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EARNINGS
IN EUROPE.
A COMPARATIVE
STUDY ON WAGE
AND INCOME
DISPARITIES
IN THE
EUROPEAN
UNION

Jutta Moisala



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A Comparative Study
on Wage and Income
Disparities in the
European Union*

Jutta Moisala**

* This report has been financed by AKAVA ry. I grateful to Petri Böckerman, Reija Lilja and Roope Uusitalo for helpful comments and suggestions.

** Labour Institute for Economic Research, Pitkäsillanranta 3 A, FIN-00530 Helsinki.
Fax: +358-9-2535 7332. Tel.: +358-9-2535 7330.
E-mail: jutta.moisala@labour.fi

ISBN 952-5071-96-0
ISSN 1795-1801

ABSTRACT

This paper explores wage and income disparities in 14 EU member states during 1994–2001 by using the ECHP data. The results reveal that there are noticeable differences in wages across EU countries measured at both gross and net level. There is no evidence for wage convergence across countries over the period, which indicates that if convergence does exist, the process is rather slow. There are remarkable differences in the income levels across 14 EU member states. Within countries, however, income disparities seem to have declined in most cases. By using household-level data it is also possible to estimate a Gini coefficient at the level of the European Union. This enables us to compare income disparities between the United States and the EU. Based on the results, income disparities across households in the European Union are substantially smaller than those in the US.

TIIVISTELMÄ

Raportissa tarkastellaan palkka- ja tuloeroja 14 EU-maassa vuosina 1994–2001 ECHP-aineiston valossa. Tulosten mukaan ‘vanhojen’ EU-maiden välillä on huomattavia palkkaeroja sekä brutto- että nettopalkkoissa mitattuna. Palkkaerot eivät tarkasteluajankohtana ole tulosten mukaan pienentyneet, mikä viittaa siihen, että mahdollinen palkkojen konvergenssi on hidasta. Myös tuloeroissa on merkittäviä eroja maiden välillä. Sen sijaan erot kotitalouksien käytettävissä olevissa tuloissa maiden sisäisillä ovat tulosten mukaan pienentyneet useimmissa maissa tarkasteluajanjaksolla. Aineiston perusteella on myös estimoitu gini-kerroin Euroopan unionin tasolla. Tämä mahdollistaa tuloerojen vertailun EU:n sekä Yhdysvaltain välillä. Tulosten mukaan kotitalouksien tuloerot Euroopan unionin sisällä ovat selvästi Yhdysvaltoja pienemmät.

1. INTRODUCTION

The growing interest towards national and cross-national differences in earnings and income inequality has produced a wide range of comparative studies on this topic during past couple of decades. A starting-point for these studies was the experience of increasing inequality of wages in the United States during the 1980s. In the case of the US these changes in the earnings distribution were translated into greater inequality in the distribution of household disposable income. As a consequence of deepening of economic integration, the comparison of the level and dispersion of wages and income across

countries within the European Union is a matter of great importance. Free movement of labour in the context of a single market and the adoption of common currency in a number of EU member states emphasises the importance of this topic for ordinary citizens.

Regardless of the increasing interest towards cross-country comparisons, it has been difficult to obtain truly comparable databases of earnings and income. It is extremely important, however, to pay attention to these questions, as discussed extensively in the paper by Atkinson and Brandolini (2001), among others. Luxembourg Income Study (LIS) project was a great achievement in this respect, providing a consistent database for a large number of countries. This was the data that for example Gottschalk and Smeeding (1997) used in their well-known study of earnings and income inequality in selected OECD countries. Since the LIS, also the European Union has started its own project with the aim of creating a longitudinal database that is comparable across the EU member states. As a result, the Statistical Office of the European Communities (Eurostat) has published a database called the European Community Household Panel (ECHP). Because of the uniformity of the definitions and the framing of the questions in the questionnaire used in data collection process, this database is a reliable source for the purpose of cross-country comparison of wages and incomes.

The aim of this paper is to characterise the level and dispersion of wages and income in 14 EU countries. Thus, the paper documents the basic facts on this issue, but it does not try to provide explanations for the patterns observed. By using the ECHP data we seek to discover cross-country patterns which should be as comparable as possible. An important limitation in the paper is that it looks at wages and income solely from the perspective of employees. This means that the paper considers wages and salaries paid to employees, but not total labour costs faced by firms that include, for instance, social security contributions paid by employers. Based on the ECHP, this is the only viable option at the same time, since no information on total labour costs is available in the data. The rest of the paper is organised as follows. Section 2 describes the data and some of the problems related to it. Section 3 describes the evolution of average wages and income while the section 4 concentrates on the changes in inequality in European Union countries. The last section concludes.

2. DATA

Eurostat launched a new project in 1992 in which the idea was to provide a cross-country comparable database of e.g. income, health, education, and housing situation at the level of the European Union. The result was the European Community Household Panel (ECHP), which has now reached its 8th and final wave covering the years 1994–2001. In this study we use the ECHP UDB data (ECHP User DataBase), which was released in December 2003¹.

The objective of the ECHP is to provide information on the population of the EU at the level of households and individuals. The aim has been to collect data by using the same questionnaire in all 15 EU member states and create a data set, which is both cross-sectionally and longitudinally representative. The ECHP is a panel dataset. This means that the same individuals (sample persons) have been interviewed, if possible, through the whole data collection period. Besides the sample persons, all new family members have been interviewed in the case that there is at least one original sample person in the family. For this reason, there are some changes in the population of various waves of ECHP.

The first wave, conducted in 1994, included all ‘old’ member states of the European Union except Austria, Finland, and Sweden, which joined the panel in 1995, 1996, and 1997, respectively. In Belgium and the Netherlands, the ECHP was linked to already existing national panels from the beginning. In Germany, Luxembourg, and the UK, instead, the ECHP was replaced by national panels from 1997 onwards². In addition, the Swedish data is based on a national cross-section data. The ECHP data is collected by national statistic institutes or by other public or private organisations in each country. The duty of Eurostat is to provide centralised support and coordinate the project.

2.1. Comparability and Data Quality

Although the ECHP is at the moment one of the best available databases for international income comparisons it is not without problems. The most important of these issues will be discussed here briefly. A more detailed analysis can be found for example in a paper by Peracchi (2002).

¹ European Commission, Eurostat, European Community Household Panel (ECHP) waves 1–8, version of December 2003 User Database (UDB), Contract No. ECHP/2003/16. Eurostat has no responsibility for the results and conclusions which have been presented in this paper.

² The national panels used in the ECHP are: PSBH (Panel Study on Belgian Households), ISEP (Dutch Socio-Economic Panel), GSOEP (German Social Economic Panel), PSELL (Luxembourg’s Social

Nonresponse and attrition are problems, which concern practically all panel surveys, including the ECHP. These two factors do not just make the sample size smaller but also might affect the representativity of the sample if attrition or nonresponse are not random. To avoid this problem, Eurostat has provided sample weights for both households and individuals. Other issues, which might affect the quality of the data, are imputation of income and replacement of the ECHP with national panels in some EU countries. To get a clear picture, how all these factors affect the quality of the ECHP data is, unfortunately, quite difficult.

There are pieces of evidence that the data collection procedure might affect the level and dispersion of household income. Based on comparisons between the Finnish ECHP data and administrative registers, Nordberg, Penttilä, and Sandstöm (2001) find out, that interviews tend to yield lower estimates of mean wages and household income. The difference is especially high at the upper end of the income distribution. According to the results of Nordberg *et al.*, survey data will also tend to indicate higher inequality (measured by the square coefficient of variation and the Gini coefficient) than register data. Because of this, it is rather problematic to compare results of income and inequality based on survey data with the ones based on registers.

The level and the quality of free or subsidised public services and other non-cash benefits is another aspect, which should be kept in mind when interpreting the results of income surveys. Within the European Union there are notable differences in this regard. In the so-called Nordic Model, the state or municipalities provide a wide range of goods and services, while in the Southern European countries, the state's influence is much smaller. Although there has been weakening in both Nordic and Southern European models, noticeable differences still remain.

Other aspects, which one should pay attention to, are cross-country differences in the price level as well as in the financing of social security system. When exploring the development of wages and income over time, also changes in the exchange rates have to be taken into account. In order to deal with problems of the price level and the exchange rates, we have measured both wages and income by using Purchasing Power Parities (PPPs), that is to say, all income measures have been converted to a artificial common currency (Purchasing Power Standards) by taking differences in the price levels across countries into account. Although this procedure is not without problems (see for example Smeeding & Rainwater 2002), it improves the cross country comparability in a certain year. To the issue on the financial differences of the social security system, we will return later in this paper.

Economic Panel), ULF (Swedish Survey of Living Conditions), and BHPS (British Household Panel Survey).

3. WAGE AND INCOME CHANGES

We shall first take an overview look at the evolution of average hourly wages and monthly household disposable income in 13 EU countries. In order to estimate hourly wages, we have used the information of both monthly wages and the average working hours per week. Monthly wages as well as information on the hours worked are based on the interviewees' own assessment. The same applies to monthly household disposable income. As already mentioned, both wages and disposable income have been converted into a common currency in order to make the amounts comparable across countries. To delimit the influence of abnormal observations (i.e. outliers) in each country, we have abandoned 0.5 percent of observations at the upper and the lower tail of the income distribution in each country. The weights we have used here are the so-called base weights. Although the use of base weights excludes all non-sample persons from the estimation, we strongly believe that it should be the most appropriate weight for reliable cross-country comparisons. This is due to the fact that base weights are constructed for each individual by taking into account his or her characteristics (Construction of weights in the ECHP 2003).

