REGIONAL WAGE INEQUALITY IN PORTUGAL

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1 — Introduction

Regional imbalances have been a long-standing feature of the Portuguese economy. Lately, there has been much concern over economic inequalities, and significant amounts of the European Community funds have been channelled to promote the so-called European social cohesion. Its impact on building infrastructures and improving communications is undeniable.

We intend to look at the problem from another angle. Living standards are directly influenced by the level of income and its distribution; wage differentials are the main factor generating income inequality (Pereirinha,1988, 401). We focus attention on the labour market and investigate regional wage inequalities in the 1980's.

The idea of convergence has been emphasized in the debate over earnings inequality. Different regional studies stressed the equalizing effect of government policies, the influence of changing industrial structures and the weakening of regional differences, as the wage determination process became more influenced by national factors and mechanisms contributing toward equilibrium, such as labour migration [see, for instance, Black (1985), Dickie and Gerking (1987) and Farber and Newman (1989)].

Recently, however, evidence on growing wage inequality within industrialized economies began to be reported in the literature [see Van Wagner (1989), Levy and Murnane (1992), Bound and Johnson (1992), Gottschalk and Joyce (1992) and Blau (1992)]. Several explanations have been developed. Skill has always been considered a crucial variable in the explanation of wage differentials. The human capital approach emphasizes the supply side of the market, relying heavily on the competitive framework developed by neoclassical theory. Another body of literature emphasizes the institutional factors, stressing the demand side of the market and the quality of jobs as relevant explanations of wage disparities. Recently, attention has been devoted to changes in the distribution of skills, brought about by technological change and by shifts in product demand. As argued by some authors, this shift in the demand for skills is changing the rewards for skills in favour of the more qualified workers, therefore widening the wage gap (Bound and Johnson, 1992).

It is our main purpose to analyse the question: Is wage inequality between Portuguese regions rising? If so, we should be left with an unanswered question: What about social cohesion within each member country? What about the convergence of living standards?

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Section 2 briefly describes the data source and the methodology used. Section 3 is devoted to presenting the results and section 4 concludes by reflecting on some perspectives.

2 — Data source and methodology

An extensive micro data set is gathered annually by the Ministry of Employment, based on a questionnaire to firms employing salaried workers. The data-base used contains information on nearly one million workers in the manufacturing sector.

Quadros de pessoal is a reliable source of information. It does not cover those tiny firms that do not have paid employees at work, but still it covers, altogether, more employees than the Industrial Census itself, revealing a very thorough coverage of firms with more than five people at work. Keeping in mind our aim — wage analysis —, this source of information can thus be considered quite trustworthy.

For each paid employee, the following information was used: region, industry division, skill, income earned and hours worked.

The study is based on the hourly earning before taxes, as it is the closest approximation to the income in fact earned by the worker that we could compute with the information available. Its appropriateness for this kind of study is supported by the ILO (BIT, 1980). Even though real regional earnings would be a more appropriate measure to analyse, the available data does not include regional purchasing power. We were therefore obliged to base our study on the assumption that there are no significant price disparities among regions.

The coefficient of variation is used as an exploratory device for measuring inequality. This index is independent of the size of the population to be analysed, which allows for comparisons among different groups at different moments in time, being easily computable and one of the most widely used inequality measures.

However, a more powerful device was needed, namely to decompose inequality, quantifying the contribution of different worker characteristics to overall inequality. The selection of an inequality measure among the profusion of measures available in the literature is a controversial subject. There is however a certain consensus (1) on the appropriateness of the Theil index to decompose inequality. Among the main properties of the measure we cite: scale independence; anonymity; satisfaction of the weak principle of transfers or Pigou-Dalton principle; additive decomposability. The appropriateness of this measure is synthesized by Cowell, who argues that «[...] multilevel decomposition of the Theil index is actually quite straightforward. Indeed, neat decomposability is one the supremely attractive qualities of this index, in sharp contrast to the Gini coefficient [...]» (Cowell, 1985, 201).

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(1) See, for example, Cowell (1985), Cowell and Kuga (1981), Shorrocks (1980), or Bourguignon (1979).

The measure is computed as follows:

$$T = \sum_{i=1}^{N} y_i \cdot \log (N \cdot y_i)$$

where y_i stands for the share of total income earned by individual i and N is the population size.

The index has 0 as its lower bound (maximum equality) and $\log N$ as its upper bound (maximum inequality). Meaningful comparisons among populations with different sizes can be made if one standardizes the measure, dividing it by its upper limit, $\log N$. The index thus obtained ranges between 0 and 1.

It has already been stressed that the Theil index exhibits additive decomposability. Once we partition the population into subgroups, based on some selected attribute(s), aggregate inequality can be decomposed into the inequality between groups, plus a weighted sum of inequality within groups. The weights considered are the income shares. The decomposed measure is given by:

$$T = \sum_{i=1}^{N} y_i \cdot \log (y_i \cdot N_i) = \sum_{g=1}^{G} Y_g \cdot \log \left(\frac{\frac{Y_g}{N_g}}{\frac{N}{N}} \right) + \sum_{g=1}^{G} Y_g \cdot \sum_{i \in S_g} \frac{y_i}{Y_g} \cdot \log \left(\frac{\frac{y_i}{Y_g}}{\frac{1}{N_g}} \right)$$

considering:

$S_1 \ldots S_g \ldots S_G$ — disjoint and exhausting subgroups defined according to the attribute(s) selected;

$N_1 \ldots N_g \ldots N_G$ — population in each subgroup; $\sum_{g=1}^{G} N_g = N$;

y_i — income share earned by individual i; $y_i \geq 0$ and $\sum_{i=1}^{N} y_i = 1$;

$Y_g = \sum_{i \in S_g} y_i$, $g = 1 \ldots G$ — income share earned by the individuals in group g; $\sum_{g=1}^{G} Y_g = 1$.

