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High and Rising?

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EUI WORKING PAPERS

EUROPEAN UNIVERSITY INSTITUTE

EUROPEAN UNIVERSITY INSTITUTE, FLORENCE

ECONOMICS DEPARTMENT

EUI Working Paper **ECO** No. 96/1

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EARNINGS INEQUALITY IN PORTUGAL: HIGH AND RISING?

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January 1996

ABSTRACT

The level of earnings inequality and its change during the 1980's in Portugal are analysed, relying on several inequality measures and on international comparisons to generate insight into their patterns. A high level of inequality at the beginning of the 'eighties is detected, together with a pronounced rise in wage dispersion, brought about by growing inequality at the top of the distribution. Changes taking place *within* economic activities, possibly technical progress, were the main forces driving these changes in the wage pattern, while relative supply shifts resulting from demographic forces, as well as demand shifts across economic activities, should be dismissed as explanations for the rise in labour market inequality in Portugal from 1983 to 1992.

Key-words: Labour; wage structure; inequality; Portugal.
JEL: J31; D63.

1. INTRODUCTION

Labour market and inequality have been two lines of research to a great extent disassociated in the literature on Portugal. Indeed, most work on inequality has concentrated on income and not on labour returns, generating expectations about the evolution of wage dispersion that are worth testing.[1] Using micro data drawn from household surveys conducted in 1980/81 and 1989/90, GOUVEIA and TAVARES [1995], RODRIGUES [1994] and RODRIGUES [1993] detect an unambiguous decline in income[2] inequality during the decade. Tavares and Gouveia put forth the hypothesis that this trend may have resulted from the evolution of wages, as low-wage employment presumably increased its importance in the economy, under the pressure of international competition that would have contributed to reinforce the Portuguese specialisation in low-skilled activities.

On the contrary, when progressing to the decomposition of the trend in inequality into income sources, RODRIGUES [1994] finds that the evolution of wages and of the returns to capital would have generated rising inequality, which was nonetheless outweighed by the evolution of the earnings of the self-employed, direct taxes and other contributions, and pensions.

This view of rising earnings inequality is shared by the short references that can be found in the literature regarding labour market inequality in Portugal. The *Relatório de Conjuntura*, an annual report by the Ministry of Employment and Social Security (MESS), reported a 10% rise in the Gini index from 1982 to 1989, and an increase, from 37% to 40%, in the share of the total wage bill earned by the top quintile of the distribution[3] [PORTUGAL. MESS. DEP, 1992: 131]. Similarly, the *Employment Outlook* by the OECD reports a rising trend in labour market inequality in Portugal from 1985 to 1989.

The first purpose of this study is to investigate the level and the trend of earnings inequality in Portugal, relying on several inequality measures and on international comparisons to generate insight into their patterns. At this stage, three major hypotheses will be tested: i) inequality in the Portuguese labour market achieves high levels, when compared to other countries; ii) inequality increased during the 1980's and early 90's, as in most other OECD countries; iii) the upper part of the earnings distribution played a major role in shaping both the level and the trend of inequality in Portugal. Progressing to an overview of the causes of the trend in inequality, the analysis concentrates on changes in the

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[1] See the point by JENKINS [1995: 30-32, 56] on income inequality trends *vs.* wage inequality trends.
[2] Gouveia and Tavares also analyse expenditures.
[3] Having focused on monthly gross earnings, including overtime pay, with data drawn from *Quadros de Pessoal.*

employment structure, relying on a simple supply-demand framework to evaluate alternative explanations for the rise in earnings dispersion, which are often presented in the literature. The fourth hypothesis under scrutiny is thus: the rise in inequality was mainly generated by shifts in the employment structure that have taken place *within* economic activities, in favour of workers with higher qualifications; supply changes and the differential demand growth across industries should be dismissed as explanations for the trend in labour market inequality in Portugal.

## 2. THE LEVEL OF EARNINGS INEQUALITY IN PORTUGAL AND ITS PATTERN

The level of inequality existing in Portugal in 1983 is depicted in figure 1, where the dispersion of hourly earnings is compared to that of monthly earnings. Gross monthly earnings and the duration of work are reported in a database gathered annually by the Ministry of Employment and Social Security (MESS), which matches information on the firm, the establishment and each of the workers, based on a questionnaire that every establishment with wage earners is legally obliged to fill in. Full-time wage-earners, both male and female, were kept for analysis.[4]

The duration of the working day is seen to have an equalising effect on wages – hourly earnings inequality is higher than monthly earnings inequality. The hourly concept, which is more often used, controls for the different durations of the workday, but it may nonetheless be influenced by the mismatch between the actual duration of work for certain types of workers and their *contractual* workday set by collective bargaining (which is reported by our data source). In fact, while manual workers usually stick to their pre-set duration of work, non-manual workers often extend their workday beyond the contractual level, having more fluid timetables.[5] Following the comparison in figure 1, the robustness of the results on inequality trends to different specifications of the concept of earnings will also be checked, confronting the evolution of hourly and monthly earnings dispersion (see section 3).

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[4] Unless otherwise stated, this will be the earnings distribution under analysis throughout the paper – full-timers, male and female; where, for the purpose of international comparisons, other distributions are considered, this will be explicitly acknowledged. See appendix A for a more detailed description of the dataset and the concepts used.

[5] See the analysis by ATKINSON *et al* [1988], who compare overlapping data reported by a household and by an employer survey – the *Family Expenditure Survey* and the *New Earnings Survey*, respectively. They find that while for manual workers there is reasonable agreement on the number of hours worked, for non-manual workers, either male or female, employees report higher values than employers, suggesting that for staff not paid on an hourly basis, employers tend to report the contractual duration of work, while workers have a different perception of the hours effectively worked.

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Figure 1 - Earnings inequality in Portugal, 1983
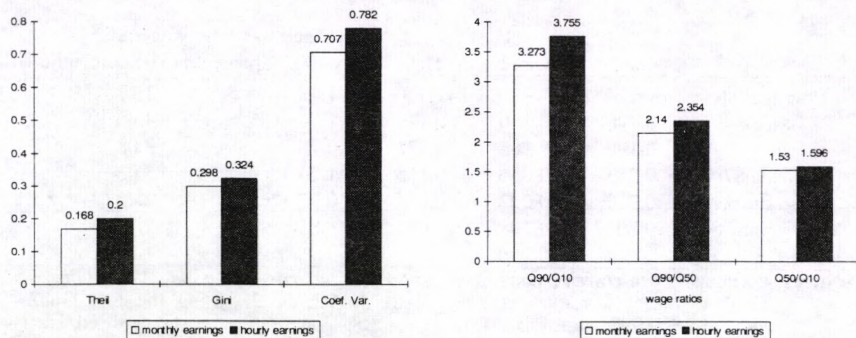
Source: Computations based on MESS, *Quadros de Pessoal*, 1983.

Meaningful international comparisons of the level of inequality must be restricted to those studies that have measured a comparable variable, for a comparable population, during the 'eighties and, of course, relying on the same inequality measures, which must be independent of the size of the population and the scale of the variable. While our database only reports gross earnings – which therefore becomes a binding constraint –, it allows great flexibility regarding other aspects of the comparison, given its very detailed and extensive nature. The availability of a harmonised international data set, on which several studies of earnings inequality have been based (The Luxembourg Income Study – LIS) imposes the restriction of our sample, for the purpose of international comparisons, to full time males aged 25 to 54 years[6], the concepts used by the LIS studies.