3.1. Changes in the wage level

Gross wages

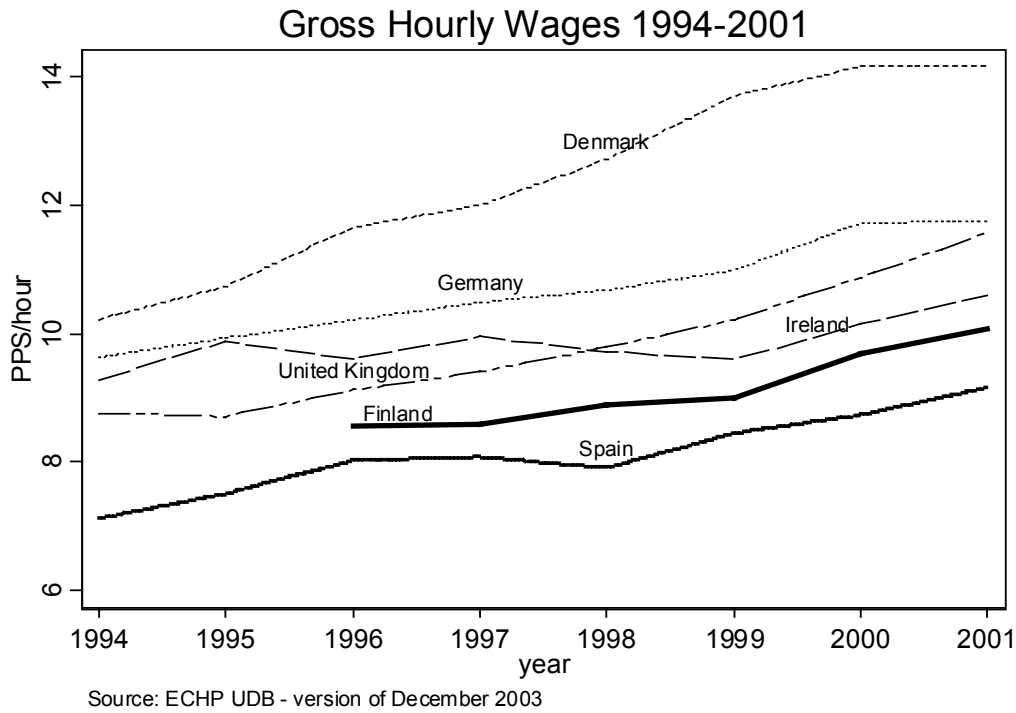
Figures 1 and 2 show the average hourly gross wages in 13 EU countries between 1994 and 2001. Unfortunately Luxembourg and Sweden are missing, because there was no data available for these countries. In the last column we have presented the change in average real wages during the observation period measured in national currency³. Wage changes in Austria and Finland are not quite comparable with the other countries because of a shorter observation period. The wages have increased the most in Ireland, Greece, and Portugal. From 1994 to 2001 the average real wage level in these countries has shot up more than 15 percent. In contrast, the real wage changes in the Netherlands, France, and Austria have been very close to zero.

Beside the wage development within countries, it is also interesting to compare the wage level differences between EU-countries. As an example, we shall take a closer look at the year 2001. In Figures 1 and 2 the most fundamental basic fact is that there are substantial differences in the average wage rates, even when the disparities in the price level have been

³ In order to convert nominal wages into real wages we have used consumer price indexes. Sources: OECD 1997, OECD 2000 and OECD 2002.

taken into account. The wage level seems to be the lowest in the Southern European countries. Compared to Portugal, the average wage level for example in Denmark, Belgium, and the Netherlands is more than twice as high.

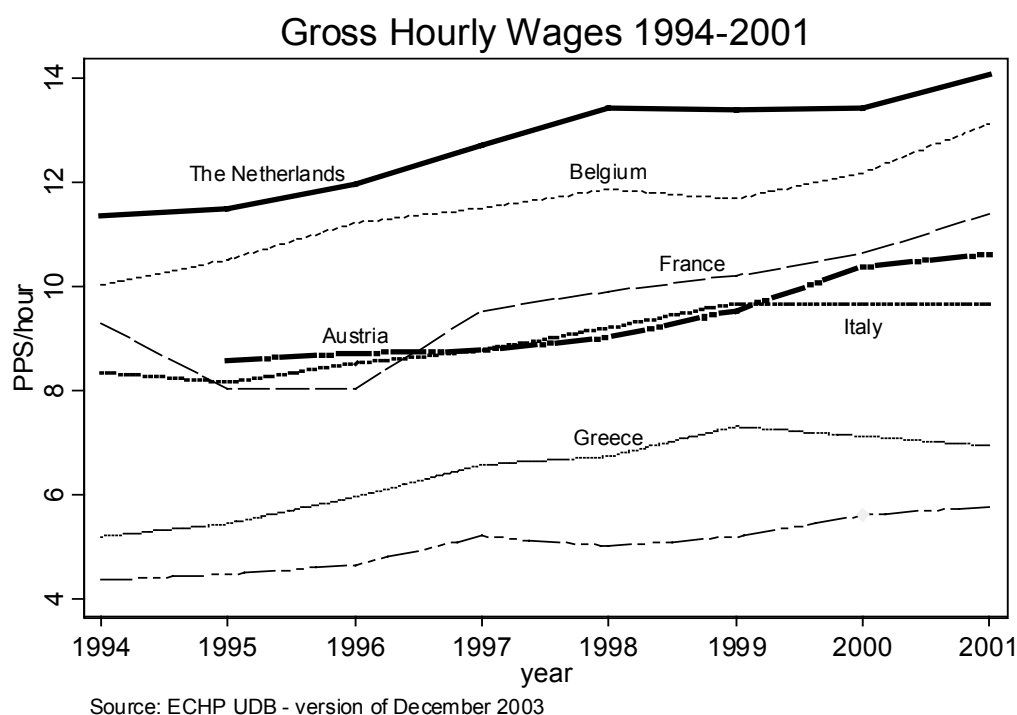
Figure 1.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994–2001 ⁴
Denmark	10.22	10.73	11.66	12.00	12.71	13.70	14.16	14.16	13 %
Finland	-	-	8.56	8.59	8.89	8.98	9.69	10.08	7 %
Germany	9.63	9.93	10.21	10.49	10.68	10.98	11.72	11.75	1 %
Ireland	9.28	9.87	9.61	9.95	9.72	9.59	10.15	10.60	17 %
Spain	7.12	7.50	8.02	8.08	7.90	8.45	8.73	9.16	7 %
UK	8.76	8.71	9.12	9.40	9.79	10.21	10.87	11.58	13 %

⁴ In the case of Finland the period of change is 1996–2001.

Figure 2.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ⁵
Austria	-	8.58	8.71	8.77	9.01	9.54	10.37	10.62	0 %
Belgium	10.02	10.51	11.21	11.50	11.86	11.68	12.18	13.12	11 %
France	9.27	8.03	8.03	9.53	9.90	10.20	10.62	11.39	0 %
Greece	5.19	5.45	5.95	6.57	6.73	7.31	7.12	6.93	16 %
Italy	8.35	8.15	8.52	8.77	9.20	9.68	9.67	9.65	2 %
The Netherlands	11.33	11.49	11.94	12.70	13.41	13.40	13.43	14.05	0 %
Portugal	4.36	4.46	4.66	5.20	5.01	5.19	5.60	5.77	16 %

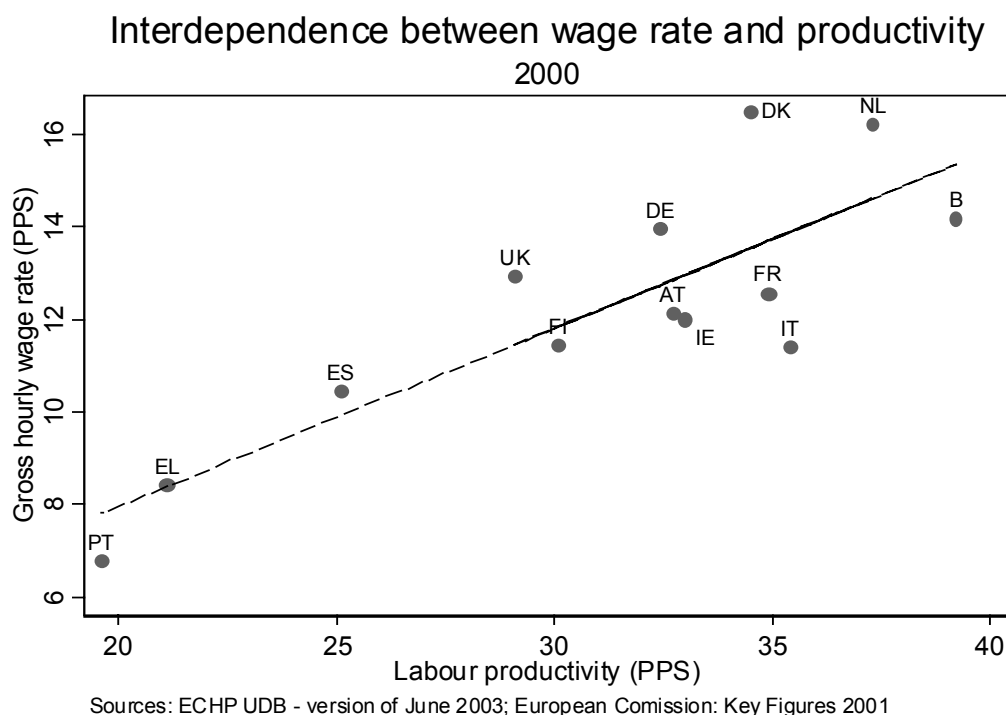
However, one must keep in mind, that we are treating employees as a homogenous group here. In other words, we have not paid any attention to the underlying differences in the educational attainment level nor the differences in the level of average labour productivity between countries. In order to see, how closely related the average wage rate and the overall labour productivity are, we have plotted these two variables on Figure 3 together with a regression line. Labour productivity is measured as GDP per hours worked. Indeed, there is a strong positive correlation between the wage rate and labour productivity across countries. In other words, labour productivity is able to explain a large part of the prevailing wage disparities between the ‘old’ EU countries. When exploring the results country by country we can see, that the average wage rate at least in Greece, Spain, Finland, and Austria is