The Theil index decomposes into two meaningful components. The first term on the right-hand side stands for inequality between the subgroups, while the second term is a weighted average of inequality within the subgroups. The inequality between subgroups can be interpreted as the share of total inequality that would exist if the attribute(s) selected were the only source(s) of inequality (Theil, 1967, 95) (Theil, 1972, 101). It allows us to measure the influence of different attributes on wage inequality. Likewise, the inequality within the subgroups represents the share of aggregate inequality not explained by the criteria selected. Indeed, if the attributes chosen were the only sources of inequality, then all the inequality within the subgroups would vanish.

3 — Wage inequality among workers: the relevance of the skill, the economic sector and the region

Wage inequality among workers in the manufacturing sector declined from 1983 to 1985, increasing afterwards, quite sharply at the end of the decade.

TABLE 1

Wage inequality among workers, 1983-1989

	1983	1984	1985	1986	1987	1988	1989
Theil index	.1979	.1814	.1769	.1850	.1867	.2020	.2449
Stand. Theil index	.0147	.0135	.0131	.0137	.0138	.0149	.0180

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

The skill, the industry and the region all are relevant variables contributing to wage inequality. Their relative importance can be quantified rigourosly, using the Theil index to decompose aggregate inequality.

TABLE 2

Decomposition of aggregate inequality among workers, 1983-1989

Year	Theil index	Attribute selected for decomposition								
		Region			Industry division			Skill		
		TB groups	TW groups	(3)/ (2) (%)	TB groups	TW groups	(6)/ (2) (%)	TB groups	TW groups	(9)/ (2) (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1983	.1979	.0166	.1813	8.40	.0375	.1604	18.96	.0525	.1454	26.54
1984	.1814	.0161	.1654	8.86	.0388	.1426	21.39	.0515	.1300	28.37
1985	.1770	.0179	.1590	10.14	.0461	.1309	26.04	.0562	.1208	31.76
1986	.1850	.0175	.1675	9.44	.0474	.1376	25.62	.0575	.1275	31.09
1987	.1867	.0177	.1690	9.49	.0465	.1402	24.90	.0598	.1269	32.02
1988	.2020	.0179	.1841	8.86	.0494	.1526	24.46	.0631	.1390	31.23
1989	.2449	.0209	.2239	8.55	.0528	.1921	21.54	.0641	.1808	26.17

Notes: TB-inequality between groups; TW-inequality within groups.

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

Skill is the most relevant feature, explaining about 30 % of total wage dispersion (see column 11, table 2); industry is associated with approximately 25 % of total inequality (column 8), while the region accounts for a little less than 10 % of aggregate wage dispersion (column 5).

Such results are not surprising. Fishlow (1972, 397), Van Weeren and Van Praag (1984, 216), Pereirinha (1988, 331-2) and Harris (1990, 270), studying

family income or hourly wages concluded that differences across regions contribute little to aggregate inequality. Van Wagner even synthesizes: «[...] Differences in mean earnings across regions contribute virtually nothing to overall inequality» (Van Wagner,1989, 83-5).

However, 10 % is an impressive regional contribution to aggregate inequality. When the authors just cited refer to the low contribution of the region to aggregate inequality, they mean a 1 to 3 % contribution — see Van Weeren and Van Praag (1984, 252-4), when referring to Belgium, Denmark, the FRG, Great Britain and the Netherlands —, or even smaller contributions of less than 1 % — see for example Van Wagner (1989, 83-2), when dealing with the USA in 1979. Also Altimir and Piñera (1982, 838), studying Latin American countries, found a regional contribution to total wage inequality of 4.3, 7.1 and 9.6 %, respectively for Panamá, Venezuela and Chile; only Costa Rica, with 15.9 %, surpasses the Portuguese regional factor as contribution toward aggregate inequality.

Regional wage inequalities are in Portugal a much far reaching problem than in most other countries. In Europe, only Italy displays regional inequalities comparable to Portugal's. «The income differences between regions do not add much to total inequality, except in Italy, where the inequality between regional areas contributes about ten percent to total inequality» (Van Weeren and Van Praag,1984, 255).

4 — High and widening wage inequality among regions

The regional perspective will deserve closer atention in the remainder of this paper, where hourly average wages are analysed.

FIGURE 1

Regional wage pattern, 1989

Percentage over the national average wage:

- > 130 %
- 95–110 %
- 85–95 %
- < 85 %

Source: MESS, *Quadros de Pessoal,* 1989.

The Lisbon region, with a productive structure based mainly on the manufacturing and the service sectors, exhibits the highest manufacturing average earning. The Algarve and Alentejo, where manufacturing is considerably underrepresented, both reward their labour force in that sector fairly well by Portuguese standards. The northern and central coastal regions, where industry and agriculture coexist, rely on a high proportion of low skilled workers and base their competitiveness on the low wages paid. The inland area in the north and centre of the country, suffering from the severe problems arising from the reduction of its labour force, caused by emigration, which has not stopped since the 60's, perpetuates its position as a region incapable of retaining its population. Work and training opportunities, particularly in manufacturing, are few, and the financial rewards for those who decide or have the chance to work in these regions are the lowest in Portugal.

The coefficient of variation and the Theil index are reliable measures for purposes of inter-temporal comparisons of inequality, since they are not influenced by the dimension of the variable under analysis, which has registered a tendency for growth during the period.

TABLE 3

Regional wage inequality, 1983-1989

	1983	1984	1985	1986	1987	1988	1989
Range (esc.)	51	65	81	94	114	129	145
Average (esc.)	113.01	137.38	168.44	201.1	229.29	252.05	286.27
Standard deviation (esc.)	20.63	24.97	32.46	38.72	43.98	48.89	56.74
Coef. variation (%)	18.26	18.18	19.27	19.25	19.18	19.40	19.82
Standardized Theil index	.00322	.00312	.00348	.00338	.00342	.00342	.00397

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

Regional wage inequality is fairly high. Van Wagner detected much lower inequality values for the USA, a much larger country where one would thus expect a greater inter-regional heterogeneity. Furthermore, a strong decreasing trend was detected for the USA: 13.44, 10.47 and 7.06, were the values of the coefficient of variation, respectively in 1959, 1969 and 1979 (Van Wagner, 1989, 76). In Portugal, to the contrary, the outstanding increases in regional wage inequality in 1985 and 1989 were not offset by the decreases which occurred in 1984 and 1986.