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[6] A remaining discrepancy refers to the annual or monthly nature of earnings. While the data on Portugal refer to monthly earnings, those on the LIS studies refer to annual earnings. However, this should not bias the comparison in any way, since multiplying the monthly earnings by 13 (12 months plus the compulsory holiday subsidy) would provide a reliable measure of the gross annual earnings of the Portuguese worker and the degree of inequality in the distribution would not change, given the scale invariant nature of the inequality indices used. This procedure is made possible by the fact that our data source captures all the regularly paid components of earnings, but is unlikely to capture irregularly paid subsidies such as holiday pay, usually received in June.

Table 1 - Gross earnings(1) inequality in several countries, full-time males aged 25-54

	Gini1	Gini2	Theil	St. Theil x 100	wage ratio: percentile 90 / percentile 10
Portugal 86	**.295**		**.168**	**1.45**	**3.17**
USA 86	0.298	0.300	0.149	1.56	4.00
Sweden 87	0.190	0.205	0.071	0.78	2.08
Canada 87	0.253	0.256	0.116	1.25	3.03
Australia 85	0.212	0.202	0.087	0.97	2.42
W. Germany 84	0.204	0.205	0.071	0.83	2.38
UK 86	..	0.296	..	..	..

Sources: Portugal – own computations based on MESS, *Quadros de Pessoal*, 1986; Gini1 and Theil – GREEN, CODER and RYSCAVAGE [1992: 6, 9], using the LIS; Gini2 – BRADBURY [1993: appendix A], using the LIS; Wage ratio and standardised Theil – own computations based on data reported in GREEN, CODER and RYSCAVAGE [1992: 6,9,14-15].

Notes: (1) Data on Portugal refer to monthly earnings, whereas for the other countries they refer to annual earnings.

(..) Data not available.

The Gini and the standardised Theil indices[7] indicate that inequality in the Portuguese labour market reaches a level similar to that of the United Kingdom, that is, slightly lower than the USA, usually taken as the paradigm of an unequal labour market, but higher than Canada, and much higher than Australia, the ex-West Germany or Sweden. The ratio of the 90th to the 10th wage percentiles confirms this ranking of the countries.

More interestingly, the detection of the pattern of inequality would enable us to answer the question *Why is inequality high in Portugal – is it mainly due to the situation at the top or at the bottom of the distribution?* Stated differently, *Is it because low wages are very low, because high wages are very high, or due to the situation at the middle of the distribution, that the value for overall inequality is high in Portugal?*
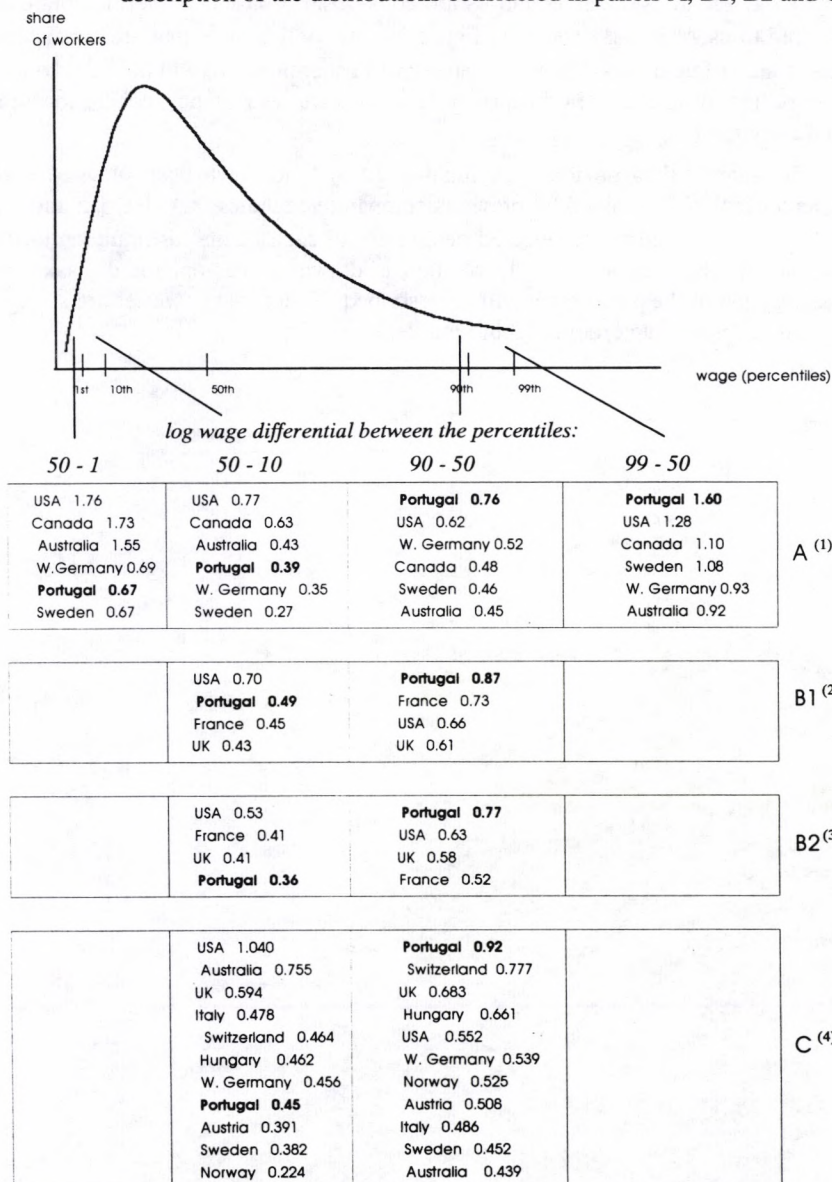
The international comparison of inequality at different points of the earnings distribution relies on studies that have specifically addressed the issue of inter-country comparisons. Since Portugal is not included in these studies, it will be *plugged into* the available rankings, using the concepts of earnings, working population and inequality measures that most closely match the concepts used by each of the studies. According to the criteria used by different authors, alternative distributions will be considered (male in some cases, female in other cases, with different age brackets). The main features of the procedure used can be summarised as follows: the data on Portugal will never be mixed with more than

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[7] It should be stressed that the Theil index is not population-size independent, as its upper limit, *log N*, increases with the population size. Comparison of the values of the Theil index would thus overstate inequality in Portugal, due to our large sample size (7 to 20 times larger than the other countries).

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one other data source (understood as one article); the concepts used are similar to those used by each of the studies, to ensure comparability of the distributions; alternative rankings of the countries are considered – based on the distributions referred to as A, B1, B2 and C in figure 2 – and only results that are consistent across the different rankings will be stressed; furthermore, we will not refer to the *size* of the differences in inequality, but instead restrict our conclusions to inequality *rankings*.

