Equality and Employment in the European Service Sector Economy, 1995 - 2000

By

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Abstract

The decline in manufacturing employment relative to service sector employment in most OECD countries has reopened debate over the relationship of employment growth to pay inequality. A widely-held view presumes that a trade-off exists; in this view labor markets matching the supply and demand for skill will generate new jobs only at the expense of greater inequalities. This paper examines the actual relationship between employment growth and pay inequality in services at the regional level for 14 European countries from 1995 to 2000. Our evidence does not support the hypothesis of a tradeoff.

In this period, the most rapid employment expansion in services occurred in real estate, in renting and business activities, in wholesale and retail trade, and in repair of motor vehicles, motorcycles and personal and household goods. All of these sectors have average wages well above the bottom of the pay distribution. Almost twice as many jobs were created in these sectors than in all the others, with the result that pay inequalities in services declined as employment grew. Overall we find a striking pattern of *declining* pay inequality across Europe as employment expanded in the service sector during the period of the introduction of the euro.

1 Introduction

The decline in manufacturing relative to service sector employment in most OECD countries has opened a new line of debate over the relationship of employment growth to pay inequality. The traditional view presupposes that employment grows as labor markets become more flexible, and attributes Europe's high unemployment rates to rigidities in labor markets, stemming from unemployment benefits, job protection laws, high levels of taxation, and centralized wage bargaining. Reducing rigidities, it is argued, would generate job growth though at the expense of greater inequality in pay structures. In particular, the thesis predicts that reducing real minimum wages will expand employment in the jobs providing the lowest wages and demanding the lowest levels of skill.

In this paper we examine the relationship between employment growth and pay inequality for 14 European countries from 1995 to 2000. Using payroll data across a wide range of industries and economic sectors, we compute a consistent between-groups component of Theil's T statistic at the regional level. This permits us to measure the overall patterns in pay inequality, as well as to isolate the contribution of each sector to changes in inequality. Thus we can determine whether inequality in the services sector increased or decreased, and whether changes were mainly due to events affecting jobs at the top or the bottom of the pay scale.

While in manufacturing rising real demand, productivity growth and falling prices are linked to rising employment and real wages, Iversen and Wren (1998) argue that in services employment growth is stimulated mainly by cost-cutting: lower real wages leading to lower prices. In these circumstances, they argue that the Rehn-Meidner (1951) argument for solidaristic wage policies would no longer apply, since wage compression would squeeze out the least productive workers and inhibit employment growth. Thus a tradeoff emerges between employment growth and pay equality. Reductions in inequality can only be achieved through employment creation directly in the public sector, financed by higher taxes. A "trilemma" thus emerges between budget restraint, income equality, and employment growth: only two of the three can simultaneously occur. Iversen and Wren call this the "trilemma of the service sector."

But does the trilemma hold in Europe today? We argue that it does not. During the period of the introduction of the euro, unemployment rates fell across the continent, while fiscal policies remained restrained under the Growth and Stability Pact. Yet wage inequality fell. The striking ability of Europe's economy to generate new private-sector jobs with an increasingly egalitarian structure of pay is in sharp contrast to much recent commentary as well as to long-established traditions of economic thought. We argue, however, that it is consistent with the expectations of a traditional Keynes-Kuznets view of economic development, and with the predictions of our own earlier work (Galbraith and Garcilazo 2004).

2. Measuring Pay Inequality in the Services Sectors

Our analysis focuses on the years 1995-2000. This time frame enables us to take advantage of improved coverage in the European System of Accounts 1995 (ESA 95), available from 1995 onward. In this data set, payroll data for 14 European countries across 16 industries is consistently available during each year at the national and regional levels.   This permits us to construct a substantial panel data set of between-sector pay inequalities across 176 administrative regions.

Our data on wages and employment is taken from the regional accounts (REGIO). Eurostat categorizes regions according to 'The Nomenclature of Territorial Units for Statistics' (NUTS[1]) classification and industries according to the Classification of Economic Activities in the European Community (NACE) Revision 1.1. The NUTS taxonomy classifies the European geographical unit by three hierarchical levels (level 0, 1 and 2). In our analysis we use level 0 (for countries) and level 2 (for regions) when available[2].   Table 1 includes the list of countries and their respective number of regions used in our analysis. Appendix Table A1 lists the individual regions by their codes according to NUTS-2003.