The fact that the ranking of regions according to their average hourly gain remained roughly unchanged during the period, accompanied by widening regional wage disparities, suggests that competitive forces in the market failed to operate.

4.1 — The influence of worker skills

One could argue that regional wage inequalities may simply reflect differences in the concentration of manpower skills and different industrial specializations. For instance, regions with a large share of skilled workers will obviously pay a higher average earning. We therefore computed the inter-regional coefficient of variation of wages *for each skill and each industrial sector separately.*

As expected, wage inequality decreases if one computes the measure for each skill separately, suggesting the existence of different regional concentrations of labour force skills. The aggregation over all skills exaggerates the wage differences among the regions.

TABLE 4

Regional wage inequality for each skill, 1983-1989

Year	TMP	MP	FOR	HS	S	SS	US	AP
1983	9.80	10.47	12.67	11.87	14.92	10.94	8.63	10.59
1984	10.07	9.63	11.17	9.61	14.32	11.75	8.95	10.61
1985	10.16	13.20	12.00	11.70	15.31	11.80	9.38	8.28
1986	9.75	13.39	12.21	11.81	15.36	10.93	8.42	8.25
1987	10.92	12.50	11.84	11.31	15.14	10.64	7.05	11.49
1988	8.53	12.19	11.93	11.09	15.70	11.13	8.18	7.82
1989	10.67	11.08	11.97	11.70	15.81	11.50	7.27	8.68

Note. — See appendix A1 for a list of skills.

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

However, inequality still remains significant, especially if one looks at intermediate positions in the skill hierarchy.

What is the trend in the regional distribution of skills and what regions and skills are more responsible for the inequality detected? The following measure aims at answering that question in an easily readable way:

$$CL_q = \frac{\sum_{r=1}^{7} \left| \frac{HT_{rq}}{HT_q} - \frac{HT_r}{HT} \right|}{2}$$

employment is measured as total number of hours worked (HT); r stands for the region; and q denotes the skill level.

The intermediate step $\left(\frac{HT_{rq}}{HT_q} - \frac{HT_r}{HT} \right)$ can be interpreted as a measure of relative abundance or scarcity of that skill in the region (as compared to the regional employment dimension), depending on its value being, respectively,

greater or less than 0.//CL_q is an aggregate index of the heterogeneity in the territorial distribution of each type of manpower qualification.

TABLE 5

Distribution of skills over space, 1989 (*)

	TMP	MP	FOR	HS	S	SS	US	AP
NL	–17.50	– 9.90	– 7.00	–17.90	1.40	1.00	–9.40	9.70
NI	– 0.20	– 0.20	0.00	– 0.20	0.00	–0.10	0.80	– 0.10
CL	– 7.00	– 7.40	– 3.20	– 8.50	–2.20	1.70	7.30	3.40
CI	– 1.90	– 1.20	– 1.00	– 1.50	–0.60	1.50	1.10	1.30
LVT	26.90	19.30	11.00	27.90	1.60	–4.60	–0.80	–12.00
Alt	– 0.30	– 0.30	0.30	0.30	–0.20	0.30	0.60	– 0.70
Alg	0.00	– 0.30	– 0.10	0.00	–0.10	0.10	0.50	– 0.30
C. Loc.	26.90	19.30	11.30	28.20	3.10	4.70	10.30	13.80

(*) The regional information refers to the ratio $\left(\frac{HT_{rq}}{HT_q} - \frac{HT_r}{HT}\right)$

Note. — See appendix A1 for a list of skills.

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

The Lisbon region concentrates the most qualified workers (above the highly skilled), while a high proportion of apprentices works in the northern coastal region. There is a remarkable lack of managers, professionals and highly skilled personnel in the northern and central coastal regions. The spatial distribution of these skill levels, together with the skilled and unskilled workers, tends to be increasingly unequal (see appendix A4) (2).

4.2 — The influence of the industrial sector

We further investigated whether the production specialization of the regions would have any influence on the wage dispersion, disaggregating the analysis to consider the industry division in which workers are engaged (see appendix A3 for the industrial classification of economic activities).

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(2) To detect the abundance or scarcity of a certain labour skill in a region another indicator could have been used, based on the flow of vacancies offered and filled along the year. Such an indicator has been proposed by Chagas Lopes (1992). Despite the shortcomings, we decided to base our analysis on one single source of information, to ensure compatibility of concepts: data on vacancies is disaggregated according to the occupational level, while our analysis concentrates on skill disaggregations; also, the regional disaggregation that we have used is hardly compatible with the delimitation used to gather information on vacancies.

TABLE 6

Regional wage inequality, by skill and industry division, 1989 (*)