In figure 2, data on Portugal, highlighted in bold, have been plugged into different rankings obtained by previous comparative studies – A, B1, B2 and C. The values reported relate selected percentiles of each of the distributions to its median. A hypothetical wage distribution is drawn at the top, for the sake of visualisation of the pattern that will be described. Notice that countries are always ranked in descending order of labour market inequality.

Figure 2 - Ranking of countries according to inequality at different points of the earnings distribution – descending order (see notes to the figure for a description of the distributions considered in panels A, B1, B2 and C)

share of workers

wage (percentiles)

1st   10th   50th   90th   99th

log wage differential between the percentiles:

50 - 1	*50 - 10*	*90 - 50*	*99 - 50*	
USA 1.76	USA 0.77	**Portugal 0.76**	**Portugal 1.60**	
Canada 1.73	Canada 0.63	USA 0.62	USA 1.28	
Australia 1.55	Australia 0.43	W. Germany 0.52	Canada 1.10	A [1]
W.Germany 0.69	**Portugal 0.39**	Canada 0.48	Sweden 1.08	
Portugal 0.67	W. Germany 0.35	Sweden 0.46	W. Germany 0.93	
Sweden 0.67	Sweden 0.27	Australia 0.45	Australia 0.92	

	USA 0.70	**Portugal 0.87**		
	Portugal 0.49	France 0.73		B1 [2]
	France 0.45	USA 0.66		
	UK 0.43	UK 0.61		

	USA 0.53	**Portugal 0.77**		
	France 0.41	USA 0.63		B2 [3]
	UK 0.41	UK 0.58		
	Portugal 0.36	France 0.52		

	USA 1.040	**Portugal 0.92**		
	Australia 0.755	Switzerland 0.777		
	UK 0.594	UK 0.683		
	Italy 0.478	Hungary 0.661		
	Switzerland 0.464	USA 0.552		C [4]
	Hungary 0.462	W. Germany 0.539		
	W. Germany 0.456	Norway 0.525		
	Portugal 0.45	Austria 0.508		
	Austria 0.391	Italy 0.486		
	Sweden 0.382	Sweden 0.452		
	Norway 0.224	Australia 0.439		

Notes: (see next page).

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Sources: Portugal: computations based on MESS, *Quadros de Pessoal*, 1983, 1986.

Other countries:

Panel A - Own computations based on data reported in GREEN, CODER and RYSCAVAGE (1992:6), who used the Luxembourg Income Study.

Panels B1 and B2 - Data in KATZ, LOVEMAN and BLANCHFLOWER (1993: 37), using data from *Annual Demographic Files, New Earnings Survey* and *Déclarations Annuelles des Salaires*, respectively for the USA, UK and France.

Panel C - Data in BLAU and KAHN (1994: table 1 in appendix), using the *International Social Survey Programme* for every country other than Sweden and Norway (*Class Structure and Class Consciousness*), Australia (*Income Distribution Survey*) and Italy (*Bank of Italy Survey*).

Notes:

(1) *Working population*: full-time males, aged 25 to 54 years.
Concept of earnings: gross monthly earnings for Portugal and gross annual earnings (full year workers) for the other countries.
Years covered: 1986 for Portugal and the USA, 1987 for Sweden and Canada, 1985 for Australia and 1984 for West Germany.

(2) *Working population*: full-time males, 18 to 64 years old in the USA, older than 21 in the UK, and with no age restrictions in France and Portugal.
Concept of earnings: log hourly earnings (gross).
Years covered: 1983 for Portugal and 1984 for all other countries.

(3) *Working population*: full-time females, 18 to 64 years old in the USA, older than 18 in the UK, and with no age restrictions in France and Portugal.
Concept of earnings: log hourly earnings (gross).
Years covered: 1983 for Portugal and 1984 for all other countries.

(4) *Working population*: full-time males for Portugal; males for the other countries (presumably, full-timers, but the data source does not provide detailed information on this aspect).
Concept of earnings: log hourly earnings for Portugal and log hours-corrected earnings for all the other countries; net earnings are considered in Austria, West Germany and Switzerland, while gross earnings are used for Portugal and the USA (for the remaining countries, information is not provided by the data source - presumably, gross earnings are considered).
Years covered: 1986 for Portugal and Australia; 1987 for Switzerland and Italy; 1980 for Sweden, 1989 for Norway; pooled data referring to 1985-1989 for the USA and the UK, 1985-88 for West Germany, 1986-88 for Hungary and 1985-87 and 1989 for Austria.

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As we climb up the wage distribution, Portugal climbs up the inequality ranking. Such is the characteristic of the Portuguese earnings distribution that consistently emerges from all the comparisons in figure 2. Indeed, at the lowest part of the distribution Portugal ranks among the least unequal countries, a situation that gradually changes as we move towards higher wages. The relation between the 90th or 99th percentiles and the median in fact depict Portugal as *the most* unequal country, with a wage distribution more stretched than the USA or the UK. A relatively compressed bottom and a stretched top can thus be highlighted as the main characteristics of the Portuguese earnings distribution. The high degree of inequality prevailing in the country's labour market is essentially due to the fact that *high wages are very high*, relative to the rest of the distribution.
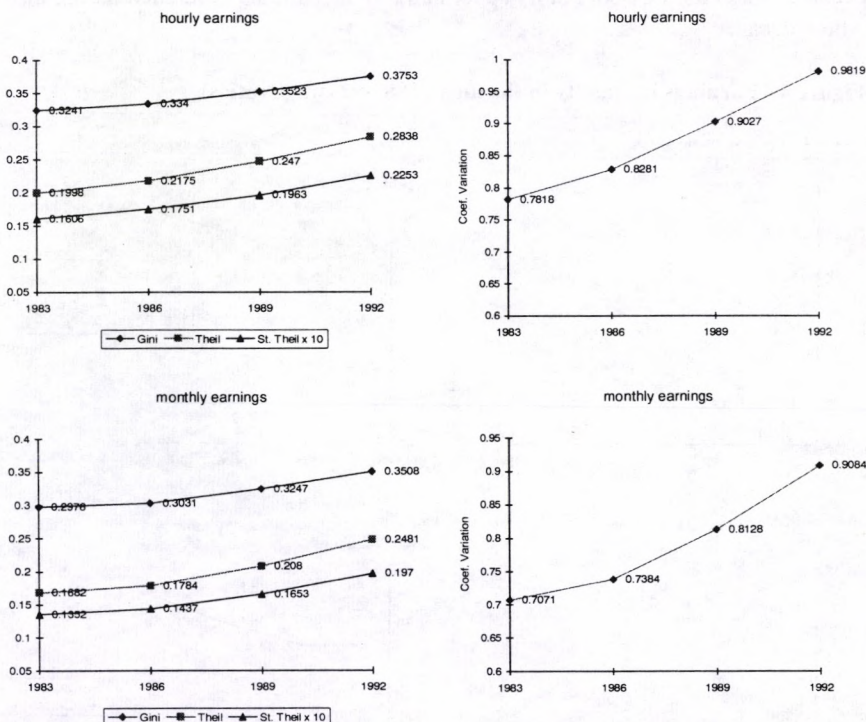
It is interesting to notice that precisely the opposite pattern has been detected by DAVIS [1992: 250] and by BLAU and KAHN [1994] for the USA. A very stretched bottom of the wage distribution and a degree of inequality at the top similar to most other countries has been identified by these authors.