⁵ In the case of Austria the period of change is 1995-2001.

rather close to the level that one would expect based on the correlation from the ‘old’ European Union.

In section 2 we already hinted that there are relevant cross-country differences in the financing of the social security system. These differences can be seen, at least to some extent, in Figure 3. In countries, where employers’ contributions to social security schemes are high, gross wages can be presumed to be low. If, on the other hand, most of the tax burden falls to employees, the gross wage rate can be expected to be higher. For example, in Denmark, gross wages are quite high compared to the level of labour productivity because of the low level of employers’ social security contributions. In other words, the amount of social security contributions paid by Danish employees is relatively high. This means that the total labour expenses faced by firms and net wages earned by employees in Denmark are much closer to the EU average than suggested by the comparison of gross wages alone. Other countries with relatively low level of social security contributions paid by employers are the United Kingdom, Ireland, and the Netherlands (social security contributions paid by employers are less than 15% of the total labour costs in these countries). On the other hand, in France the employers’ social security contributions were more than 25 percent of the total labour costs in the year 2000, while the employees’ share of the social security contributions was relatively low. (Taxing wages 2000–2001.)

Figure 3.⁶



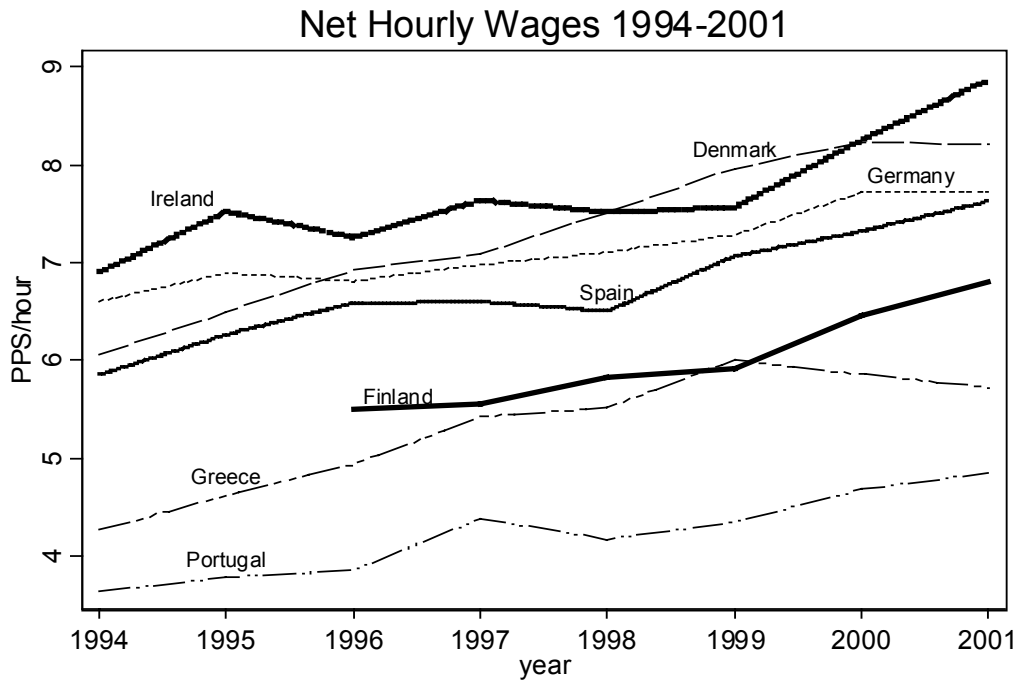
Net wages

Gross hourly wages, even when converted into the same currency are, as we all well know, just numbers on a piece of paper. In the end of the day, what really matters for employees, is the purchasing power of the net wage⁷. In order to see, how income taxation affects the picture of the average wage rates, we have calculated the average net hourly wages adjusted with a purchasing power parity for years 1994–2001. The results are shown in Figures 4 and 5.

⁶ List of abbreviations: AT = Austria, B = Belgium, DE = Germany, DK = Denmark, EL = Greece, ES = Spain, FI = Finland, FR = France, IE = Ireland, IT = Italy, NL = The Netherlands, PT = Portugal, UK = The United Kingdom.

⁷ Of course, one major simplification has been made here: no attention to the services provided by the public sector has been paid. These services are mostly financed via taxation from which follows, that countries with a wide range of high quality public services available also have a higher overall tax rate. As a consequence, in countries with higher taxation, citizens' *de facto* purchasing power is higher than what would be expected based on the pure wage level, because of free/subsidised children's day-care, schooling, health care etc.

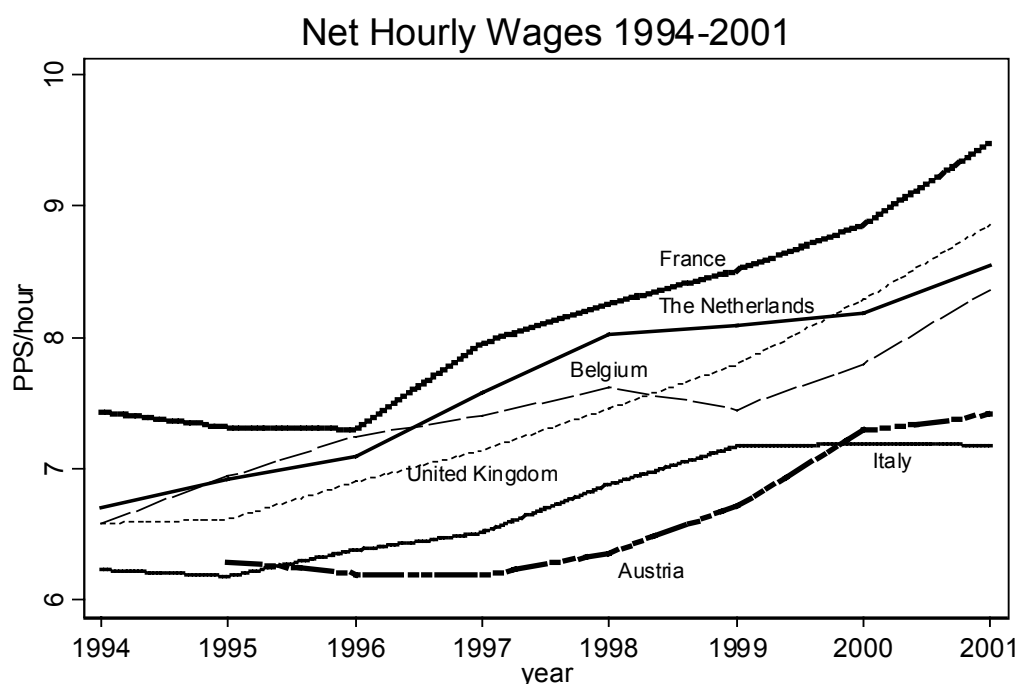
Figure 4.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ⁸
Denmark	6.05	6.50	6.93	7.09	7.51	7.96	8.24	8.21	11 %
Germany	6.60	6.89	6.81	6.98	7.11	7.28	7.71	7.73	-3 %
Ireland	6.90	7.52	7.26	7.63	7.52	7.56	8.25	8.87	32 %
Spain	5.85	6.26	6.59	6.60	6.51	7.06	7.32	7.63	9 %
Finland	-	-	5.50	5.56	5.82	5.91	6.45	6.80	11 %
Greece	4.27	4.62	4.93	5.42	5.52	6.00	5.86	5.73	17 %
Portugal	3.64	3.78	3.85	4.38	4.17	4.35	4.68	4.85	16 %

⁸ In the case of Finland the period of change is 1996-2001.