TMP	MP	FOR	HS	S	SS	US	AP
0.37	0.38	0.25	0.3	0.25	0.29	0.16	0.63
0.32	0.3	0.22	0.28	0.24	0.21	0.15	0.33
0.27	0.26	0.22	0.28	0.17	0.21	0.15	0.23
0.27	0.25	0.2	0.23	0.15	0.18	0.13	0.2
0.25	0.24	0.15	0.18	0.15	0.15	0.12	0.17
0.19	0.18	0.15	0.18	0.12	0.13	0.12	0.14
0.19	0.15	0.14	0.16	0.12	0.12	0.1	0.13
0.19	0.15	0.13	0.15	0.11	0.11	0.09	0,13
0.18	0.13	0.13	0.14	0.11	0.1	0.09	0.12
0.17	0.13	0.12	0.14	0.11	0.1	0.08	0.1
0.14	0.13	0.11	0.14	0.11	0.09	0.08	0.09
0.14	0.11	0.1	0.12	0.1	0.09	0.08	0.09
0.14	0.11	0.1	0.11	0.1	0.09	0.08	0.09
0.13	0.09	0.1	0.11	0.09	0.08	0.07	0.08
0.12	0.09	0.09	0.1	0.08	0.08	0.07	0.08
0.11	0.09	0.09	0.09	0.08	0.08	0.07	0.07
0.11	0.09	0.09	0.09	0.08	0.08	0.07	0.07
0.1	0.08	0.08	0.08	0.08	0.07	0.06	0.07
0.09	0.08	0.08	0.08	0.07	0.07	0.06	0.07
0.08	0.08	0.08	0.08	0.06	0.07	0.06	0.06
0.08	0.08	0.07	0.08	0.06	0.07	0.05	0.06
0.08	0.08	0.07	0.07	0.06	0.07	0.05	0.06
0.08	0.05	0.07	0.07	0.05	0.06	0.04	0.06
0.07	0.05	0.07	0.07	0.04	0.06	0.04	0.05
0.05	0.05	0.06	0.06	0.02	0.06	0.03	0.03
0.05	0.04	0.04	0.06	0.02	0.03	0.03	0.03
0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.02
0.04	0.03	0.03	0.04	0.01	0.02	0.02	0.02
0	0.01	0.02	0.04	0.01	0.01	0.02	0

(*) Industries are sorted according to the coefficient of variation of wages; the industry labels are not included. For the complete information, see appendix A5.

Note. — The horizontal lines stand for the coefficient of variation when all industries are taken together.

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

For most skills, regional wage dispersion is reduced if one takes into account each specific industry division. When the analysis comprehends all sectors of activity, inequality between regions is thus overestimated. That is to say that each region seems to concentrate sectors that reward each skill either well or badly.

One should however stress that the same does not hold true for the top managers and professionals. In this case most industries, when taken individu-

ally, exhibit higher values of wage dispersion between regions than the industries altogether. This fact suggests that in each region industries that pay well coexist with others that pay the top managers and professionals badly.

The results obtained allow us to conclude that wage inequality across regions is the outcome of differences in the concentration of manpower skills, as well as the result of different productive specializations. In fact, wage inequality between regions is reduced if one analyses it within each industry and each skill (except for the top managers and professionals).

However, for the same type of work (i. e. the same qualification and the same industry), regional wage inequalities are still significant.

The regional dimension is stressed by these conclusions, since both the rewards for the same attribute vary across regions, and regions differ in their capacity to attract industries and manpower skills. That is to say, the spatial discontinuity of the labour market is characterized both by different concentrations of types of jobs/workers and different rewards for the same attribute.

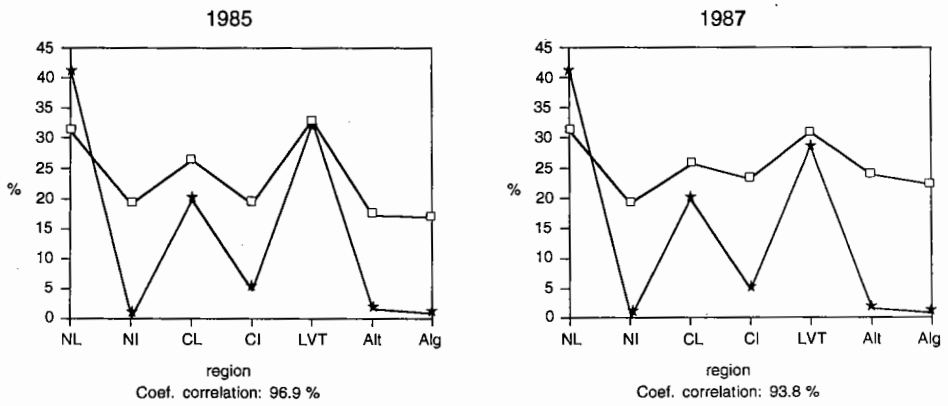
5 — Wage inequality within regions

Inequality among manufacturing workers tended to grow from 1983 to 1989 within most regions (see appendix A6).

The structure of inequality within each region seems to be associated with the employment dimension of the region. In regions with a large share of the country's total employment (above 20 %), worker skill is an important feature of wage determination. On the other hand, small regions reveal a relative indifference to worker qualifications, other kinds of variable thus becoming important to wage differentiation. This pattern is particularly expressive in 1985 and 1987, as demonstrated in the following picture.

FIGURE 2

The contribution of skill toward wage inequality within each region, 1985 and 1987



Source: Computations based on MESS, *Quadros de Pessoal,* 1985 and 1987.

The larger a region's workforce, the stronger is the influence of skill on wage inequalities. We can thus conclude that, for regions with a small share of total employment, the variables chosen do not seem good predictors of wage inequality.

6 — Conclusion

The wage gap among Portuguese manufacturing workers increased during the 1980's. As suggested by most authors, skill is an important factor contributing to wage inequality and the industrial structure also plays an important role.

Regional inequality, a much greater problem in Portugal than in most other countries, increased during the decade. For this reason, convergence theories predicting the equalization of wage rates over space are not supported by the evidence in Portugal. The spatial discontinuity of the labour market is twofold. On the one hand, regions have different concentrations of labour skills; on the other, workers earn varying rewards for the same attribute, depending on the region. That is to say, the operation of the labour market leads neither to the homogenization of worker characteristics over space, nor to the setting of an equilibrium wage for each characteristic.

The regional wage structure widened during that period, despite there having been very strong migratory movements from the periphery to the more developed and better paying regions, as attested by the 1991 Census figures. It might be argued that an unprecedented type of migratory movements took place, reinforcing the regional wage gap. It is mostly the more educated and qualified who emigrate, since there is a lack of employment opportunities in regions where agriculture is still the dominant activity. Changes in the skills and educational structures of the regions, brought about by migratory movements, may have led to growing wage disparities. Labour mobility could thus have had the opposite effect, as compared to the predictions of the theory. This objection would need further examination, after introducing the variable education and further disaggregating the skill levels.