3. RISING LABOUR MARKET INEQUALITY

Following a trend by now widely reported for many other OECD countries[8], rising inequality characterised the evolution of labour returns in Portugal during the 80's and early 90's.

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[8] See for example OECD [1993] for an overview of this trend.

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**Figure 3 - Earnings inequality in Portugal ,1983-92 (Gini, Theil and coefficient of variation)**

hourly earnings

Gini — Theil — St. Theil x 10

Values shown: 0.3241, 0.334, 0.3523, 0.3753; 0.1998, 0.2175, 0.247, 0.2838; 0.1606, 0.1751, 0.1963, 0.2253

hourly earnings

Coef. Variation: 0.7818, 0.8281, 0.9027, 0.9819

monthly earnings

Gini — Theil — St. Theil x 10

Values shown: 0.2976, 0.3031, 0.3247, 0.3508; 0.1682, 0.1784, 0.208, 0.2481; 0.1352, 0.1437, 0.1653, 0.197

monthly earnings

Coef. Variation: 0.7071, 0.7384, 0.8128, 0.9084

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

Several inequality measures – Gini, standardised Theil and coefficient of variation – unanimously report a rise in wage dispersion, especially marked after 1986, when the economy began to recover and real wages were rising (see table B1 in appendix). Declining real wages were therefore associated with a slight increase in inequality, whereas the benefits of rising real wages were more unequally distributed. Over the decade, the Gini index for hourly earnings increased by 16%, from 0.32 to 0.38, while the coefficient of variation reported a more pronounced change of 26%. A similar trend is detected for monthly earnings. Such evidence sharply contrasts with the results found by GOUVEIA and TAVARES [1995] and RODRIGUES [1993] when analysing *income* inequality, no support being found for the hypothesis according to which the evolution of labour returns would have been responsible for the decline in income inequality.

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A look at point measures of inequality enables the detection of the pattern of change in inequality. From 1983 to 1986, the bottom of the wage distribution became more compressed, but its upper half, on the contrary, stretched during the whole decade.

Figure 4 - Earnings inequality in Portugal, 1983-92 (wage ratios)
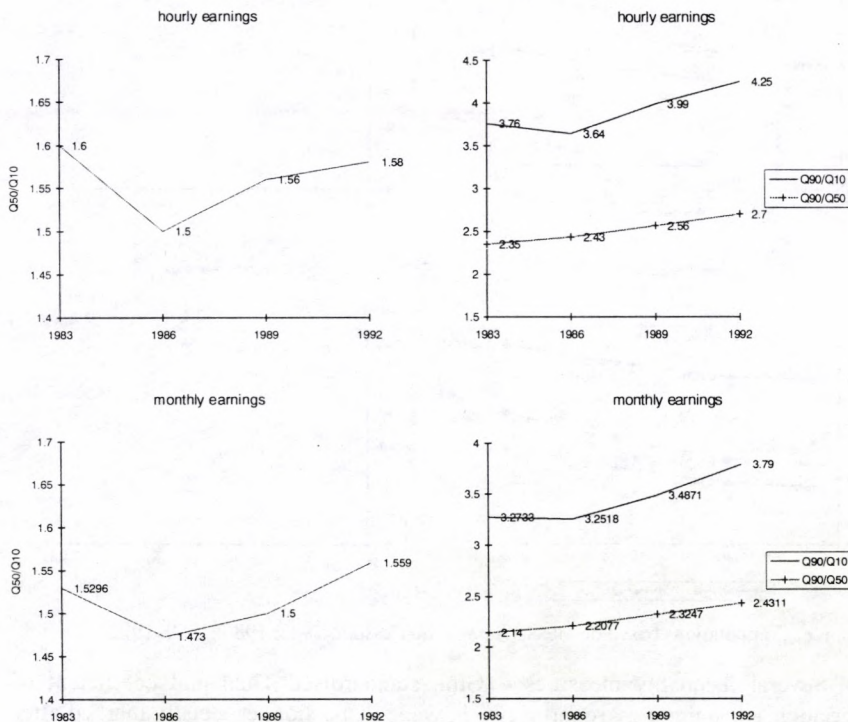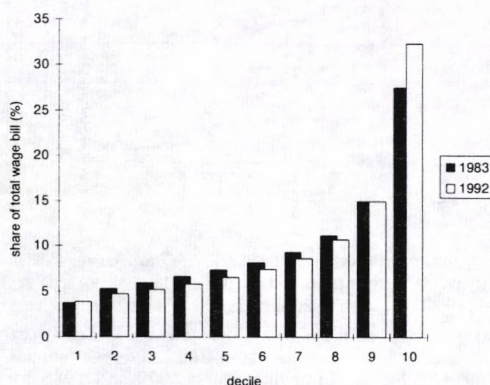

Source: Computations based on MESS, *Quadros de Pessoal*, 1983, 1986, 1989, 1992.

As a result, the 50/10 percentiles wage ratio in 1992 reached a value similar to that of 1983, while the 90/50 wage ratio increased by about 15%. This preliminary evidence suggests that the rise in inequality during the decade was brought about by the reinforcement of the major characteristic of the distribution that had been highlighted for the beginning of the 'eighties – compressed bottom and stretched top.

Information on the shares of the wage bill earned by each decile in 1983 and 1992 confirms this idea. Some *redistribution* has occurred during the decade, in

favour of the 10% lowest wage workers and, to a much higher extent, in favour of the 10% highest wage workers, at the expense of all the other deciles.

**Figure 5 - Shares of the total wage bill earned by each decile, 1983 and 1992**

Humble progressive transfers have taken place at the bottom of the distribution, while remarkable regressive transfers have occurred at the top. No straightforward conclusions about dominance can be drawn, since the Lorenz curves for 1992 and 1983 intersect. However, even though the 1992 distribution allocates a higher share of the wage bill to the 10% poorest, it does not exhibit a lower coefficient of variation[9] and indeed, as already pointed out, several inequality measures – Gini, coefficient of variation, Theil and Standardised Theil – all report a remarkable rise in labour market inequality (see namely the rise in the Gini index, from 0.32 to 0.38).

These changes in the earnings distribution can be viewed in an international perspective.

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[9] As such, the result by SHORROCKS and FOSTER [1987] on unanimous inequality rankings by any transfer-sensitive, scale-invariant and population-homogeneous measure, cannot be applied here.

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Figure 6 - Changes in inequality at different points of the earnings distribution for several countries, full-time males aged 25-54 years
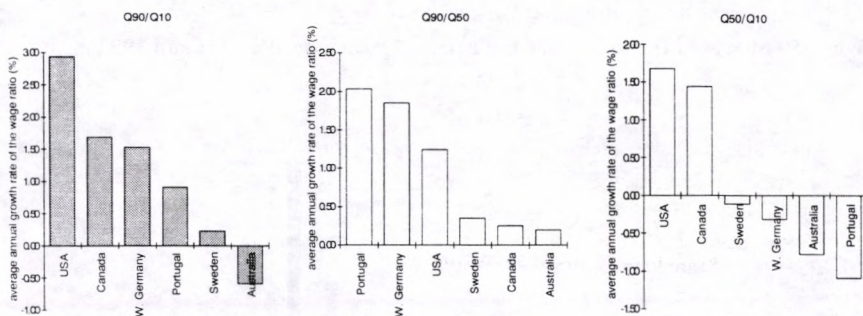
Sources: Portugal – own computations based on MESS. *Quadros de Pessoal*, 1983, 1989.
Other countries – computations based on data reported in GREEN, CODER and RYSCAVAGE [1992: 6], who used the LIS.