Table 1. Number of European Regions in Each NUTS level according to NUTS-99

Country	Level 1	Level 2
Belgium	3	**11**
Denmark	1	**1**
Germany	**16**	40
Greece	4	**13**
Spain	7	**17**
France	9	**22**
Ireland	1	**2**
Italy	11	**21**
Luxembourg	1	**1**
The Netherlands	4	**12**
Austria	3	**9**
Portugal	3	**7**
Finland	2	**6**
Sweden	1	**8**
United Kingdom	12	**37**
# Regions included	**16**	**155**
Total	**183**	

Industries according to the NACE Rev. 1.1 are categorized into 16 units. We display these in Table 2.

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[1] The latest version of NUTS categorization is NUTS-2003
[2] Data for Germany is only available at level 1.

Table 2. Industries Included in NACE Rev. 1.1

Code	Industries
A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social, personal service activities
P	Private households with employed persons

The arguments of Iversen & Wren (along with those of Esping-Andersen 1993, 1994, which they reference) suggest that employment expansion in services creates mainly low-paid jobs, thus increasing overall inequality. These authors treat the service sector as a single industrial category, ignoring heterogeneity within the sector. Instead, we subdivide the service sector into 11 subcategories. This enables us to pinpoint which sub-sectors gained (and any that may have lost) jobs in the late 1990s, and to determine the effects of these on the overall distribution of services pay.

Stanback *et al*. (1981) proposed and Wilson (1998) developed a seven-sector decomposition of the services sector, into sub-sectors that respond to similar types of demand (for instance, distributive services, producer services, consumer services, and so forth). We use eleven of 16 NACE Rev. 1.1 categories, giving us additional heterogeneity in the service sector. Table 3 matches the industrial categorization from NACE Rev 1.1 to the Stanback categorization. In the middle column we assign a classification for each of the NACE Rev 1.1 categories; the first letter "S" or "non-S" specifies whether the sector belongs to the service sector or not, and the remaining letters corresponds to the Stanback category.

Table 3. Categorization NACE-CLIO Rev 1.1 by types of Services

NACE Rev. 1.1	Code Assigned	Stanback Category
a Agriculture, hunting and forestry	A1	Agriculture Mining and Fishing
b Fishing	A2	
c Mining and quarrying	A3	
f Construction	C	Construction
d Manufacturing	M	Manufacturing
e Electricity, gas and water supply	Sd1	Distributive Services
i Transport, storage and communication	Sd2	
g Wholesale and retail trade; rmv*, mphg**	Sw	Wholesale trade
j Financial intermediation	Sp1	Producer Services
k Real estate, renting and business activities	Sp2	
o Other community, social, personal service activities	Sc1	Consumer Services
p Private households with employed persons	Sc2	
h Hotels and restaurants	Sc3	
m Education	Sh&e1	Private sector health and Education
n Health and social work	Sh&e2	
l Public administration and defence; css***	Spa	Public Administration

*repair of motor vehicles
**motorcycles and personal and household goods
***compulsory social security

The main empirical work of this paper consists in extending our (Galbraith-Garcilazo 2004) inter-sectoral measures of pay inequality across industries at the national and regional level. The new measures improve upon previous measures since payroll data is now consistently available across 16 sectors disaggregated by 174 European administrative regions and across 14 countries. However the time frame is considerably shorter than in the earlier paper.

Our measure of inequality is the between-groups component of Theil's T statistic described in Conceição and Galbraith (2000) and in Conceição, Galbraith and Bradford (2001), building on Theil (1972). We use compensation of employees (e2rem95 in REGIO) and employment (e2empl95), disaggregated by region and then by sector, as the elementary units of observation. The formal expressions for Theil's T statistic are given in the appendix (A1).