Turning now to intra-regional inequality, we could find that in regions with a small share of total employment, the variables chosen do not seem good predictors of wage inequality. The reasons for inequality should be looked for elsewhere, namely in the individual characteristics of the workers (age, education, sex, etc.) as well as firm-specific characteristics (for instance, size, profitability, or capital ownership).

There is no sign that the trend towards increasing wage inequality will be reversed. To the contrary, the Single Market will probably result in greater opportunities for the higher skilled workers. It is essentialy the upper skills that are lacking in some countries today and, on the supply side, those are the better informed workers, who have a wider market horizon, being therefore more able to take advantage of opportunities that arise. Inequality may therefore be reinforced by the growing distance between the upper wages (converging towards

the European standard at a faster pace) and the rest of the distribution. Moreover, there is so far no clear tendency towards a strong regional decentralization affecting the dynamics of the labour market. For example, despite all aspirations to the contrary, vocational training opportunities are still concentrated mainly in the more developed regions. The decline of skills in the periphery can lead to growing regional wage inequality.

Portugal has therefore a long way before it can achieve economic and social convergence with its more highly developed European partners: it has to achieve outstanding overall results, *and* reduce internal regional disparities, in order to catch up with their economic performance.

APPENDIX

Complementary information

A1 — The *Portuguese worker skill classification* considers the following items:

TMP — top managers and professionals;
MP — other managers and professionals;
FOR — foremen and supervisors;
HS — highly skilled personnel;
S — skilled personnel;
SS — semi-skilled personnel;
US — unskilled personnel;
AP — apprentices.

A2 — The country was partitioned into the following *regions*:

NL — northern coastal region;
NI — northern inland region;
CL — central coastal region;
CI — central inland region;
LVT — Lisbon and the Tagus valley;
ALT — Alentejo;
ALG — Algarve.

A3 — *Portuguese industrial classification of economic activities (manufacturing):*

311-312 Food.
313 Drink.
314 Tobbaco.
321 Textiles.
322 Clothing.
323 Leather and leather goods (except footwear and clothing).
324 Footwear.
331 Sawing and processing of wood and cork; wood manufactures (except furniture).
332 Wooden furniture.
341 Paper and paper products.
342 Printing and publishing.
351 Industrial chemicals.
352 Other chemical products.
353 Petroleum refining.
354 Manufacture of other petroleum and solid fuel products.
355 Rubber processing.
356 Plastics processing.
361 Ceramics.
362 Glass and glassware.
369 Other non-metallic mineral products.
371 Iron and steel.
372 Non-ferrous metals.
381 Metal articles (except mechanical, electrical and instrument engineer. and vehic.).
382 Mechanical engineering, except electrical equipment.
383 Electrical engineering.
384 Motor vehicles, motor vehicle parts and accessories and other means of transport.
385 Precision instruments.
390 Miscellaneous manufacturing.

TABLE A4

Spatial distribution of skills, 1983-1989 (*)

		TMP	MP	FOR	HS	S	SS	US	AP
1983	NL	–16,9	– 7.7	– 8.2	–12.6	0.6	3.3	–5.9	8.2
	NI	– 0.4	– 0.4	– 0.1	– 0.4	–0.1	0.0	0.6	– 0.1
	CL	– 7.5	– 9.2	– 4.6	– 8.2	–1.6	0.6	5.4	5.1
	CI	– 2.1	– 0.8	– 1.2	– 1.1	–0.7	1.3	1.8	– 0.1
	LVT	27.6	18.5	14.1	23.2	2.2	–6.1	–2.8	–12.0
	Alt	0.3	– 0.1	0.1	– 0.4	–0.1	0.3	0.5	– 0.7
	Alg	0.4	– 0.3	– 0.2	– 0.5	–0.3	0.6	0.4	– 0.4
	Coef. Loc.	27.6	18.5	14.3	23.3	2.8	6.1	8.7	13.3
1984	NL	–18,4	– 7.5	– 7.1	–13.1	0.8	3.9	–6.7	8.8
	NI	– 0.3	– 0.4	– 0.1	– 0.4	–0.1	–0.2	1.2	0.0
	CL	– 6.8	– 9.2	– 4.0	– 8.0	–1.8	0.8	5.4	4.9
	CI	– 2.4	– 1.2	– 1.0	– 1.8	–0.5	1.2	1.7	– 0.1
	LVT	28.3	18.3	11.9	24.3	1.8	–6.5	–2.5	–24.2
	Alt	– 0.4	– 0.1	0.4	– 0.6	–0.1	0.3	0.3	– 1.1
	Alg	– 0.1	– 0.2	0.0	– 0.3	–0.1	0.5	0.6	– 0.3
	Coef. Loc.	28.4	18.5	12.3	24.3	2.6	6.7	9.2	19.7