Notes: Data refer to monthly earnings for Portugal, while yearly earnings (for full-year workers) were used for the other countries. Average annual growth rates were computed using data for the following years: 1979 and 1986 for the USA, 1981 and 1987 for Sweden and Canada, 1981 and 1985 for Australia, 1981 and 1984 for Germany and 1983 and 1989 for Portugal.

Data referring to male workers indicate an intermediate change in overall earnings inequality in Portugal. In fact, the ratio of the 90th to the 10th wage percentiles changed in Portugal at an average annual rate which was lower than that of the USA, Canada or the ex-West Germany, but higher than Sweden or Australia. This intermediate position of the Portuguese labour market results from having had simultaneously *the sharpest increase in inequality at the top of the distribution* and *the sharpest reduction in inequality at the bottom of the distribution*, as reported by the changes in the 90/50 and 50/10 wage percentiles (figure 6). International comparisons thus provide further evidence in favour of the idea that changes taking place in the Portuguese wage distribution reinforced the pattern of inequality that had been detected for the beginning of the decade, as the lower part of the distribution compressed even more, while its top stretched even more.[10] The evolution in Europe can be contrasted to that in North-America.

[10] Computations over a shorter time period for Portugal, but ending at a date closer to the final period for the other countries (1983-86), which capture precisely the sharp decline in inequality that occurred at the bottom of the distribution, yielded the following results: -3.76%, 0.67% and -3.12%, as the average annual growth rate for the 50/10, 90/50 and 90/10 wage deciles, respectively. According to these figures, the sharpest decrease in inequality at the bottom of the distribution coexisted in Portugal with the third highest increase in inequality at the top of the distribution (among the countries represented in figure 6).

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Compressing bottom and *stretching top* was the trend followed by the European countries depicted and by Australia, whereas in the North American countries, the bottom of the distribution became particularly more unequal.

4. FORCES DRIVING RISING INEQUALITY

Changes in the overall earnings distribution consistently reproduce what has taken place regarding the female, male, white collar or blue collar earnings distributions separately.

Figure 7 – Lorenz curves for selected groups of workers, hourly earnings, 1983 and 1992
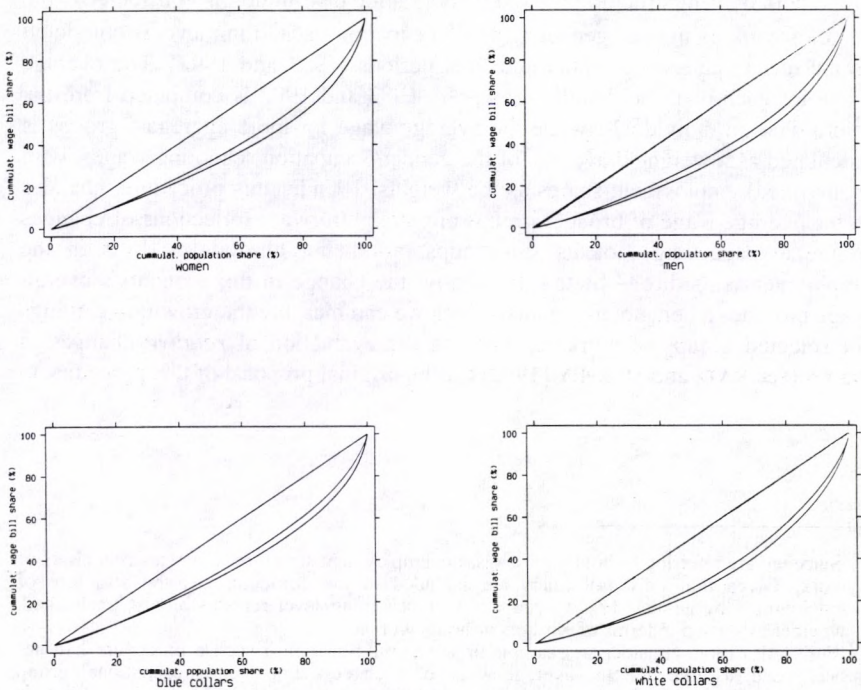
Source: Computations based on MESS, *Quadros de Pessoal*, 1983 and 1992.

In every case, a modest redistribution has occurred in favour of workers with the lowest wages, while more pronounced regressive transfers have taken place at the top of the distribution.

An implication of this fact should be stressed. To the extent that the overall rise in inequality has been determined by the evolution of labour returns *within* gender and broad occupational groups, understanding of the causes of rising inequality has to be sought among other dimensions of inequality (other variables) – schooling is a major candidate, according to previous studies on other countries; alternatively, the relevance of these two variables has to be proven by a rise in inequality *between* the groups which is more pronounced or comparable to the rise in within-groups inequality. A look at the evolution of relative wages may shed some light on this issue.

To evaluate changes in real relative wages, controlling for the impact of shifts in the employment structure, a fixed demographic distribution is considered – the share of workers in each gender / broad occupation / schooling level is computed as the mean value of its initial and final periods (1983 and 1992). The average wage for each of these detailed groups in 1983 and 1992 is computed from the micro data on individuals, while the average wage for more aggregate groups is calculated as a weighted average of the gender/occupation/schooling wages, with their (fixed) employment shares as the weights.[11] Under this procedure, changes in the average wage of broader groups are straightforward reflections of changes in the average wages of its sub-groups, not being blurred by shifts in the employment structure.[12] Stated differently, the change in the economy's overall wage provides a benchmark against which we can measure the growth in earnings for selected groups of workers, enabling the evaluation of *relative* changes in wages (see KATZ and MURPHY [1992] for the original proposal of this procedure).

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[11] Since we are referring to hourly earnings, the employment structure is evaluated in hours of work. Given that only full-timers are included in the computations, the structure of employment by gender, broad occupation or schooling level remains almost unchanged, whether evaluated in terms of workers or hours worked.

[12] For clarification, consider an example of what could happen if such a procedure had not been used: assume that the average wage of each educational and occupational group remains unchanged both for men and women, while only the educational structure of female employment improves. In that case, women's average wage would rise and a reduction in the gender wage gap would have been brought about exclusively by shifts in the employment (educational) structure, not reflecting changes in the average wage by occupation or educational level. The procedure used ensures that the evolution of the average wage of broad groups of workers reflects the underlying evolution of wages for more detailed groups, not being blurred by changes in the composition of the workforce, which is held fixed.