3. Analysis and Findings

3.1 Trends in Unemployment and Employment Shares

Unemployment across EU-15 countries decreased by more than two percentage points – from 10.1 % to 7.8 % – during 1995-2000. In the REGIO accounts, total employment grew by 11.4 million, from 113.7 million in 1995 to 125.1[3] million in 2000. The employment to population ratio increased from 30.67% in 1995 to 33.28% in 2000. During the five year period, sectors adding jobs added a total of 12.5 million net new jobs, while sectors losing jobs lost a total of 1.1 net jobs. Counting across sectors, 88% of the total jobs created were in the service sector. Table 4 provides the total number of jobs created and lost within each of the 16 sectors during the 5 year period.

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[3] This total number includes data that can be disaggregated at the regional level

Table 4. Jobs Created and Lost by Industry (in 000's) from 1995-2000 for 14 Countries

	A1	A2	A3	M	Sd1	C	Sw	Sc3	Sd2	Sp1	Sp2	Spa	Sh&e1	Sh&e2	Sc1	Sc2	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	total
Be	1.5	:	:	-21.8	-1.4	2.4	29.9	7.3	17.5	8.5	103	31.4	8	53.2	1.7	21.5	261.2
De	:	:	-68	6	-66.9	-126	:	:	75.2	141	1770	-221	:	:	:	:	179
Dk	-3	-1	0	-10	-4	20	39	7	12	0	64	-13	11	50	8	-1	-99
Gr	-6.3	1	-1	0.3	-0.7	27	25.5	13.5	3.5	11.4	24.3	6.4	21.3	19.6	-2.7	18.8	162.4
Es	52.4	-2	-5.4	354	-4.4	269	290	70.1	49.9	2.2	187	55.6	66	75.5	74	65.8	1560.7
Fr	29.3	-.1	-13	5.1	3.1	52.5	311	116	152	5	738	162	65.4	133	200	119	2079.7
Ie	1.3	:	0.6	46.1	-2.6	53.2	63.4	37.5	32.6	19.9	57.5	6.1	8.9	24.1	17.4	-2.8	363.9
It	-73	-2	-0.6	52.6	-19.6	2.8	264	93.3	79.6	13.4	362	-57.9	-9.1	58	115	98.6	1015.7
Nl	5.3	:	-0.7	14	-6.5	44	139	21.4	50.5	53.4	269	0.1	28.2	94.7	34.6	:	745
At	0.3	:	-0.5	-19.6	-2	-9.7	33.8	14.7	9.1	2.4	75.4	2.7	22.9	26.8	16.3	2	174.2
Pt	-10	-1	0.9	12.3	-0.3	40.3	24.2	17.4	3.9	-4.8	2.7	14.2	18.3	12.6	8	5.9	373
Fi	0.5	1.3	0.9	63.8	-1.7	62.5	64.7	20.1	35.7	-8	76	1	16.6	44.5	22.3	4.5	248.4
Se	-1.3	0.1	-1.6	0.7	-0.9	6.9	21.7	8.3	19.5	10.6	97.1	-26.7	-6.1	30.6	1.9	0.1	160.7
Uk	-48	:	6	-209	-38.4	236	540	206	195	39.4	893	7.9	400	133	204	:	2644.9
created	90.6	2.4	8.4	554.5	3.1	817.1	1846.2	633	735.9	307	4718.8	287.5	666.8	755.8	703	336.6	12466
Lost	141	6.5	89.9	260.2	149.4	-136	0	0	0	12.8	0	305.3	-5.2	0	0	0	1116
Total	-50	-4	-82.	294	-146	681	1846	633	736	294	4719	-30.8	651.6	756	701	333	11329.9

Two sub-sectors dominated net job gains: 'real estate, renting and business activities' (Sp2) created 38 % of the net new jobs, and 'wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods' (Sw) created another 15%.

Table 5 presents the employment share of each country in each year under investigation.[4] Note the gains for Spain and Ireland, and relative declines for Denmark and Sweden. In the rest of the countries there is no clear trend.