Figure 5.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ⁹
France	7.43	7.31	7.30	7.95	8.26	8.51	8.86	9.49	4 %
The Netherlands	6.70	6.91	7.10	7.57	8.02	8.09	8.18	8.55	3 %
Belgium	6.57	6.94	7.24	7.40	7.61	7.45	7.80	8.36	7 %
UK	6.58	6.61	6.90	7.14	7.45	7.79	8.29	8.86	15 %
Italy	6.23	6.18	6.38	6.51	6.88	7.17	7.18	7.18	2 %
Austria	-	6.29	6.19	6.18	6.35	6.71	7.29	7.41	- 5 %

The subtraction of income taxes and the employees' social security contributions has the most eminent impact on wages in Denmark, The Netherlands, Belgium, and Germany. Meanwhile the effect in Portugal, Ireland, France, Spain, and Greece is much more modest. These results reflect rather well, just as they should, the differences in the level of income taxation in these countries (see annex 1). Also by using the net measure, real wages have increased in most countries under observation, the average growth rate being 9 percent between 1994 and 2001. This figure is a bit higher compared to the case of real gross wages. Some differences remain between countries though. By definition, the differences in the growth rate of gross and net wages should approximately indicate changes in the income taxation and employees' social security contributions. Broadly speaking, this is holds – if

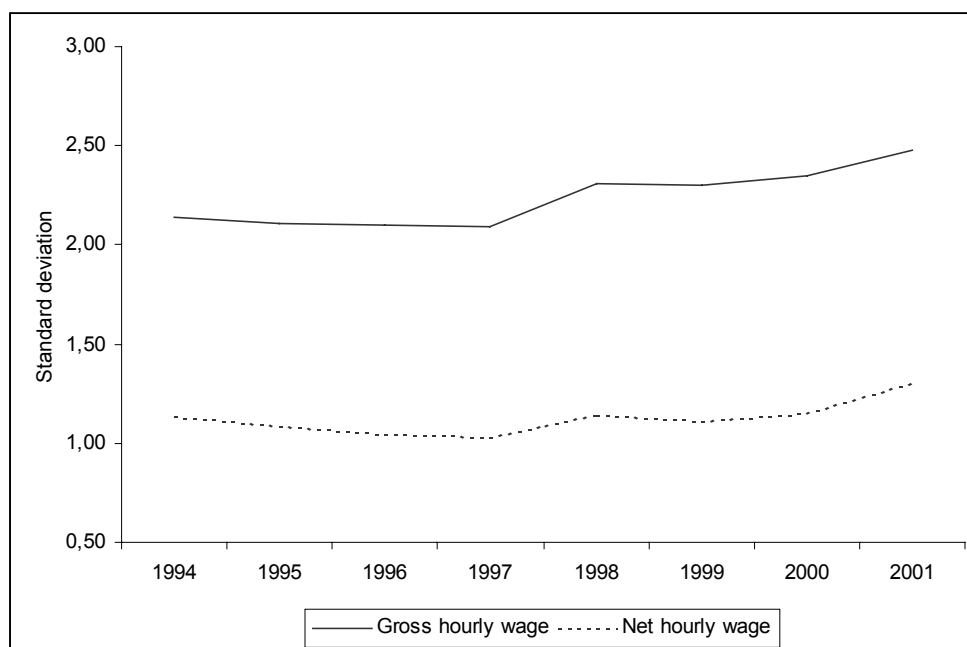
⁹ In the case of Austria the period of change is 1995-2001.

the overall income taxation rate has decreased (e.g. in Ireland, the Netherlands, and Finland; annex 1), so has the wage differential between gross and net wage.

Convergence or divergence?

Although wage disparities evidently remain, an interesting question is, whether there are any signs of wage convergence in the European Union. According to the factor price equalization theorem that is based on the Heckscher-Ohlin Trade Model, free trade equalises prices of individual factors of production between countries. The same outcome may arise from international immigration of the labour force. In order to see, if there has been signs of wage convergence at the end of the 1990s, we have estimated the standard deviation of the average wage levels (with PPP adjustment) in 13 EU member states. Base weights have been used to estimate the average wages just like before, but while estimating the standard deviation no weights have been used. This means that all the countries under observation have the same impact on the standard deviation estimate. The results are presented in Figure 6.

Figure 6. A measure of wage convergence between EU countries.



According to the Figure 6 there does not seem to be any signs of declining dispersion of wages, i.e. σ convergence, within the EU: the standard deviation measured by both gross and net wages has not declined over the period of investigation. We do admit, that our observation period is rather short and that σ convergence is a very simple way to measure

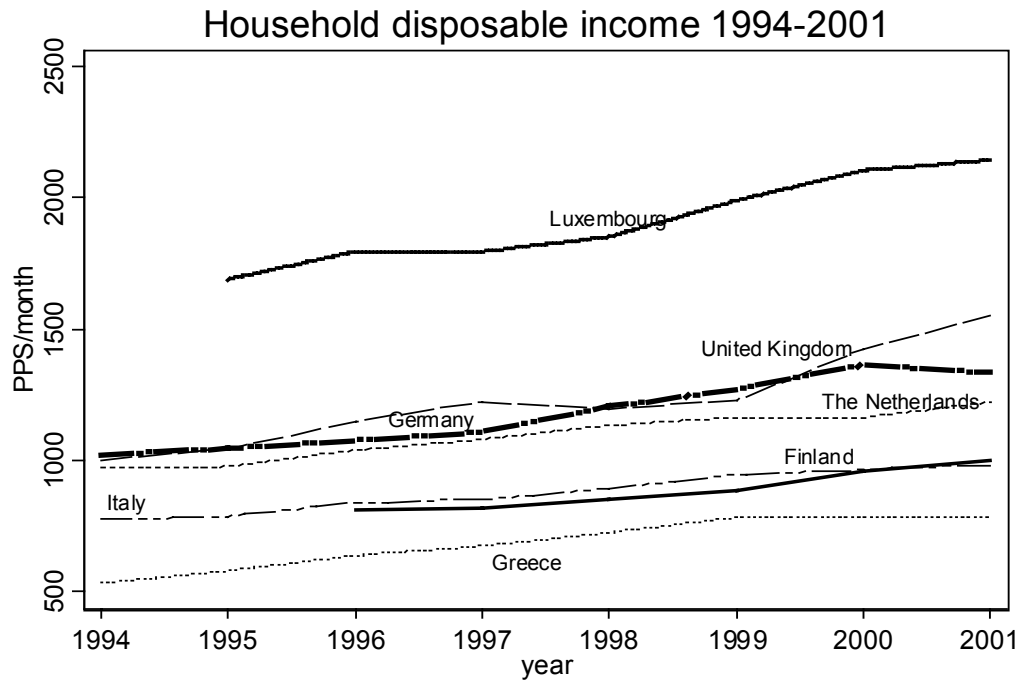
these changes. However, the evidence does suggest that *if* there is wage convergence between the EU countries, the rate of the convergence is relatively slow despite the fact that there has been a substantial deepening of economic integration during the 1990s.

3.2. Changes in the level of income

Beside the gross wage, other sources of income, such as capital income and social security benefits, have an effect on the financial well-being of individuals. To see how the level of these different income sources has developed as a whole, we have described the development of the household disposable income in the years 1994–2001. In difference with the gross wages, also Luxembourg is now under inspection. France, instead, is not included because there is no comparable data available for that country.

Most studies of income and income inequality adjust income to take into account the differences in material needs for families of different sizes. The so-called equivalence scales are designed to accomplish this adjustment by paying attention to the composition and the size of a family. Here we have used the modified OECD scale in order to arrive to the measure of household ‘equivalent’ income. The results are shown in Figures 7 and 8. Also in this case, the amount of income has been expressed in purchasing power standards in order to improve cross-country comparability. Instead the change in the level of household disposable income has been measured in real-term national currency.

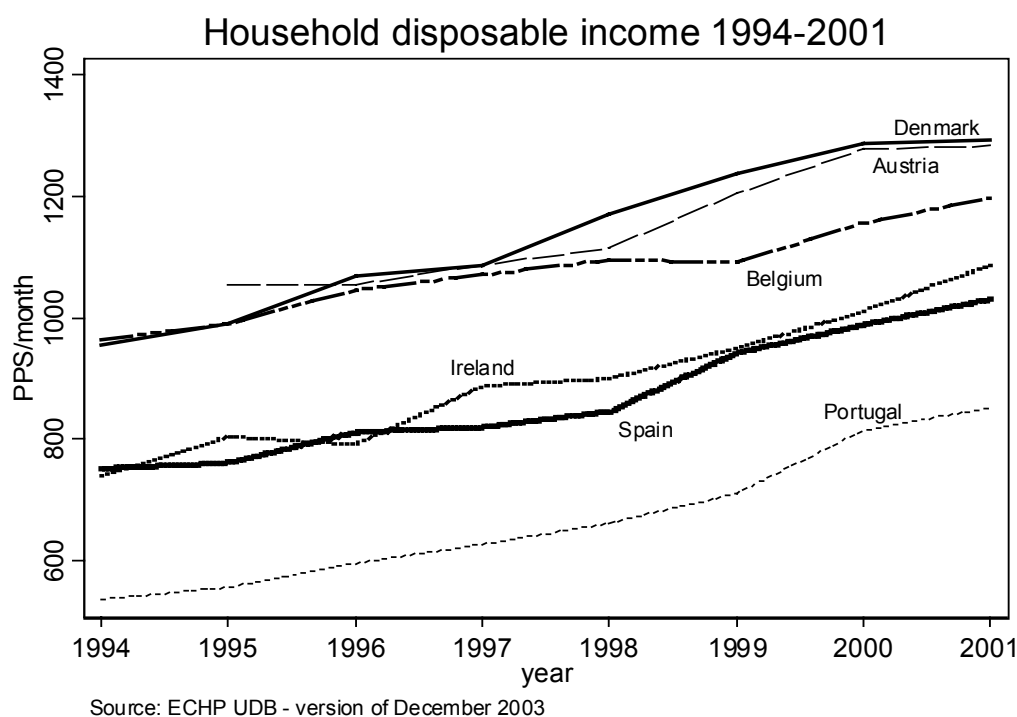
Figure 7.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ¹⁰
Finland	-	-	807	816	851	885	962	998	13 %
Germany	1020	1045	1076	1106	1205	1269	1362	1334	7 %
Greece	529	578	636	672	724	781	780	784	31 %
Italy	772	786	836	850	891	945	964	981	11 %
LU	-	1690	1796	1797	1852	1990	2105	2145	14 %
The Netherlands	968	975	1038	1079	1133	1163	1162	1221	2 %
UK	999	1042	1146	1223	1195	1227	1423	1552	36 %

¹⁰ In the case of Finland the period of change is 1996-2001 and in the case of Luxembourg 1995-2001.