		TMP	MP	FOR	HS	S	SS	US	AP
1985	NL	–17,1	– 7.5	– 7.5	–14.4	0.9	2.7	–6.3	10.5
	NI	– 0.2	– 0.3	– 0.1	– 0.4	–0.1	–0.2	1.3	– 0.1
	CL	– 7.0	– 8.5	– 3.7	– 8.9	–1.7	1.7	5.7	4.2
	CI	– 2.1	– 1.0	– 1.0	– 1.1	–0.6	1.4	2.0	0.0
	LVT	27.0	17.9	12.2	25.7	1.9	–5.7	–3.3	–13.5
	Alt	– 0.4	– 0.4	0.3	– 0.6	–0.2	0.4	0.2	– 0.7
	Alg	– 0.2	– 0.2	– 0.1	– 0.3	–0.2	0.4	0.5	– 0.3
	Coef. Loc.	27.0	17.9	12.5	25.7	2.8	6.3	9.7	14.7
1986	NL	–17,0	– 7.8	– 7.1	–14.2	1.1	1.9	–4.2	10.5
	NI	– 0.2	– 0.3	– 0.1	– 0.4	–0.1	–0.2	1.2	0.2
	CL	– 6.9	– 8.4	– 3.9	– 8.4	–2.0	1.2	5.5	4.3
	CI	– 1.9	– 0.6	– 1.1	– 1.1	–0.6	1.8	1.2	– 0.1
	LVT	26.5	18.1	12.2	25.0	2.0	–5.5	–4.5	–13.5
	Alt	– 0.3	– 0.6	0.3	– 0.4	–0.2	0.4	0.1	– 0.6
	Alg	– 0.2	– 0.3	– 0.2	– 0.4	–0.2	0.3	0.6	– 0.3
	Coef. Loc.	26.5	18.1	12.5	25.0	3.1	5.7	8.7	14.8
1987	NL	–18,8	– 8.0	– 6.9	–14.1	1.6	1.9	–6.8	9.7
	NI	– 0.2	– 0.4	– 0.1	– 0.3	–0.1	–0.2	1.0	– 0.2
	CL	– 7.8	– 9.8	– 4.0	– 8.9	–2.1	1.2	5.7	4.1
	CI	– 2.1	– 1.0	– 1.1	– 1.1	–0.5	1.6	1.9	– 0.3
	LVT	29.0	19.6	12.0	24.9	1.4	–5.0	–2.9	–12.4
	Alt	– 0.2	– 0.2	0.2	– 0.4	–0.2	0.3	0.5	– 0.6
	Alg	– 0.2	– 0.2	– 0.1	– 0.1	–0.1	0.1	0.5	– 0.3
	Coef. Loc.	29.0	19.6	12.2	24.9	3.0	5.2	9.7	13.8
1988	NL	–17,8	– 9.5	– 7.6	–17.3	1.1	0.1	–6.1	10.3
	NI	– 0.1	– 0.2	0.0	– 0.3	0.0	–0.1	0.9	0.0
	CL	– 6.2	– 8.5	– 4.3	– 7.9	–2.4	2.1	2.2	4.2
	CI	– 1.9	– 0.9	– 1.1	– 1.3	–0.6	1.3	1.3	– 0.2
	LVT	26.4	19.8	13.0	26.8	2.3	–4.2	–2.2	–12.9
	Alt	– 0.3	– 0.3	0.3	– 0.3	–0.2	0.5	0.7	– 0.9
	Alg	– 0.2	– 0.3	– 0.2	– 0.2	–0.2	0.2	0.5	– 0.4
	Coef. Loc.	26.5	19.8	13.3	27.1	3.4	4.3	7.0	14.5
1989	NL	–17,5	– 9.9	– 7.0	–17.9	1.4	1.0	–9.4	9.7
	NI	– 0.2	– 0.2	0.0	– 0.2	0.0	–0.1	0.8	– 0.1
	CL	– 7.0	– 7.4	– 3.2	– 8.5	–2.2	1.7	7.3	3.4
	CI	– 1.9	– 1.2	– 1.0	– 1.5	–0.6	1.5	1.1	1.3
	LVT	26.9	19.3	11.0	27.9	1.6	–4.6	–0.8	–12.0
	Alt	– 0.3	– 0.3	0.3	0.3	–0.2	0.3	0.6	– 0.7
	Alg	0.0	– 0.3	– 0.1	0.0	–0.1	0.1	0.5	– 0.3
	Coef. Loc.	26.9	19.3	11.3	28.2	3.1	4.7	10.3	13.8

(*) The regional information refers to the ratio $\left(\frac{HT_{rq}}{HT_q} - \frac{HT_r}{HT}\right)$

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

TABLE A5

Regional wage inequality (coefficient of variation), by industry division and skill, 1983-1989

Ind.	TMP	MP	FOR	HS	S	SS	US	AP
1983								
311	.11	.15	.12	.10	.09	.08	.08	.07
312	.50	.30	.26	.26	.24	.10	.11	.16
313	.11	.17	.17	.08	.13	.15	.16	.22
314	.00	.02	.01	.05	.02	.00	.01	.01
321	.10	.09	.07	.18	.03	.04	.05	.02
322	.23	.05	.07	.09	.05	.07	.08	.06
323	.11	.11	.04	.11	.08	.04	.03	.05
324	.11	.13	.19	.10	.03	.06	.04	.05
331	.18	.12	.13	.11	.07	.08	.05	.05
332	.10	.25	.13	.29	.11	.03	.03	.03
341	.07	.07	.03	.04	.07	.16	.05	.16
342	.22	.13	.13	.14	.13	.10	.08	.08
351	.05	.07	.07	.02	.07	.16	.07	.11
352	.06	.07	.09	.05	.08	.08	.17	.16
353	.05	.02	.03	.01	.00	.02	.08	.10
354	.05	.00	.12	.00	.06	.00	.04	.32
355	.07	.06	.10	.10	.15	.16	.11	.07
356	.14	.18	.06	.02	.07	.04	.12	.06
361	.27	.06	.06	.03	.04	.05	.06	.08
362	.10	.04	.12	.09	.04	.11	.06	.12
369	.13	.09	.07	.09	.06	.07	.05	.07
371	.09	.07	.10	.07	.09	.05	.05	.21
372	.12	.21	.17	.09	.13	.14	.52	.31
381	.13	.09	.07	.07	.10	.07	.07	.06
382	.10	.09	.10	.12	.10	.10	.08	.14
383	.05	.08	.04	.06	.05	.07	.06	.13
384	.08	.13	.11	.07	.15	.18	.21	.11
385	.06	.13	.14	.06	.11	.11	.14	.04
390	.16	.50	.32	.44	.20	.10	.11	.07
1984								
311	.12	.18	.11	.09	.09	.07	.10	.06
312	.46	.36	.27	.35	.27	.11	.12	.19
313	.15	.10	.19	.12	.12	.17	.15	.27
314	.00	.01	.01	.00	.00	.01	.01	.00
321	.09	.07	.04	.13	.02	.02	.02	.02
322	.13	.11	.11	.13	.11	.17	.17	.06
323	.26	.15	.05	.07	.06	.04	.02	.08
324	.10	.22	.08	.11	.02	.03	.12	.03
331	.07	.08	.08	.12	.05	.06	.05	.04
332	.20	.06	.14	.18	.09	.07	.06	.04
341	.04	.15	.05	.09	.06	.13	.04	.15
342	.17	.08	.13	.09	.10	.08	.07	.06
351	.06	.11	.04	.09	.03	.01	.06	.18
352	.09	.06	.13	.05	.08	.07	.15	.12
353	.05	.05	.07	.06	.04	.01	.10	.25
354	.25	.00	.04	.02	.02	.04	.05	.00