Table 5. Employment Share (%) among 14 Countries, 1995 to 2000

	be	dk	de	gr	es	fr	Ie	it	nl	at	pt	fi	se	uk
1995	2.75	2.13	17.87	1.82	9.65	17.34	0.90	13.86	4.32	2.75	1.26	1.56	3.41	20.40
1996	2.75	2.14	17.48	1.81	9.72	17.33	0.93	13.87	4.40	2.73	1.26	1.58	3.36	20.64
1997	2.75	2.15	16.98	1.79	9.96	17.38	0.98	13.79	4.49	2.72	1.27	1.61	3.28	20.87
1998	2.75	2.14	16.67	1.83	10.17	17.41	1.03	13.64	4.54	2.70	1.27	1.58	3.26	21.00
1999	2.70	2.09	17.56	1.80	10.25	17.25	1.07	13.38	4.52	2.65	1.25	1.61	3.21	20.66
2000	2.71	2.08	17.46	1.78	10.05	17.43	1.11	13.39	4.52	2.64	1.26	1.75	3.23	20.60

Table 6 presents employment shares by sector. Table A2 in the appendix gives further details on employment share by sector within each country.

Table 6. Employment Share (%) among 16 Sectors

|	A1	A2	A3	M	Sd1	C	Sw	Sc3	Sd2	Sp1	Sp2	Spa	Sh&e1	Sh&e2	Sc1	Sc2
	A	B	c	d	e	f	g	h	i	J	K	l	m	n	o	p
1995	1.58	0.09	0.41	24.10	1.08	7.53	11.32	3.37	6.89	3.99	9.94	9.92	6.56	8.00	3.35	1.87
1996	1.54	0.08	0.40	23.79	1.05	7.30	11.44	3.41	6.85	3.94	10.29	9.86	6.60	8.03	3.45	1.98
1997	1.57	0.08	0.37	23.48	1.01	7.29	11.59	3.47	6.75	3.92	10.80	9.62	6.53	8.04	3.49	1.99
1998	1.55	0.08	0.32	23.21	0.96	7.23	11.75	3.53	6.73	3.88	11.23	9.51	6.53	7.97	3.51	2.01
1999	1.44	0.08	0.32	22.55	0.90	7.47	11.69	3.55	6.80	3.91	12.19	9.18	6.53	7.86	3.57	1.98
2000	1.40	0.07	0.31	22.15	0.87	7.39	11.77	3.57	6.85	3.87	12.81	9.00	6.49	7.88	3.61	1.97

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[4] The values in these tables should be interpreted with some caution since data for 8 sectors is missing in Germany, for 2 sectors in Belgium, the UK, and the Netherlands, and for 1 sector in Austria and Ireland.

3.2 Trends in Relative Wages

We calculate relative wages by dividing average payroll per worker within each region and each sector by the European average during each year. Thus our measure of relative wages fluctuates around the value of one, and is equal to one when the average wage in a region or sector is equals to the European average. Under the NACE Rev.1.1 classification, there are approximately 15 thousand data points for 1995-2000.

Figure 1 presents a box-plot of relative wages when services are aggregated into a single sector. There are a total of 5 sectors. The box bounds the inner half of the distribution between the 25th and 75th percentile, and the whiskers display three times the distance between the median and the lower/upper quartile to indicate how far the remainder of the distribution extends, with outlying observations shown as points.