Figure 8.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ¹¹
Austria	-	1054	1054	1087	1115	1205	1277	1283	-2 %
Belgium	964	989	1046	1070	1095	1091	1156	1198	3 %
Denmark	956	991	1069	1086	1170	1237	1287	1292	10 %
Ireland	738	803	791	887	900	949	1011	1087	51 %
Portugal	535	555	595	626	661	710	814	852	41 %
Spain	751	761	811	819	845	941	988	1030	12 %

On the average, the household disposable income has risen around 18 percent in 10 EU countries between 1994 and 2001. The increase has been most remarkable in Ireland, Portugal, Greece, and the UK. On the other hand, in Belgium and the Netherlands the upward trend has been much more restrained. Once again there is no data available for Austria, Finland, and Luxembourg from the beginning of the observation period. In Luxembourg and Finland the development of the household disposable income in real terms has been quite close to the EU median (11 %) while the development in Austria has lagged far behind.

According to the ECHP, the average level of household disposable income in 2001 was at its highest level in Luxembourg by a wide margin. The second place on this ranking list

¹¹ In the case of Austria the period of change is 1996-2001.

definitely belongs to the United Kingdom. The level of household disposable income is lowest, once again, in Southern European countries namely in Portugal, Greece, and Italy.

4. CHANGES IN WAGE AND INCOME INEQUALITY

Beside the average level of wages and income it is interesting to see, what has happened to the wage and income dispersion in the EU countries. As a measure of income inequality we have used the Gini coefficient¹², which has been estimated for each individual country. In addition to this, the ECHP data gives a unique opportunity to estimate a ‘EU Gini coefficient’ based on the population of the European Union (excluding Luxembourg in the case of gross wage, France in the case of household disposable income, and Sweden in both of these situations). This is done below. In the estimation of the Gini coefficient for the EU, we have taken into account the population size differences between countries, which means that e.g. Germany has a more eminent influence on the coefficient than Luxembourg.

4.1. Changes in wage dispersion

We have first estimated the Gini coefficient based on the gross hourly wages. Figures 9–10 and tables below them report the results. As can be seen, the Gini coefficient at the EU level has remained steady during 1994 and 2001. These changes have been only modest also in most individual countries apart from Austria, Ireland, and the Netherlands, where changes have been rather large. According to the ECHP data, wage distribution has become more equal in most countries under consideration. In five out of 13 member states the inequality has increased, especially so in the Netherlands. There is, however, a possibility that the year 2001 value of the Gini in the Netherlands is some kind of an outlier, since the change compared to the previous years is quite remarkable.

According to our results for the year 2001, the Gini coefficient varied from 0.196 in Denmark to 0.345 in Portugal. Other countries, where the wage dispersion seems to be low from the European perspective are Belgium and Finland. Besides Portugal, wage differences measured by the Gini coefficient were also large in Spain, where the value of the coefficient was close to 0.30 in 2001.

¹² The Gini coefficient is a way to capture the dispersion of income with a single number. The Gini coefficient is always between zero and one, where zero means perfect equality (everyone has the same income) and one means perfect inequality (one person has all income and the rest of persons earn nothing).

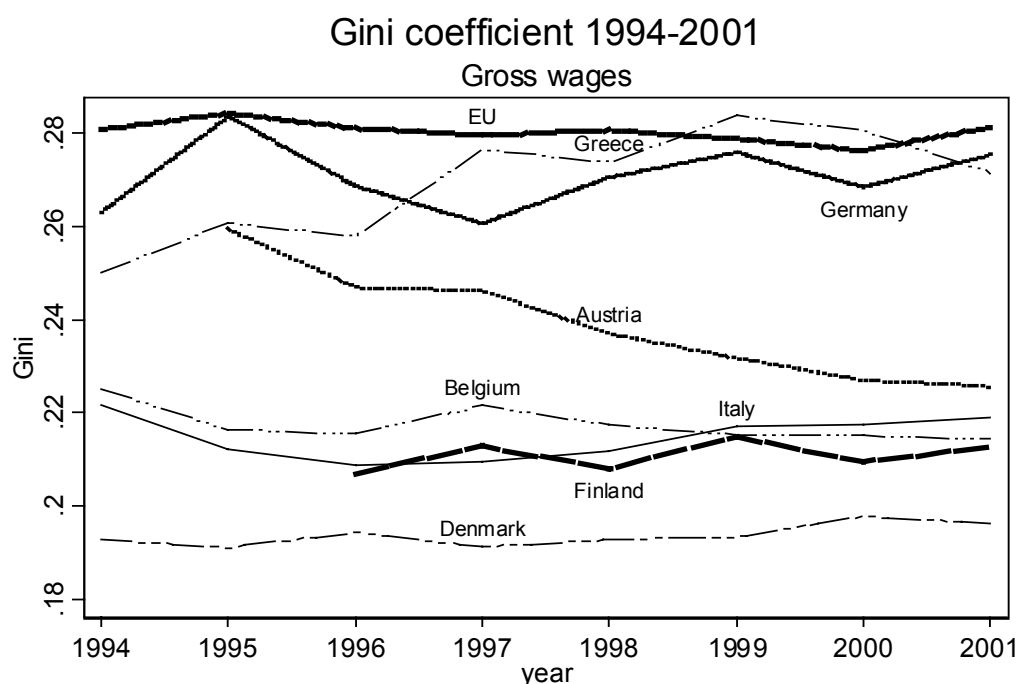
In order to see, if the changes in the wage inequality have been statistically significant, we have estimated the 95 percent confidence intervals for the Gini coefficient measured from gross wages¹³. The procedure used here is so-called bootstrap method, which is an alternative method for assessing sample variability. The estimates achieved by the bootstrapping method are shown in brackets below the observed Gini coefficients. In order to get consistent bootstrap estimates, 2000 replications have been made each time. In addition, sample design has been taken into account, when possible, by using the information about the primary sampling unit in each country¹⁴.

Although the way confidence intervals has been produced here is rather far from perfect (mostly due to data imperfections), it gives at least a good idea, how significant the changes in wage dispersion have been (by change, in this case, we mean the difference between the beginning and the end of the sampling period, i.e. in most cases the years 1994 and 2001). As shown in the tables below Figures 9 and 10, there is no overlap between the 95 % confidence intervals in the case of Austria, France, Ireland, and the Netherlands. In other words, in these countries the change in the wage inequality has been statistically significant. In Austria, France, and Ireland the wage inequality has decreased while the opposite has happened in the Netherlands.

¹³ The given confidence interval is the so-called bias-corrected confidence interval. Because of the fairly large number of replications this does not differ much from the normal- and percentile confidence intervals.

¹⁴ For Denmark and Luxembourg the primary sampling unit is not a matter of concern, because simple random sampling has been used. In other countries this is not the case. Unfortunately information about the primary sampling unit (PSU) is not complete in the ECHP. For Austria, Finland, France, Germany, and the Netherlands stratified sampling has been used but no information about the primary sampling unit has been given. This might cause some bias to the results since observations within one PSU are not likely to be independent.

