as far apart as the existence of features such as extension mechanisms in Europe, and their absence in the USA, would lead us to foresee. Certain aspects contributing to firm autonomy in setting wages have been stressed, some of which are common to most European countries, while others are peculiar to Portugal. Employers can choose to negotiate individually with a trade union movement that is fragmented and furthermore wage drift is widespread. Also, exceptions to the minimum wage were common until early 1990s, and the educational and vocational training systems have in Portugal a very limited role in shaping workers' career and wages. Thus, when comparing the American and the European *models*, the European diversity should not be disregarded. For example, the degree of centralisation of the bargaining system varies widely (see the extreme case of Sweden), the links between the educational system and the labour world differ (see the extreme situation of Germany) and the minimum wage achieves contrasting levels in the different countries, covering different shares of the workforce.

During the decade, an upgrading of the *quality* of the labour force could be detected, accompanied by rising returns to worker qualifications, which suggests that sharp shifts in the demand for labour favoured workers with upper qualifications. These changes were not brought about by shifts in the industrial structure, as activities traditionally important in the Portuguese economy, namely textiles and retail trade, contributed the most to job creation. Though the displacement of workers across sectors was *not* a major force driving inequality, different industries did show different capacities to raise their wage levels, with the leading ones revealing rising inequality. It can be claimed that the modernisation taking place in certain segments of the economy called for worker qualifications that were in short supply, and wages adjusted correspondingly. The mediation provided by institutions with explicit concerns for inequality-reduction (see trade unions) was unable to offset this rise in inequality. The traits of decentralisation that can be found in the Portuguese labour market, namely the widespread wage drift, may have been an important force generating this outcome. To the extent that rising inequality – in particular, increasing returns to schooling and skill — has been signalling the lack of an adequate labour force to promote economic change, investment in schooling and vocational training becomes a crucial issue, not just for equity reasons, but also for growth and economic modernisation imperatives.

APPENDIX A – DATA USED

The data set

The data set gathered by the Ministry of Employment and Social Security (MESS) is based on a questionnaire that every establishment with wage earners is, since 1982, legally obliged to fill in, matching data on the firm, the establishment and each of the workers.¹² By design, public administration and domestic work are not covered by the database (state-owned companies are) and in practice neither is agriculture. For the remaining sectors, *Quadros de Pessoal* (QP) is a very reliable source of information, being in fact a census of firms, establishments, and their workers. For manufacturing, a thorough evaluation of the coverage of QP can be made, since a *Census* of manufacturing is available, gathered by a different source. Comparison of both data sets reveals that QP covers more workers than the census itself, despite the fact that the census includes very small firms that are not a part of the population covered by QP (firms with no wage earners).

Sampling

Agriculture, fishery and mining, as well as public administration and international organisations were excluded from the analysis, since these sectors are not adequately covered by the inquiry (they either have a very low share of wage earners in total employment, or they are among the activities explicitly excluded from the obligation to answer the questionnaire); residual categories such as *other manufacturing activities* were also dropped (representing 0.5% of the workers in the database in 1992). *Electricity, gas and steam* and *communications* were excluded from the analysis (in 1992, these sectors represented 2.8% of the workers), due to the very unrepresentative nature of the sample that had been drawn.¹³

The years of 1983, 1986, 1989 and 1992 were selected for analysis, given that they span over a decade, allowing for the detection and explanation of inequality

¹² Workers engaged in the firm during the whole or part of the last week of March, including those on temporary leave (for example, maternity leave or strike).

¹³ These sectors were made up of one or two large firms (with several thousands of workers) and a reduced number of small firms (with fewer than 50 employees); the random sample picked precisely one or two of the latter type of firms, thus generating a very distorted image of the activity. This procedure of eliminating economic activities for which a small number of observations is available in the sample is found in other works (see namely GREGG and MACHIN [1994:110], who have eliminated 15 3-digit activities). The alternative of arbitrarily picking the monopoly or one of the oligopoly firms in the industry would render it unfeasible to report the results by economic activity, as confidentiality constraints would be violated for those firms; furthermore, the dimension of our already-hard-to-manage sample would increase by approximately 15% and a random sample for some activities would coexist in our selection of data with the population itself for other activities.