Figure 1. Relative Wages Across 5 Sectors, 1995-2000
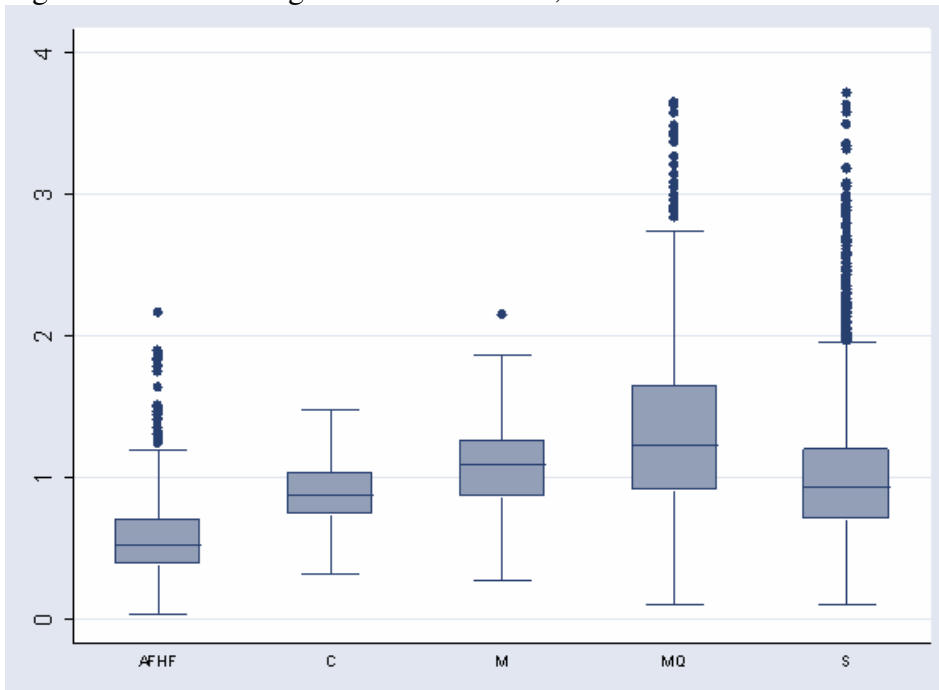
When the service sector is aggregated into a single sector, its average pay falls into the mid-lower end of the pay-distribution, lower than manufacturing (M) and mining and quarrying (MQ), higher than agriculture, foresting, hunting and fishing (AFHF), and similar to construction (C). Yet even after aggregating services into a single sector, it is not clear that wages fall entirely at the bottom of the pay-structure.

This scenario changes significantly when the service sector is broken up into its 11 sub-sectors. We graph this situation in Figure 2.

Figure 2. Relative Wages Across 16 Sectors, 1995-2000
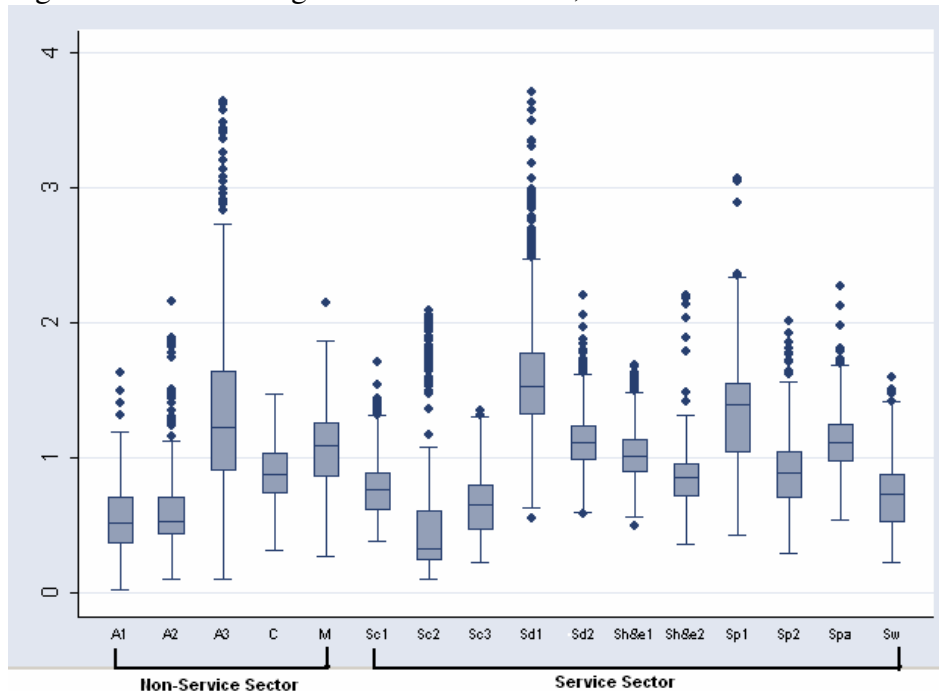
The heterogeneity of wages within the service sector is now very clear. Wages in consumer services [especially 'other community, social, personal service activities' (Sc2), 'hotels and restaurants' (Sc3)] fall at the bottom of the pay distribution. However, wages from distributive services 'electricity, gas and water supply' (Sd1), and in producer services 'financial intermediation' (Sp1) come in at the top of the pay distribution. Wages from distributive services 'transport, storage and communication'(Sd2), private sector health and education (Sh&e1, Sh&e2), producer services 'real estate, renting and business activities' (Sp2) and from the public sector (Spa) rank near the middle of the pay scale.