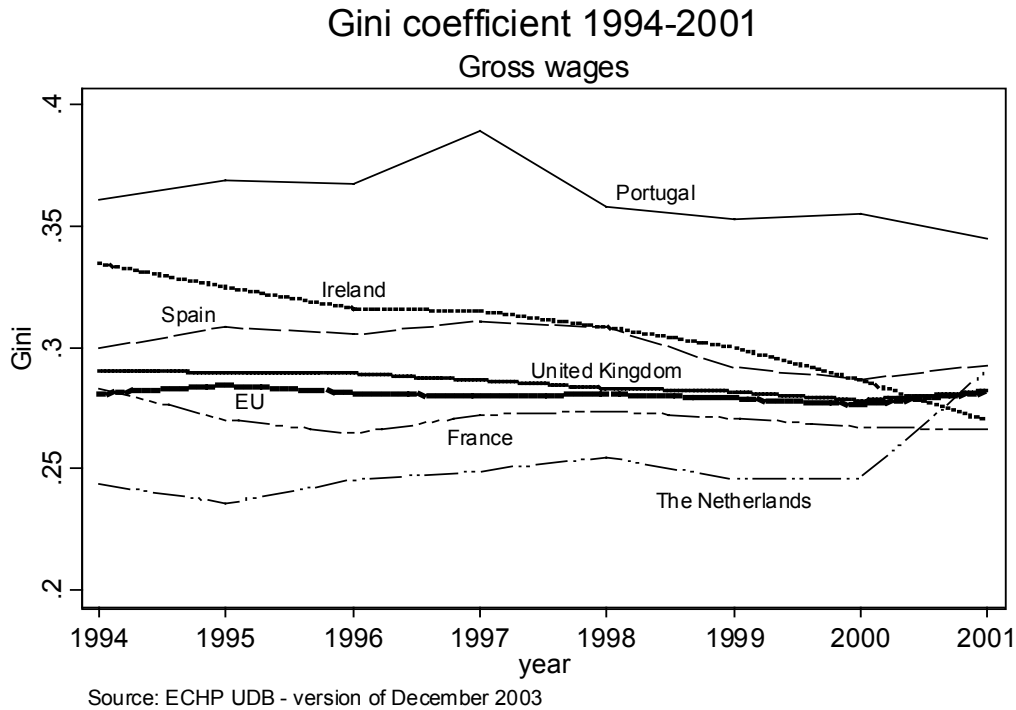
Figure 9.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ¹⁵
Austria	-	.260	.247	.246	.237	.232	.227	.226	-13.1 %
		[.251;.267]	[.239;.255]	[.239;.255]	[.229;.245]	[.224;.240]	[.219;.236]	[.217;.235]	
Belgium	.225	.216	.216	.222	.217	.215	.215	.214	-4.8%
	[.216;.241]	[.207;.226]	[.203;.225]	[.211;.233]	[.206;.231]	[.204;.228]	[.204;.228]	[.204;.228]	
Denmark	.193	.191	.194	.191	.193	.193	.198	.196	1.6 %
	[.187;.199]	[.185;.197]	[.187;.201]	[.184;.199]	[.184;.202]	[.184;.203]	[.189;.208]	[.186;.209]	
Finland	-	-	.207	.213	.208	.215	.209	.213	2.9 %
			[.201;.214]	[.206;.219]	[.202;.214]	[.208;.223]	[.202;.218]	[.205;.221]	
Germany	.263	.284	.269	.261	.271	.276	.268	.275	4.6 %
	[.254;.272]	[.274;.294]	[.260;.277]	[.254;.268]	[.263;.279]	[.268;.284]	[.260;.277]	[.267;.284]	
Greece	.250	.261	.258	.277	.274	.284	.281	.272	8.8 %
	[.239;.260]	[.249;.274]	[.246;.270]	[.263;.291]	[.259;.289]	[.270;.299]	[.267;.294]	[.259;.285]	
Italy	.222	.212	.209	.209	.212	.217	.218	.219	-1.4 %
	[.213;.231]	[.202;.222]	[.199;.220]	[.200;.220]	[.202;.223]	[.205;.229]	[.205;.230]	[.206;.233]	
EU	.281	.284	.281	.280	.281	.279	.276	.281	0 %
	[.262;.309]	[.265;.312]	[.260;.309]	[.262;.312]	[.261;.310]	[.262;.306]	[.261;.303]	[.265;.306]	

¹⁵ In the case of Austria the period of change is 1995-2001 and in the case of Finland 1996-2001.

Figure 10.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001
France	.283 [.277;.289]	.270 [.264;.276]	.265 [.259;.270]	.272 [.265;.279]	.274 [.267;.281]	.271 [.264;.278]	.267 [.261;.274]	.266 [.258;.273]	-6.0 %
Ireland	.334 [.323;.347]	.325 [.312;.338]	.316 [.303;.331]	.315 [.301;.328]	.308 [.295;.321]	.300 [.286;.314]	.286 [.271;.301]	.269 [.254;.286]	-19.5 %
The Netherlands	.243 [.235;.251]	.236 [.230;.242]	.245 [.238;.252]	.249 [.243;.256]	.255 [.248;.262]	.246 [.239;.253]	.246 [.240;.253]	.291 [.282;.301]	19.8 %
Portugal	.361 [.342;.380]	.369 [.349;.389]	.367 [.347;.386]	.389 [.371;.409]	.358 [.335;.381]	.352 [.328;.376]	.355 [.331;.381]	.345 [.319;.371]	-4.4 %
Spain	.299 [.291;.308]	.308 [.299;.318]	.305 [.295;.315]	.310 [.299;.322]	.308 [.298;.319]	.291 [.281;.304]	.287 [.276;.300]	.292 [.280;.306]	-2.3 %
UK	.291 [.282;.300]	.290 [.280;.299]	.289 [.280;.298]	.286 [.278;.296]	.283 [.275;.292]	.282 [.273;.291]	.278 [.269;.289]	.282 [.271;.292]	-3.1 %
EU	.281 [.262;.309]	.284 [.265;.312]	.281 [.260;.309]	.280 [.262;.312]	.281 [.261;.310]	.279 [.262;.306]	.276 [.261;.303]	.281 [.265;.306]	0 %

Which factors account for the variation in the wage level between individuals within countries? In order to shed some light on this question we have used the variance decomposition method based on the following simple wage equation

$$(1) \quad \ln w_i = \beta_0 + \beta_1 e_i + \beta_2 a_i + \beta_3 a_i^2 + \beta_4 g_i + \varepsilon_i,$$

where $\ln(w)$ = natural logarithm of gross wage

e = years of schooling

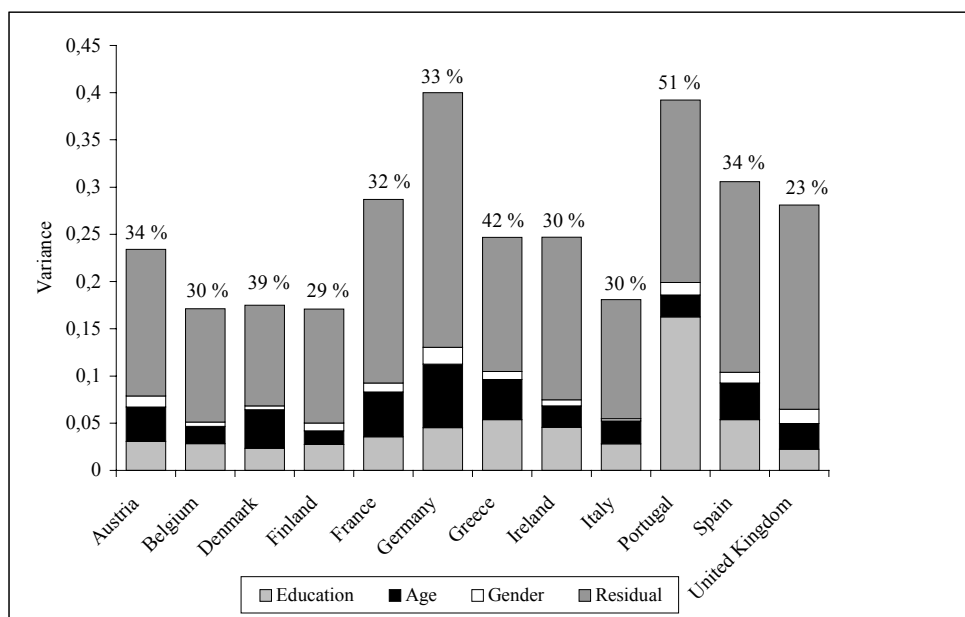
a = age

g = gender

ε = stochastic error term.

Since there is no direct measure for work experience in the ECHP we have used the age of an employee to approximate its magnitude. The variance decomposition has been done by using age and education as classified variables. Thus, we have created five indicators for age and three indicators for the educational attainment level¹⁶. The results of the variance decomposition are reported in Figure 11.

Figure 11. Gross wage variance decomposition (2001).



The height of each bar in Figure 11 illustrates the variance of logarithmic gross wages in each country. The higher the bar is, the bigger are the wage disparities within that country. In addition, Figure 11 shows to which extent schooling, age and gender are able to explain the differences in wages in each country. Of course these three explanatory variables are not fully able to explain the wage disparities within countries. The amount of variance which is explained by these three variables has been described by goodness of fit of the model (measured as R^2) in connection with each bar. For example, in the case of Germany this R^2

¹⁶ In the ECHP no information of the actual years of schooling is given. There is, however, information available of the highest level of education completed measured by three aggregated groups. According to this we have presumed that ISCED levels 0–2 equal 9 years, ISCED 3 equals 12 years, and ISCED levels 5–7 equal 16 years of schooling. The information about the educational attainment in the Netherlands turned out to be unreliable, so we have excluded this country from the decomposition.

is 33 percent. The rest of the variance, which remains unexplained by the three variables included, is shown as a 'residual' in the graph¹⁷.

As Figure 11 shows, most of the variance in logarithmic wages remains unexplained after taking into account the prevailing differences in educational attainment, age, and gender across individuals. Actually in each country, the R^2 of the model is at most around 50 percent. Depending on the country, the single factor, which has the most eminent impact on wages is either the educational level or age. In Portugal, especially, the importance of educational attainment is large while in Denmark it is age (i.e. work experience) that matters most for the variation in wages. On the other hand, of these three explanatory variables, gender seems to contribute least for the observed wage variation in all EU countries.