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Table 2 – Real wage growth under fixed employment structure, 1983-1992

total	gender		broad occupation		schooling				
	men	women	white col.	blue col.	<= 4 yrs.	6 yrs.	9 yrs.	11-12 yrs.	Univ.
27.27	27.78	26.31	29.86	26.16	26.13	27.39	24.21	30.38	44.68

change in log hourly earnings x 100

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

If the employment structure by gender, schooling level and broad occupational group had remained fixed at its mean level of the decade, the overall wage of the economy for full-time workers would have increased by 27 points.[13] While this change was rather homogeneous across gender and white/blue collar groups, the wage gap across schooling levels widened substantially. Indeed, the earnings of men increased by only 1% relative to that of women, meaning that the gender gap remained roughly unchanged over the decade; the gap between white and blue collars' earnings increased by 4%; but the returns to University education sharply increased relative to the other schooling levels. The earnings of holders of a University diploma increased by 17 to 19% relative to workers with 6 years of education or less, by 20% relative to those with 9 years of education, and by 14% relative to high school graduates. The wage growth for those with 9 years of education was surprisingly slow when compared to the other schooling levels, breaking the otherwise monotonic (increasing) relationship between growth of real wages and schooling level. This fact is worrying, if one considers that the length of compulsory education has been set at precisely 9 years, for children entering primary school (first year of education) in 1987. While such changes were taking place in the legislation, the mutations occurring in the labour market were not operating to motivate people to reach that level of education – the attractiveness of 9 years of school, relative to 6 or 4, as measured by their relative wages, decreased during the decade. This situation, together with the small difference between the growth of wages for those with 6 years of education and those holding a high school diploma suggests that the traditionally acknowledged mismatch between the educational and the productive systems in Portugal did not change much over the decade, as judged by the labour market valuation of such schooling levels. On the contrary, finishing University definitely *pays off*, having become a much more attractive option in the 'nineties than it was in the early 'eighties.

Relative changes in real wages therefore confirm the idea that inequality between gender or broad occupational groups was not a major force driving the rise in inequality. Instead, the sources of this trend must be sought elsewhere, namely in the rising returns to education, in particular to University education. The rise in the wage premium for University graduates is common to many other

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[13] KATZ and MURPHY [1992: 41] refer to 100 times log changes as percentage changes.

countries, having been particularly studied for the USA. Several explanations have been put forth to justify this trend, and a synthesis is by now possible, distinguishing among four different categories of explanations.

One first line of reasoning relies on demographic factors, stressing that the increase in the relative supply of workers holding a University diploma that was brought about by the *baby boom generation*, was followed by a decline in the rate of growth of the working population with highest schooling levels (against a steadily growing demand for such workers). Also the increased participation of females could have contributed to rising inequality, given their traditional position in lower ranks of the earnings distribution. Either of these formulations highlights supply-driven changes in the wage distribution.

Explanations based on shifts in the pattern of international trade and on the increased openness of the economies, on the other hand, stress the importance of demand factors. Under increased international competition, more developed countries would have shifted their productive structures towards technologically more advanced activities, thus increasing the relative demand for a more schooled and skilled labour force, while the output of traditional activities, often intensive in low-skilled labour, would be increasingly supplied by less developed countries. Shifts in the employment structure across industries are thus the observable link to test this hypothesis. An alternative formulation of this view stresses the gradual switch, in the process of economic development, from high wage / low inequality activities (manufacturing) to low wage / high inequality activities (services).

Another formulation of demand-driven changes in the wage distribution highlights the mutations that have been taking place within economic activities. Technological progress is pointed out as the main force generating the need for a more qualified labour force. Though much effort has recently been put into measuring the impact of technological progress on the demand for labour and wages, the key proof is often left to the trend in the *residuals*, generating much suspicion of the interpretation of the results (see namely KLITGAARD and POSEN [1995: 33]).[14]

The weakening of institutional forces is stressed by other studies. In particular, the declining unionisation rate and the weakening of the minimum wage legislation would have contributed to rising earnings dispersion.

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[14] The work by KRUEGER [1993] on the impact of the adoption of computers on wages is a reference to this issue, relying on alternative tools of analysis, and direct measurement of the phenomenon. Also MACHIN [1995] bases his analysis on direct measurement of the phenomenon.

Reliance on the supply-demand framework developed by KATZ and MURPHY [1992], under the formulation applied by JUHN and MURPHY [1995][15], can lead one into dismissing for the Portuguese case some of these explanations of the trend in labour market inequality, while lending support to others. The model considers the relative demand for different categories of labour (which depends on their relative prices and on demand shocks, being derived from an aggregate production function) and their relative supply (exogeneously determined) and formal framework is provided for the idea that, in the absence of demand shocks, changes in labour supply and changes in wages must be negatively related; otherwise, supply shifts alone cannot account for the changes in real wages, and the operation of demand forces must be investigated (see [KATZ and MURPHY, 1992: 47]).

Following JUHN and MURPHY [1995], consider ten different types of labour inputs, as evaluated by the wage decile into which the worker falls. Different labour inputs would thus be defined as the type of attributes implicitly required to be in a decile of the wage distribution. The real wage growth for each of these types of workers can be linked to a supply index and to a demand index. The supply index evaluates the impact of demographic changes – reflected in the gender and school completion rate mix – on the composition of the working population. On the other hand, shifts in the industrial composition of employment will proxy changes in the demand for particular types of workers, under the assumption that the types of workers more intensively used in expanding industries will profit from increased relative demand. It should, however, be noticed that a demand shift index built on this assumption of fixed-coefficient requirements captures a particular type of demand changes – those that take place across industries. Forces operating within industries and biasing the demand in favour of particular types of workers are not reflected in the index. This measure can be extended to reflect shifts in the industry and occupational structure of the workforce (instead of just changes in the industrial mix).

To compute the relative growth in the supply of workers in a certain category, consider first the distribution of employment in that category across gender and schooling levels, then multiply those values by the aggregate changes in the gender/schooling distribution[16]:

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[15] Including some extra-variables, while eliminating others, to conform with our data and the aims of the analysis.

[16] KATZ and MURPHY [1992] measure labour in *efficiency units* – value-weighted annual hours of work, where the value of the hours worked by each type of workers is computed as its relative wage, averaged over the whole period under analysis. While using an adapted version of this concept of efficiency units of labour – value-weighted weeks worked – to measure changes in demand, JUHN and MURPHY [1995] evaluate supply shifts in terms of number of workers. Since we are referring to hourly wages, employment is measured in

$$\Delta S_d = \sum_i \frac{E_{di}}{E_d} \cdot \Delta sh_i \tag{1}$$

with S – supply of workers

E – employment level in 1983

d –worker category/decile d

i – gender/schooling group i

Δsh_i – change in the aggregate share of workers in the gender/schooling group i, 1983-1992.

Changes in the demand for workers in each decile are computed similarly, considering the industry/occupational distribution of employment (instead of the gender/schooling distribution).

Consider first the evolution of average real wages by decile (table 3).

Table 3 – Real wage growth, relative growth in the supply and demand of workers, by earnings decile, 1983-1992

decile	1	2	3	4	5	6	7	8	9	10
change in log average real hourly earnings x 100	31.69	16.19	15.79	14.60	15.96	18.53	21.18	24.36	28.28	44.85
relative growth in supply (1)	3.9	-0.07	-6.02	-9.63	-9.62	-8.18	-4.97	0.80	11.33	22.43
relative growth in demand (2)	-4.13	3.62	3.07	0.79	0.88	0.53	0.05	-2.20	-0.07	-1.92

Source: Computations based on MESS, *Quadros de Pessoal*, 1983 and 1992.
Notes: (1) The relative change in supply is computed as the decile initial distribution across
gender/schooling levels, multiplied by the aggregate change in the share of workers
in each gender/schooling group, between 1983 and 1992 (see equation 1).
(2) The relative change in demand is computed as the decile initial distribution across
industry/broad occupational levels, multiplied by the aggregate change in the share
of workers in each industry/occupational group, between 1983 and 1992 (see
equation 1).