As already noted, the bulk of employment growth within services during 1995-2000 was in 'real estate, renting and business activities' (Sp2), and in 'wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household' (Sw) – sectors whose wages fall near the middle of the pay distribution. Table 7 shows trends in relative wages across sectors. Notice that the only sectors gaining in relative wage position are in services (Sw, Sc3, Sh&e1, Sh&e2, Sc1). While not all services sectors gained in relative position, no sector outside services did so. This table would appear to challenge claims that employment growth in services accompanies depressed wages and that "it becomes increasingly difficult to combine rising wages with lower prices in services" (Iversen and Wren 1998).

Table 7. Trends in Relative Wages Across 16 Sectors

|	A1	A2	A3	M	Sd1	C	Sw	Sc3	Sd2	Sp1	Sp2	Spa	Sh&e1	Sh&e2	Sc1	Sc2
	a	b	c	d	e	f	g	h	i	j	k	l	m	N	O	p
1995	0.50	0.70	1.48	1.14	1.60	0.95	0.76	0.65	1.15	1.46	1.01	1.15	0.99	0.80	0.79	0.34
1996	0.50	0.76	1.39	1.13	1.62	0.94	0.76	0.66	1.14	1.49	1.01	1.15	1.01	0.83	0.80	0.35
1997	0.48	0.73	1.39	1.13	1.62	0.91	0.76	0.67	1.16	1.49	1.01	1.14	1.03	0.85	0.83	0.35
1998	0.48	0.66	1.38	1.13	1.62	0.89	0.76	0.68	1.16	1.49	1.04	1.12	1.03	0.85	0.86	0.34
1999	0.49	0.67	1.33	1.14	1.65	0.86	0.79	0.69	1.15	1.46	1.01	1.13	1.04	0.87	0.86	0.35
2000	0.46	0.60	1.34	1.14	1.60	0.85	0.80	0.70	1.13	1.47	1.02	1.12	1.05	0.89	0.87	0.34

Table 8 presents the pattern of relative wages across countries. Significant gains occur in the UK, Ireland, and Sweden, while relative wages in Germany, Belgium and the Netherlands decline over time. It is worth noting that this period was one of significant revaluation for the British pound, compared to the eurozone; this accounts for the dramatic improvement in the measured relative wage position of the UK.

Table 8. Trends in Relative Wages Across 14 Countries

	be	dk	de	gr	es	fr	ie	it	nl	at	pt	fi	se	uk
1995	1.33	1.15	1.30	0.53	0.77	1.17	0.86	0.84	1.24	1.19	0.39	1.05	0.98	0.76
1996	1.27	1.14	1.25	0.58	0.78	1.16	0.88	0.93	1.19	1.13	0.40	1.02	1.10	0.76
1997	1.22	1.11	1.19	0.60	0.74	1.11	0.93	0.94	1.13	1.07	0.40	0.98	1.09	0.90
1998	1.21	1.13	1.18	0.58	0.75	1.10	0.91	0.90	1.14	1.07	0.41	1.02	1.06	0.94
1999	1.23	1.16	1.09	0.61	0.75	1.10	0.94	0.91	1.17	1.07	0.43	0.99	1.07	0.99
2000	1.20	1.14	1.07	0.58	0.72	1.07	0.97	0.89	1.17	1.05	0.43	0.87	1.15	1.07

With some 2500 observations per year at the level of sectors-within-regions, the shape of the distribution of relative wages can be estimated through a kernel density function. Figure 3 compares the estimated probability density function of the year 1995 with the function from 2000.