4.2. Changes in income dispersion

By means of progressive taxation and social security benefits, states pursue to equalize consumption possibilities of their citizens within a country. Addition to the wages, there are, of course, other sources of income, such as capital income, which affect the ultimate consumption possibilities of an individual. To see, how all these different sources of money income influence the overall picture of income dispersion, we have estimated the Gini coefficient based on the household disposable income. Figures 12 and 13 show the results in 13 EU member states.

In most countries, the dispersion of household disposable income has become narrower during 1994 and 2001. The clearest exception to this pattern is Finland, where the Gini coefficient has increased from 0.239 to 0.256 between 1996 and 2001. However, it is interesting to notice, that the value of the coefficient seems to have declined in 2001 compared to the year before. The same trend has been documented by Statistics Finland (Income Distribution Statistics 2001: 11). At the level of the European Union, the Gini coefficient has been rather stable during the period of investigation. At the beginning of the period two new entering countries, Austria and Finland, have some effect on the coefficient, but since that changes have been small by any standards.

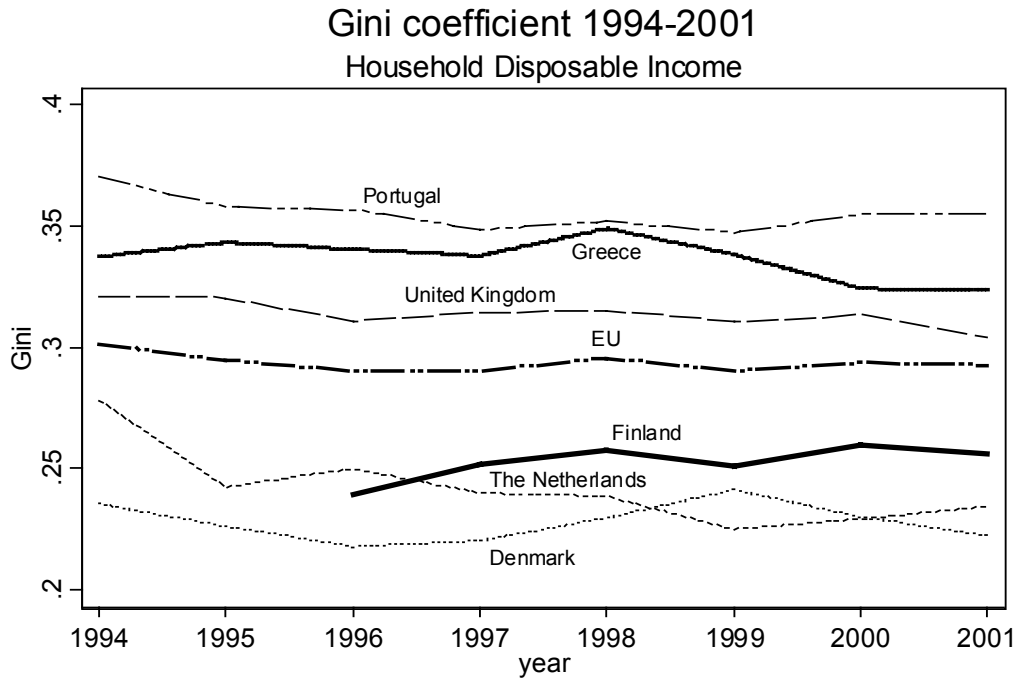
¹⁷ The variance decomposition has been done here by using the partial sum of squares. This way the order of the explanatory variables does not affect the results $(x_1|x_2, \dots, x_n)$. The problem, which arises when using this method is, that explanatory variables' partial sum of squares do not sum up to the model sum of squares. This is due to the correlation between the explanatory variables in the model. There is no truly satisfactory way to deal with this problem. Here we have divided the difference between the model sum

Again it is interesting to see if the changes in the income dispersion have actually been statistically significant. By using the bootstrap method, just like the one before, we have estimated the 95 percent confidence intervals for the Gini coefficient based on the household disposable income. The results can be seen in brackets in the tables below Figures 12 and 13. In most countries, changes in the Gini coefficient take place within the 95 percent confidence intervals. However, in the case of Austria, Finland, Italy, and the Netherlands the 95 percent confidence intervals at the beginning and at the end of the period of investigation do not overlap. For this reason, there is reliable evidence that inequality has decreased in Austria, Italy, and the Netherlands and increased, on the other hand, in Finland.

According to the Gini coefficient for the year 2001, the dispersion in the household disposable income was the smallest in Denmark, Austria, and Belgium. On the other extremity are Portugal, Greece, Spain, and the United Kingdom, where the Gini coefficient was over 0.30 in 2001. The median value of the Gini coefficient in 13 EU member states was 0.26 at the same time.

of squares and the sum of partial sum of squares to each explanatory variable (i.e. to education, age, and gender) by their proportion of the variance which the model can explain.

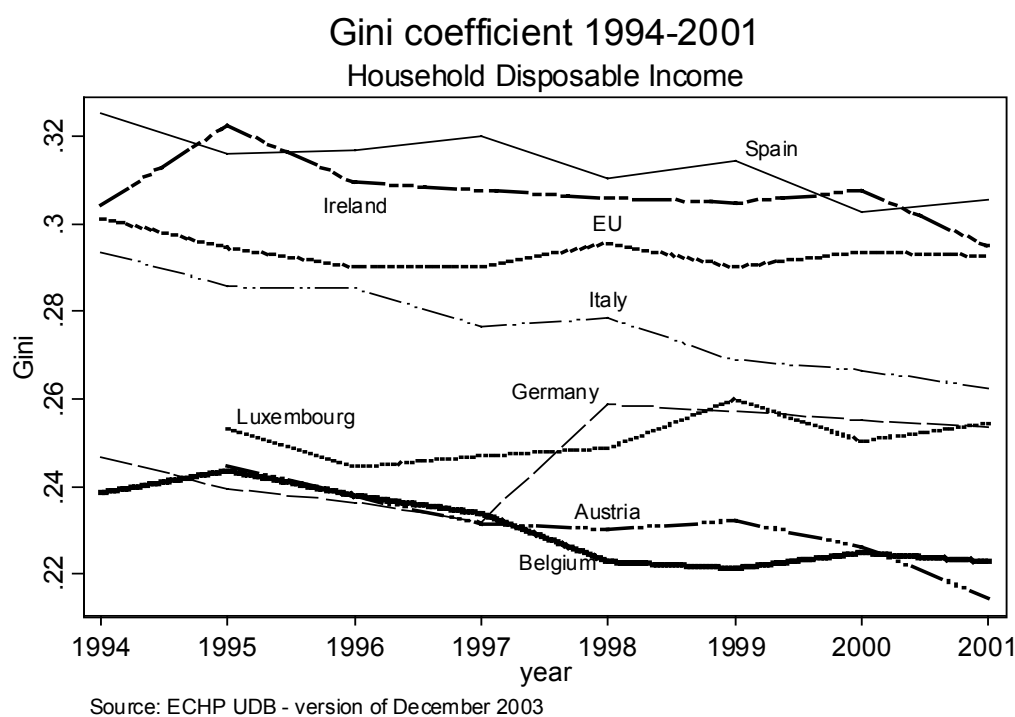
Figure 12.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994- 2001 ¹⁸
Denmark	.235 [.229; .242]	.226 [.220; .232]	.218 [.212; .223]	.220 [.214; .226]	.230 [.222; .237]	.241 [.231; .253]	.230 [.222; .239]	.222 [.214; .231]	-5.5 %
Finland	-	-	.239 [.234; .246]	.252 [.245; .259]	.258 [.251; .265]	.251 [.245; .259]	.260 [.251; .269]	.256 [.248; .265]	11.7 %
Greece	.337 [.327; .347]	.343 [.332; .355]	.340 [.329; .354]	.338 [.326; .349]	.349 [.335; .364]	.338 [.326; .353]	.324 [.312; .337]	.323 [.311; .335]	-4.2 %
LU	-	.253 [.246; .261]	.245 [.236; .252]	.247 [.239; .255]	.249 [.241; .257]	.260 [.252; .270]	.250 [.242; .259]	.254 [.247; .264]	0.4 %
Portugal	.370 [.354; .389]	.358 [.343; .374]	.357 [.339; .377]	.348 [.333; .364]	.352 [.335; .368]	.347 [.330; .367]	.355 [.336; .374]	.355 [.335; .380]	-4.1 %
The Netherlands	.278 [.273; .284]	.242 [.238; .247]	.250 [.245; .254]	.240 [.235; .244]	.238 [.234; .243]	.225 [.221; .229]	.229 [.225; .234]	.234 [.230; .239]	-15.9 %
UK	.321 [.313; .330]	.320 [.311; .332]	.311 [.302; .320]	.314 [.305; .323]	.315 [.306; .324]	.311 [.301; .319]	.313 [.304; .322]	.304 [.295; .314]	-5.3 %
EU	.301 [.268; .335]	.295 [.261; .330]	.290 [.257; .326]	.290 [.253; .329]	.296 [.272; .324]	.290 [.268; .318]	.294 [.270; .325]	.293 [.266; .327]	-2.7 %

¹⁸ In the case of Luxembourg the period of change is 1995–2001 and in the case of Finland 1996–2001.

Figure 13.