Ind.	TMP	MP	FOR	HS	S	SS	US	AP
355	.09	.07	.07	.09	.12	.15	.14	.06
356	.13	.21	.13	.14	.07	.07	.10	.13
361	.07	.06	.05	.09	.03	.03	.04	.09
362	.10	.07	.07	.07	.04	.07	.05	.23
369	.17	.08	.08	.12	.07	.06	.05	.04
371	.15	.14	.10	.14	.10	.10	.13	.08
372	.09	.08	.11	.10	.15	.14	.15	.14
381	.15	.15	.06	.06	.09	.06	.07	.04
382	.07	.05	.08	.10	.07	.09	.06	.10
383	.05	.06	.06	.02	.04	.05	.08	.23
384	.07	.14	.07	.10	.11	.12	.21	.10
385	.09	.18	.11	.08	.10	.10	.15	.26
390	.08	.38	.26	.31	.11	.12	.09	.04
1985								
311	.11	.21	.14	.14	.10	.08	.08	.07
312	.41	.39	.25	.31	.27	.10	.12	.26
313	.21	.15	.15	.09	.12	.14	.12	.22
314	.00	.01	.01	.01	.02	.02	.03	.03
321	.09	.06	.03	.13	.01	.02	.02	.04
322	.02	.11	.09	.08	.09	.12	.13	.05
323	.05	.15	.05	.08	.10	.03	.03	.06
324	.17	.09	.08	.11	.03	.02	.05	.03
331	.17	.09	.11	.19	.05	.06	.05	.04
332	.20	.06	.14	.22	.09	.05	.07	.06
341	.08	.13	.06	.08	.08	.14	.10	.22
342	.17	.13	.13	.13	.10	.10	.09	.10
351	.08	.07	.02	.04	.04	.04	.08	.07
352	.10	.04	.12	.05	.09	.07	.13	.10
353	.12	.10	.15	.14	.02	.08	.01	.00
354	.03	.00	.05	.03	.03	.00	.05	.13
355	.14	.09	.12	.09	.15	.16	.08	.06
356	.21	.26	.18	.08	.08	.08	.09	.17
361	.05	.18	.02	.08	.04	.06	.05	.10
362	.09	.10	.06	.03	.04	.06	.06	.11
369	.12	.06	.08	.10	.08	.08	.06	.08
371	.18	.10	.13	.15	.13	.12	.08	.12
372	.13	.19	.13	.15	.15	.15	.22	.09
381	.13	.15	.05	.09	.09	.07	.05	.04
382	.09	.05	.06	.09	.07	.09	.09	.08
383	.03	.02	.05	.04	.04	.06	.07	.27
384	.10	.22	.05	.08	.13	.16	.23	.12
385	.10	.08	.06	.04	.10	.08	.16	.18
390	.14	.33	.27	.28	.17	.10	.15	.08
1986								
311	.12	.08	.12	.14	.08	.05	.09	.09
312	.45	.43	.33	.27	.31	.13	.11	.62
313	.25	.16	.19	.14	.12	.10	.06	.15
314	.00	.01	.00	.00	.01	.01	.00	.04
321	.17	.08	.03	.11	.02	.01	.02	.02
322	.08	.07	.09	.05	.08	.11	.12	.03
323	.09	.12	.06	.08	.07	.03	.02	.05

Ind.	TMP	MP	FOR	HS	S	SS	US	AP
324	.08	.01	.09	.07	.03	.04	.05	.04
331	.09	.16	.05	.13	.05	.04	.04	.04
332	.12	.07	.12	.14	.07	.03	.05	.03
341	.07	.16	.08	.08	.08	.14	.06	.19
342	.20	.15	.14	.13	.13	.09	.10	.08
351	.07	.10	.02	.02	.04	.06	.19	.16
352	.08	.09	.11	.06	.09	.09	.09	.10
353	.02	.07	.09	.08	.07	.04	.02	.00
354	.00	.00	.04	.03	.05	.00	.10	.51
355	.13	.11	.13	.20	.12	.14	.13	.13
356	.27	.19	.13	.09	.13	.15	.12	.18
361	.12	.07	.02	.13	.02	.06	.06	.09
362	.18	.09	.07	.07	.05	.07	.06	.12
369	.18	.09	.10	.13	.09	.08	.09	.06
371	.20	.11	.12	.12	.12	.14	.11	.04
372	.20	.00	.31	.16	.22	.22	.23	.11
381	.13	.13	.08	.07	.09	.07	.05	.05
382	.08	.08	.04	.13	.07	.07	.07	.09
383	.07	.05	.05	.07	.05	.06	.10	.16
384	.14	.10	.04	.09	.12	.15	.20	.03
385	.16	.13	.11	.06	.14	.07	.17	.11
390	.09	.26	.26	.29	.19	.06	.11	.07
1987								
311	.14	.14	.12	.17	.09	.08	.08	.04
312	.53	.43	.35	.30	.31	.12	.21	.50
313	.20	.14	.07	.18	.09	.06	.03	.17
314	.00	.05	.02	.01	.02	.01	.01	.00
321	.09	.06	.04	.14	.02	.02	.03	.02
322	.08	.06	.10	.03	.07	.11	.13	.06
323	.15	.09	.06	.07	.06	.04	.03	.07
324	.11	.01	.05	.12	.03	.03	.05	.02
331	.12	.16	.08	.08	.05	.06	.05	.03
332	.07	.05	.11	.11	.07	.03	.03	.03
341	.09	.14	.08	.08	.08	.13	.05	.25
342	.21	.17	.14	.13	.14	.08	.08	.08
351	.05	.06	.04	.03	.05	.08	.13	.16
352	.08	.06	.11	.04	.09	.07	.09	.15
353	.06	.11	.11	.09	.07	.04	.02	.36
354	.06	.00	.08	.03	.07	.00	.02	.15
355	.15	.03	.13	.04	.13	.18	.17	.05
356	.27	.13	.15	.09	.09	.10	.08	.12
361	.14	.10	.08	.01	.06	.06	.07	.08
362	.14	.11	.08	.06	.05	.09	.06	.05
369	.16	.08	.11	.15	.11	.09	.06	.04
371	.14	.12	.14	.15	.14	.16	.06	.09
372	.20	.07	.06	.13	.08	.06	.08	.05
381	.25	.18	.09	.11	.10	.10	.06	.05
382	.12	.07	.05	.13	.07	.07	.07	.07
383	.07	.07	.04	.04	.06	.08	.09	.13
384	.12	.06	.06	.09	.14	.16	.17	.19
385	.11	.21	.09	.11	.13	.08	.17	.12
390	.25	.32	.20	.28	.16	.08	.09	.04