The rise in the real wage of the last decile was remarkable, when compared to the rest of the distribution (see the second line of table 3, which rephrases the result illustrated earlier by figure 5 on the shares of the total wage bill earned by each decile in 1983 and 1992); among the categories with the sharpest wage increase, the first decile follows, with the remaining upper deciles – 9th to 6th, in that order – coming next. Comparison of the last and the 4th deciles provides the most expressive picture of the rise in inequality, as the gap between these two categories of workers widened by 30%.

terms of hours. Notice once again that the employment structure according to hours worked or number of workers is quite similar.

How far can demographic factors explain this pattern of change in real wages? During the decade, an increased female labour force participation was noticeable, driving their employment share up, from 30% in 1983 to 40% in 1992; also the schooling structure of the working population changed, under the influence of the entry into the labour market of younger cohorts. Changes in the relative supply of workers are quantified in table 3. The *pure* supply shifts explanation of the rise in inequality would require changes in factor supplies to be negatively related to changes in wages. Surprisingly though, supply forces completely fail in predicting the direction of changes in real wages for the different categories of workers. Indeed, an upgrading of the quality of the labour force can be noticed, as the relative supply of workers initially in the 10th to 8th deciles increased. The first decile was the only other one to register a rise in relative supply. Notice that groups of *workers whose supply increased* are precisely those that exhibited the *sharpest rise in real wages*. Also, that the group of workers who fared worst in terms of wage growth – the 4th decile – registered the sharpest *decline* in relative supply. In brief, supply shifts would, *ceteris paribus*, have led to the opposite result regarding changes in real wages by decile. The hypothesis of stable demand for labour must be rejected, as demographic factors, stressing supply-side explanations, fail to account for the rise in labour market inequality in Portugal.

The demand shifts that have taken place during the decade should therefore be analysed. In particular, the index built captures changes in the demand that have occurred *across* economic activities (refer once again to table 3). Demand shifts across industries and broad occupational groups (white/blue collar) also fail to predict the direction of changes in relative wages. While the relative demand for higher qualifications was *declining* across industries, their relative wages were *increasing* the most; the same trend is registered by the first decile. It should however be stressed that these demand shifts (and thus their failure to account for the changes in wages) are humble, when compared to the *pure* supply changes. The irrelevance of changes in the employment structure across industries as an explanation for the mutations undergone by the wage distribution could have been foreseen by a comparison of the employment structures in 1983 and 1992. In fact, the 1992 employment structure mirrors that of 1983, with the main change being the slight increase in the already dominant position of the textiles industry.

Figure 8 – Employment structure by economic activity, 1983 and 1992 (1)
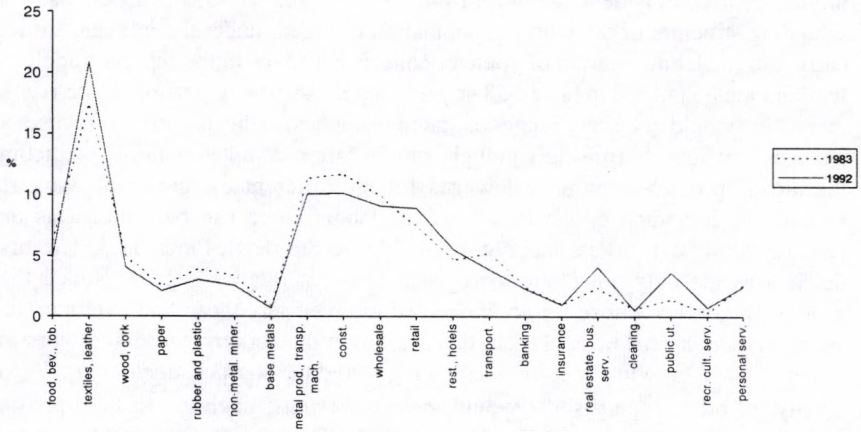
The slight changes that occurred in the Portuguese employment structure by industry did not bias the demand for labour in favour of workers with higher qualifications. Another range of explanations for the rise in labour market inequality should thus also be dismissed – the one that stresses the different rates of growth across industries, be it brought about by the increasingly competitive international environment, by changes in the pattern of trade or by the development process itself. While categorically dismissing the possibility of stable relative labour demand, data on Portugal reveal that demand shifts under constant coefficients of labour requirements also fail to account for the changes that have taken place in the earnings distribution. Forces operating within economic activities, and generating an increase in the relative demand for upper qualifications, are therefore required to explain the pattern of wage growth.

The relevance of these forces operating within industries can be explicitly addressed by decomposing the changes in the employment structure into its between and within-industry components, according to the formula [MACHIN, 1995: 5] [BERMAN *et al*, 1993:9]:

$$\Delta P_n = \sum_i \Delta S_i \cdot \overline{P}_{ni} + \sum_i \Delta P_{ni} \cdot \overline{S}_i \qquad (2)$$

where i refers to an industry, and n stands for a category of workers, defined according to the gender/schooling/broad occupational group; $P_{ni} = E_{ni}/E_i$ is the share of employment category n in industry i; $S_i = E_i/E$ is the share of industry i in total employment, and P_n represents the share of category n in total

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employment. The first term on the right-hand side quantifies the between-industry employment change, while the second term evaluates the within-industry component.

Table 4 – Changes in the structure of employment, 1983-1992

		MEN				WOMEN			
		change in the employment share (1)				change in the employment share (1)			
schooling	occup.	total	between-industry component (2)	within-industry component (2)		total	between-industry component (2)	within-industry component (2)	
			value	value	%		value	value	%
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
<= 4 yrs.	white	-2.82	-0.08	-2.74	*-97.2*	-0.68	0.37	-1.05	*-154.2*
	blue	-11.82	-2.67	-9.15	*-77.4*	-1.06	0.56	-1.62	*-153.3*
6 yrs.	white	-0.98	0.08	-1.06	*-107.8*	0.04	0.29	-0.25	*-670.9*
	blue	3.09	-0.28	3.38	*109.2*	4.00	0.22	3.78	*94.5*
9 yrs.	white	1.07	0.11	0.96	*89.4*	1.39	0.34	1.05	*75.4*
	blue	1.50	0.02	1.49	*99.0*	1.05	0.08	0.97	*92.3*
11-12 yrs.	white	0.02	0.12	-0.10	*-459.5*	1.65	0.38	1.28	*77.2*
	blue	0.74	-0.01	0.75	*100.9*	0.74	0.08	0.66	*89.0*
Univ.	white	0.32	0.07	0.25	*79.0*	0.51	0.22	0.29	*56.5*
	blue	0.69	0.02	0.67	*97.0*	0.54	0.09	0.45	*83.8*

Source: Computations based on MESS, *Quadros de Pessoal*, 1983 and 1992.
Notes: (1) Difference between the employment share in 1992 and that in 1983 (either one evaluated in percentual points).
Note that, since the values refer to absolute changes in the employment shares, they should not be used to evaluate relative changes (as an example, the rise of about 2 percentual points in the share of University graduates meant an extremely pronounced increase, from 2% to 4% of the workforce).
(2) Twenty two-digit industries were considered.