patterns, while the manageability of the database and the identification of stylised facts would be enhanced by omitting the details of a year-to-year analysis. For the first year under analysis, a 20% random sample of firms, stratified according to economic activity (defined at the 2-digit level) was drawn. For subsequent years, firms previously sampled were followed, and new firms, that had meanwhile joined the database, were sampled according to the principle just described. Sampling *firms* according to this procedure enables us to take into account firm *birth* and *death* which, as reported by MATA [1993], MATA and PORTUGAL [1994] and by BRANDÃO ALVES and MADRUGA [1993], achieves high levels in the Portuguese economy.¹⁴

Only full-time wage earners were retained for analysis (part-timers represent a small share of the database, 10% of the wage earners in 1992). Full timers are defined in the database according to the duration of work set by collective bargaining, which generally results in working at least 120 to 140 hours a month, depending on the economic activity. The resulting sample sizes are described in the table below.

Table A1 – Sample sizes

	1983	1986	1989	1992
number of workers	253 157	247 536	291 379	295 050
number of firms	15 180	16 138	21 000	24 567

The sample reproduces accurately not just the average firm size of each economic activity, but also its firm size structure (number of firms in each size bracket). Ex-post checks on the distribution of the sample according to worker characteristics also confirmed its representativeness. Alternative sampling procedures were considered, but they were judged to be less appropriate. Namely, sampling proportional to firm size would drive us away from the situation of an economy essentially made up of small firms, requiring the introduction of *additional assumptions* (those embodied in a weighting scheme) to enable the representativeness of the sample to be claimed. The procedure was considered superfluous, given that no cost is involved in gathering data about small firms, as opposed to the major constraint usually faced by sample designers. Furthermore, given the emphasis to be placed on the demand side of the market, it was assessed to be important to preserve the market structure/degree of concentration of the sectors.

¹⁴ According to BRANDÃO ALVES and MADRUGA [1993: 29-30, table 4], 31% of the establishments created in 1982 were out of business one year later (55% if a three-year period is considered); MATA and PORTUGAL [1994: 228] report that 22% of the firms created in 1983 were out of business a year later, and only half of the initial ones survived for four years. MATA [1992: 121-122] makes a good case for dismissing the possibility of these facts resulting from fluctuations in the coverage of the data source.

APPENDIX B – CONCEPT OF EARNINGS

Average hourly earnings were computed as $hw = \frac{bw + ts + rs + is}{nh}$, all the right hand side variables referring to monthly reported figures: *bw* stands for base-wage, *ts* is the payment indexed to tenure, *rs* are regularly paid subsidies, *is* are irregular subsidies and *nh* is the normal duration of work, as defined in the collective agreement or by firm regulations. Gross earnings are considered, before the deduction of any taxes or Social Security contributions, and no other labour costs are included. Cash benefits, as well as benefits in kind paid regularly, are reported. Irregularly paid subsidies, such as Christmas or holiday pay, are likely not to be reported, since only the fraction actually *paid* in March is registered.

Hourly rewards are meant to control for the different durations of the working day. The fact that most wage bargaining agreements specify the normal duration of work, together with the monthly wage, strengthens this choice. Comparable hours of work should be analysed, and therefore overtime pay and work were not taken into consideration.

APPENDIX C – VARIABLES USED TO DECOMPOSE INEQUALITY AND GROUPS DEFINED

- *Skill*, defined according to the Portuguese Classification of Skills: top managers and professionals; other managers and professionals; foremen and supervisors; highly skilled personnel; skilled personnel; semi-skilled personnel; unskilled personnel; apprentices.
- *Schooling*: primary school or less (≤ 4 yrs.); 6 yrs.; 9 yrs.; 11-12 yrs.; university (2 types of bachelor diplomas; university graduation).
- *Gender*
- *Age*, defined as actual years.
- *Tenure*, defined as actual years.
- *Occupation*: defined according to the 5-digit Portuguese Classification of Occupations, yielding 1207 different occupations in the sample.
- *The firm*
- *The establishment*
- *Type of collective bargaining mechanism*: collective bargaining contract; collective bargaining agreement; firm agreement; Government mandatory regime.
- *Economic activity*: defined according to the 6-digit Portuguese Classification of Economic Activities, yielding 443 activities; the 2-digit classification yields 20 activities.
- *Location*, defined as one of the 18 *distritos* of mainland Portugal.
- *Ownership structure*: public company; sole proprietorship; partnership; joint-stock company.
- *Firm size*: the actual employment level.

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