	1994	1995	1996	1997	1998	1999	2000	2001	Change 1994-2001 ¹⁹
Austria	-	.245 [.238; .252]	.238 [.231; .245]	.232 [.225; .239]	.230 [.223; .238]	.232 [.224; .240]	.226 [.219; .235]	.215 [.207; .222]	-12.2 %
Belgium	.239 [.228; .254]	.244 [.234; .254]	.238 [.224; .248]	.234 [.224; .244]	.223 [.214; .233]	.221 [.212; .231]	.225 [.215; .236]	.223 [.214; .237]	-6.7 %
Germany	.247 [.240; .255]	.240 [.233; .248]	.236 [.230; .243]	.232 [.225; .239]	.259 [.250; .268]	.257 [.249; .266]	.255 [.246; .265]	.254 [.245; .264]	2.8 %
Ireland	.304 [.294; .316]	.323 [.308; .342]	.309 [.300; .326]	.308 [.295; .325]	.306 [.292; .320]	.305 [.291; .321]	.308 [.291; .326]	.295 [.279; .312]	-3.0 %
Italy	.294 [.281; .307]	.286 [.275; .299]	.285 [.273; .298]	.277 [.265; .289]	.279 [.268; .290]	.269 [.258; .280]	.266 [.256; .278]	.263 [.252; .273]	-10.5 %
Spain	.325 [.316; .335]	.316 [.306; .325]	.317 [.307; .327]	.320 [.309; .331]	.310 [.300; .321]	.314 [.303; .326]	.303 [.292; .314]	.305 [.294; .316]	-6.2 %
EU	.301 [.268; .335]	.295 [.261; .330]	.290 [.257; .326]	.290 [.253; .329]	.296 [.272; .324]	.290 [.268; .318]	.294 [.270; .325]	.293 [.266; .327]	-2.7 %

As reported by Gottschalk and Smeeding (1997), among others, a number of studies concerning the United States have revealed that changes in the earnings distribution have been translated into greater inequality in the distribution of family income. Since there are substantial differences for example in the way of distributing the income in Europe compared with the US, it is interesting to know, if this same result holds also in Europe.

¹⁹ In the case of Austria the period of change is 1995–2001.

As an example we shall take a closer look to the year 2001. In general, there seems to be a strong positive correlation between the gross wage Gini and the Gini coefficient based on the household disposable income²⁰. That is to say, countries with a high Gini coefficient based on gross wages tend to have a large dispersion in the household disposable income. In most EU countries, the dispersion of the household disposable income seems to be larger than the dispersion of wages. On the ground of 95 % confidence intervals this result is statistically significant in the cases of Denmark, Finland, Greece, Italy, and the UK. In only three countries is the dispersion of gross wages greater compared to that of household disposable income. These countries are Germany, the Netherlands, and Austria, although in the case of last mentioned the result is not statistically significant.

Are the changes in the wage dispersion related to the changes in the household income? This question is rather interesting for the following reason: if we estimate the correlation coefficient taking all available countries into account, there seems to be no correlation at all between these two measures of inequality (the correlation coefficient is 0.02). In other words, one cannot say in general that in countries where wage dispersion has increased also household income distribution has become more unequal. There is, however, one country, which seems to drive this particular result namely the Netherlands. In the Netherlands there has been a strong trend towards greater inequality in gross wages, but the development has been opposite when looking at the household disposable income. Indeed, the results are quite different when excluding the Netherlands: the correlation coefficient between the changes in the gross wage and the household disposable income is 0.52 and it is statistically significant at 10 % level. In other words, the correlation between wage and income changes does seem to be moderate at the level of the 'old' EU.

All in all, factors that may account for changes in income distribution across countries are complex. There is a fairly limited number of empirical studies that have looked at this issue. Macroeconomic variables seem to play a role in changes in income distribution based on the available evidence. For instance, Sarel (1997) discovers by using a cross-country data for 45 countries (including both developed and developing countries) that higher growth rate, higher income level, higher investment rate, real depreciation of currency and an improvement in terms of trade produce a more equal income distribution. De Gregorio and Lee (1999) point out that higher attainment in education and more equal distribution of education are keys for more equal distribution in income by using a panel data set for a

²⁰ The value of a simple correlation coefficient between the Gini coefficient based on the gross wage and the Gini coefficient based on the household disposable income in 2001 is 0.68 and it is statistically significant at 5 % level.

broad range of countries. However, changes in the education structure of countries take time to build-up. For this reason, macroeconomic forces are likely to be more important factors for the short-run changes in income distribution across countries that were illustrated above for the European Union countries over the period from 1994 to 2001. Detailed investigation of this issue is beyond the scope of this paper.

4.3. EU vs US – Differences in income disparities

In addition to the comparisons of income differences within the European Union, it is tempting to compare the EU Gini coefficient to the one in the United States. In the US, as well as within the European Union, there are quite considerable economic differences between states. Although the Gini coefficient calculated covering all states in the United States is a standard indicator of economic progress, it has to our knowledge not been reported for the EU-level before.

As mentioned earlier, data comparability is a matter of great concern, when comparing e.g. the Gini coefficients between countries. Because in many cases the Gini coefficient for the United States is estimated on the basis of income *before* tax (cf. Atkinson & Brandolini 2001: 772), it is rather difficult to find estimates which would be at least somewhat comparative with those based on the ECHP. Fortunately the United States is included to the Luxembourg Income Study in which the measure of disposable income should be relatively comparable with our results for the EU.

On the homepage of the Luxembourg Income Study (LIS Key Figures), the Gini coefficients based on the household disposable income have been published for the United States. The US Gini coefficients reported in that source have been presented in Table 1. To ease the comparison, the EU-level Gini coefficients based on the ECHP have been reported once more. In addition to the Gini coefficients their standard errors have been shown. The standard errors have been in both cases produced by the bootstrap method.

Table 1. Gini coefficients – US vs EU.

	1991	1994	1997	2000
United States (LIS)	0.366 (0.0025)	0.355 (0.0014)	0.372 (0.0019)	0.368 (0.0020)
European Union (ECHP)		0.301 (0.0177)	0.290 (0.0201)	0.294 (0.0148)

Sources: ECHP UDB – version of December 2003; LIS Key Figures 2004.

According to our results and the estimates based on the Luxembourg Income Study, it seems that the income inequality among the US citizens is greater than that of the European Union. The EU-level Gini coefficient has been below 0.3 almost every year. In contrast, in the US the value of the Gini coefficient has been continually above 0.35. Moreover, the changes in the Gini coefficients have been rather minor in the case of the European Union, while in the US there has been more fluctuations in this respect.

5. CONCLUSIONS

In this paper we have provided the basic facts about the level and development of wages and household disposable income in the European Union countries. In addition, differences in wage and income dispersion, measured by the Gini coefficient, have been under examination. In a nutshell, a picture of disintegration emerges. This means that there are large disparities in the level of wages and income across countries in the EU and there is no indication of convergence during the 1990s. In order to get an overall look at the patterns documented in this paper, we will here highlight some of the most interesting aspects in detail.

First of all, between 1994 and 2001, the level of gross wages and household disposable income has increased in every country under consideration. On the average, this increase has been around 8 percent in the case of gross and net wages and somewhat greater, about 19 percent, in the case of household disposable income. The increase in both gross wages and disposable income has been rapid for example in Ireland, Greece, and Portugal, where the wage and income levels were initially lower. However, this does not necessarily mean that the wage and income levels are converging within the EU since also countries like the United Kingdom have experienced a substantial growth in wages and income at the same time.

The changes in gross wage dispersion have been rather modest in most EU countries. In those countries, where the change in wage dispersion has been statistically significant (Austria, France, and Ireland), the inequality has decreased. The changes in income inequality have not been statistically significant in most countries. When significant changes have happened, they have been, apart from Finland, towards lower values of the Gini coefficient. All in all, although there are substantial differences between and within countries in the level of household disposable income, the dispersion of income at the EU-level is certainly smaller than the dispersion in the United States. This pattern is in

line with a common perception according to which equality is appreciated more in Europe.

There are a number of issues related to this topic which have not been discussed, or even mentioned in this paper. There are a lot of open questions for which this paper does not give any answers. This is a reflection of the fact that the aim of the paper was to provide the basic facts to the discussion. By doing this, we hope that this paper will stimulate theoretical and empirical research for understanding the economic mechanisms behind the enduring wage and income disparities across the European Union countries.

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Taxing Wages 2000–2001 (2001) OECD.

Annex 1.

	Income tax + Employees' social security contributions (1994)	Income tax + employees' social security contributions (2001)	Change 1994–2001 (percentage points)
Austria*	27.0	28.3	1.3
Belgium	39.2	41.7	2.5
Denmark	45.2	43.3	-1.9
Finland**	37.6	32.4	-5.2
France	27.4	27.0	-0.4
Germany	38.2	40.7	2.5
Greece	17.2	17.7	0.5
Ireland	30.9	16.9	-14.0
Italy	26.7	27.8	1.1
The Netherlands	41.3	32.9	-8.4
Portugal	18.0	16.4	-1.6
Spain	19.5	18.9	-0.6
UK	26.5	23.2	-3.3

*Refers to the year 1995; **Refers to the year 1996.

Sources: Taxing wages 1998–1999: 343; Taxing wages 2001–2002: 403.