The relevance of the within-industry component of employment shifts is overwhelming, as illustrated by the very high absolute values in columns 6 and 10 of table 4.[17] Only in the case of white-collar women holding a University diploma does that contribution go below 75% (reaching 57%), which means that changes in the industrial composition of the workforce were also a relevant force contributing to the rise in the employment share of that group of workers. The share of workers with four years of education or less decreased, a trend that was felt throughout gender and broad occupational groups. It should nonetheless be pointed out that employment shifts across economic activities created

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[17] In two cases – white-collar males with a high school diploma and white-collar females with 6 years of education – the direction of change of the within-industry component contradicts the overall change. It should, however, be remarked that the employment shares of those two groups of workers in practice *did not change* (see their very low values in columns 3 and 7).

employment opportunities for women with very low schooling levels (as opposed to the evolution for men – see columns 4 and 9 for workers with 4 years of education or less). The increased role of the textile industry may have contributed to this outcome. This pattern of change also applies to white-collar males who hold only six years of education. In every other case, the general pattern applies – a rise in the employment share of the group was noticed, mainly driven by changes occurring within industries. In some instances, these within-industry shifts outweighed contradicting forces operating across industries (see the situation of blue-collar males with 6 or 11-12 years of schooling).

Several points can thus be highlighted in a synthesis of the results in table 4. First of all, support is found for the hypothesis that changes taking place within industries are a major force driving the rise in inequality. Technological progress is one promising line of research into the causes or rising demand for skilled workers and rising labour market inequality. The between-industry component of shifts in the employment structure, though less important, also deserves a comment. While for males the evolution across industries contributed to raise the *schooling profile* of the workforce (accompanying the trend noticed within the industries), for females the situation is characterised by some duality. Indeed, shifts in the industrial structure have created employment opportunities for women throughout the schooling rank, for example in the highest *and lowest* levels.

5. CONCLUSION

Rising inequality characterised the evolution of labour returns in Portugal during the 1980's and early '90s. The decline in *income* inequality over the decade was thus *not* due to the evolution of labour returns. The pattern of change in inequality reinforced the main characteristic detected for the Portuguese earnings distribution at the beginning of the decade – a stretched top, where dispersion increased remarkably.

A simple supply-demand framework can generate interesting insights into the causes of rising labour market inequality. One explanation for this trend, often presented in the literature, relies on demographic factors, stressing the decline in the rate of growth of groups of workers with the highest qualifications. Supply-driven explanations, however, fail to account for the rise in inequality in the Portuguese labour market (and indeed would lead to predictions in sharp contradiction with the changes that have actually occurred in relative wages). Changes brought about by shifts in the employment structure across sectors of activity are also categorically dismissed as sources of rising wage dispersion, since no major changes in the industrial composition of the workforce can be

detected. Moreover, the slight changes that have occurred were not biased towards sectors requiring workers with upper qualifications, having instead favoured more traditional activities. As such, explanations for the rise in inequality that rely on shifts in the employment structure brought about for example by the increased openness of the economy also have to be dismissed.

Evidence on Portugal lends support to the idea that forces operating within industries have contributed to switching the relative demand in favour of very qualified workers. Technical progress is a major candidate under this set of explanations. Going beyond this supply and demand framework, the decline in union influence and the role of the minimum wage legislation should not be disregarded either.

APPENDIX A: METHODOLOGICAL ISSUES

DATA SET

Since 1982 the Portuguese Ministry of Employment and Social Security (MESS) has gathered annually data on every establishment with wage earners. Reported data cover, namely, worker attributes, earnings (split into base-wage, tenure-related subsidies, other regular subsidies, irregular subsidies and overtime pay) and duration of work (normal and overtime). By design, public administration and domestic work are not covered by the database[18] 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, comparison with the *Census of manufacturing* reveals that QP covers more workers than the census itself.

The analysis is based on a random sample of the database. 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 patterns, while the manageability of the database and the identification of stylised facts is 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 taking into account firm *birth* and *death* which, as reported by MATA [1993], by MATA and PORTUGAL [1994] and by BRANDÃO ALVES and MADRUGA [1993], achieves high levels in the Portuguese economy.

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; residual categories such as *other manufacturing activities* were also dropped (0.5% of the workers in the database in 1992). *Electricity, gas and steam* and *communications* were not included (in 1992, these sectors represented 2.8% of the workers), due to the very unrepresentative nature of the sample that had been drawn.[19]

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[18] State-owned companies are covered.

[19] 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), these latter ones having been picked in the random sample, thus generating a very distorted image of the sector. 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

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Only full-time wage earners were retained for analysis (part-timers represented 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 the average firm size of each economic activity, as well as 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 us to claim the representativeness of the sample. 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.

CONCEPTS OF EARNINGS

Average hourly earnings were computed as $hw = \dfrac{bw + ts + rs + is}{nh}$, 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. Monthly earnings obviously refer to the numerator of the fraction.

We are dealing with gross earnings, 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

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picking the monopoly or one of the oligopoly firms in the industry was considered, but it has been chosen not to implement it, mainly because 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.

subsidies, such as Christmas or holiday pay, are likely not to be reported, since only the fraction actually *paid* in March is registered.

CONCEPT OF WHITE / BLUE COLLAR WORKER

Identification of white/blue collar workers was based on their occupation (*Portuguese Classification of Occupations*), according to the following criteria:

– scientific, technical and artistic professions (codes 0-1): white collar
– managers and higher clerical staff (code 2): white collar
– clerical staff and similar workers (code 3): white collar
– commercial staff and salesmen (code 4): white collar
– protection and security personnel, personal and domestic services and similar workers (code 5): blue collar
  (codes 50 to 52, corresponding to *directors and other supervisors of hotels*, were the exception, having been coded as white collars)
– farmers, stock-breeders, farm and forestry workers, fishermen and hunters (codes 7-9): blue collar
  (code 60, *directors of farms*, were coded as white collars)
– production workers in extraction and manufacturing industries and operators of fixed and transport machinery: blue collar.

Inspection of the 5-digit classification did not reveal inconsistencies in these criteria.

APPENDIX B: COMPLEMENTARY INFORMATION

Table B1 - Real wage growth, 1983-1992

		AVERAGE ANNUAL GROWTH RATE (%)		
		1983-86	1986-89	1989-92
AVERAGE MONTHLY EARNINGS		-0.5	3.1	5.4
MINIMUM WAGE	domestic work	2.0	3.0	7.2
	agriculture	1.3	2.5	4.5
	other activities	0.1	-0.4	2.5
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 enforce in each of the years.

Note: $Average\ real\ earnings = \dfrac{average\ nominal\ earnings\ (index\ base\ 1983)}{CPI\ (index\ base\ 1983)}$ (BIT [1980: 243-254] summarises this widely used procedure).

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