Ind.	TMP	MP	FOR	HS	S	SS	US	AP
1988								
311	.12	.11	.13	.12	.10	.06	.10	.07
312	.48	.29	.25	.29	.30	.09	.10	.31
313	.23	.14	.12	.25	.09	.09	.09	.12
314	.00	.03	.01	.04	.00	.05	.00	.00
321	.06	.07	.04	.16	.02	.02	.03	.02
322	.11	.12	.10	.08	.08	.10	.10	.04
323	.16	.14	.04	.07	.08	.06	.04	.08
324	.18	.09	.09	.15	.03	.03	.05	.01
331	.05	.19	.07	.09	.06	.08	.08	.05
332	.16	.11	.11	.15	.08	.04	.03	.05
341	.07	.19	.09	.03	.11	.14	.11	.22
342	.31	.09	.28	.13	.10	.09	.09	.07
351	.04	.02	.05	.07	.08	.17	.25	.15
352	.05	.07	.17	.06	.11	.11	.16	.18
353	.07	.08	.08	.08	.05	.02	.02	.00
354	.00	.00	.10	.01	.03	.00	.17	.31
355	.16	.22	.20	.16	.22	.19	.09	.06
356	.29	.16	.13	.05	.04	.07	.05	.14
361	.09	.17	.09	.15	.06	.03	.01	.07
362	.26	.15	.33	.16	.10	.26	.15	.13
369	.19	.04	.07	.08	.12	.08	.07	.07
371	.15	.08	.10	.07	.09	.10	.04	.08
372	.22	.06	.13	.15	.09	.10	.06	.25
381	.18	.10	.08	.09	.09	.07	.07	.05
382	.12	.08	.07	.12	.09	.10	.08	.11
383	.09	.10	.06	.04	.07	.12	.09	.15
384	.07	.07	.06	.05	.14	.16	.17	.16
385	.16	.37	.07	.11	.11	.08	.12	.13
390	.13	.34	.24	.38	.17	.08	.07	.09
1989								
311	.14	.15	.13	.14	.09	.08	.08	.06
312	.37	.38	.20	.23	.25	.09	.08	.33
313	.27	.26	.10	.28	.11	.08	.07	.17
314	.00	.05	.02	.07	.01	.01	.03	.00
321	.08	.09	.04	.15	.02	.02	.02	.02
322	.08	.13	.07	.07	.07	.10	.09	.03
323	.12	.08	.09	.14	.06	.07	.06	.09
324	.07	.11	.10	.16	.02	.03	.06	.02
331	.08	.24	.12	.11	.08	.08	.07	.03
332	.19	.09	.13	.18	.12	.06	.04	.06
341	.10	.11	.09	.07	.15	.15	.16	.23
342	.19	.15	.15	.18	.11	.09	.07	.10
351	.05	.08	.07	.08	.08	.21	.13	.13
352	.11	.08	.14	.06	.11	.11	.15	.09
353	.04	.03	.08	.04	.01	.03	.03	.63
354	.05	.01	.08	.06	.05	.12	.02	.12
355	.19	.25	.22	.28	.24	.18	.09	.08
356	.27	.18	.11	.08	.06	.09	.03	.14
361	.14	.09	.03	.09	.02	.06	.04	.06
362	.25	.13	.22	.04	.04	.21	.05	.07

Ind.	TMP	MP	FOR	HS	S	SS	US	AP
369	.13	.05	.10	.08	.10	.07	.07	.09
371	.11	.09	.08	.10	.08	.07	.06	.08
372	.17	.08	.15	.14	.11	.07	.15	.20
381	.14	.08	.07	.09	.10	.07	.05	.06
382	.09	.04	.06	.08	.08	.06	.08	.07
383	.08	.03	.04	.05	.06	.10	.12	.13
384	.05	.05	.09	.12	.12	.13	.12	.05
385	.18	.13	.07	.11	.15	.29	.08	.07
390	.32	.30	.25	.30	.17	.08	.10	.07

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

TABLE A6

Wage inequality within regions, 1983-1989

	NL	NI	CL	CI	LVT	Alt	Alg
1983	.0136	.0177	.0162	.0106	.0156	.0179	.0191
1984	.0127	.0125	.0133	.0111	.0179	.0146	.0175
1985	.0119	.0154	.0124	.0135	.0143	.0152	.0185
1986	.0126	0.194	.0125	.0122	.0158	.0134	.0151
1987	.0126	.0122	.0121	,0126	.0162	.0156	.0159
1988	.0140	.0129	.0156	.0121	.0161	.0204	.0185
1989	.0140	.0129	.0138	.0130	.0260	.0195	.0186

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

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