Figure 3. Kernel Density of Relative Wages 1995 and 2000
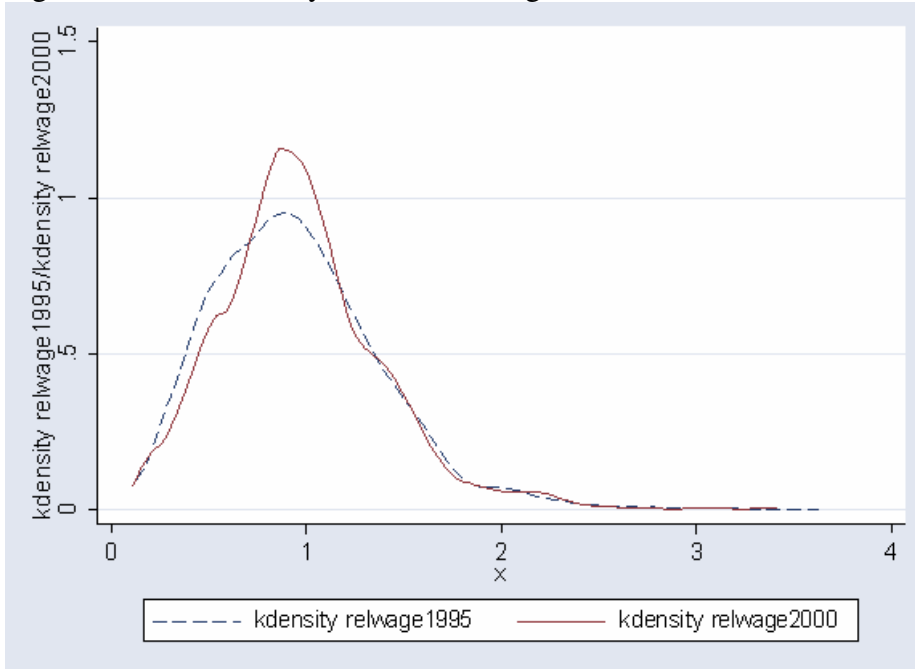
The figure shows how the distribution of relative wages across sector-region cells becomes tighter around the average over time. While the upper end of the distribution is similar for both years, the lower end differs: there are fewer observations on the lower end of the pay scale for 2000 and more around the middle. Tightness in the distribution of relative wages implies a more egalitarian pay structure. In the next section we measure pay-inequality and its trend through time directly.

3.3 Measuring Inequality across Sectors

Our first measure of inequality groups services into a single sector. Under this taxonomy, there are five sectors (agriculture, foresting, hunting and fishing (AFHF), mining and quarreling (MQ), manufacturing (M), construction (C), and service sector (S)), each observed across 14 countries (at the national level) and across 176 regions (at the regional level), each year from 1995 to 2000. Here the between-groups component of Theil's T statistic measures inequality between the five sectors across Europe, while the within-groups component measures inequality within the sectors and between the regions (and countries) for each year.

Table 9. Inequality Between Five Sectors, National and Regional level, 1995-2000

		1995	1996	1997	1998	1999	2000
Country Level	Between Groups	0.0057	0.0052	0.0053	0.0055	0.0055	0.0059
	Within Groups	0.0304	0.0244	0.0157	0.0154	0.0135	0.0152
	Total	0.0361	0.0296	0.0211	0.0208	0.0189	0.0210
Regional Level	Between Groups	0.0059	0.0054	0.0055	0.0057	0.0057	0.0060
	Within Groups	0.0388	0.0325	0.0239	0.0240	0.0220	0.0231
	Total	0.0446	0.0378	0.0294	0.0297	0.0277	0.0291

The patterns and measures are very similar at the country and at the regional levels, even though the two measures are not directly comparable to one another, since Theil's T statistic is bounded above by the number of groups[5]. That the within-groups component has a greater value than the between-groups component is not surprising, considering that all regional variations are treated as forming part of the "within-groups" variation. But note that while inequality between groups is relatively stable, that within groups declines from 1995 to 1997.

The between-groups component of Theil's T statistic is a summation of the individual Theil elements from each sector. Since entropy measures are symmetrical by design, some Theil elements are positive and others negative, depending on whether the relative wage of a sector is greater or less than unity. We can determine the contribution to Theil's T statistic of each sector by graphing the individual Theil elements in a stacked bar graph. A time series of this graph enables us to determine which sectors gained and lost relative position during this period.

Figure 4 reports the individual Theil elements between sectors, measured at the regional level. The trends are very similar to those at the national level.

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[5] The Theil index is bounded below by zero and above by log (N), where N represent the number of groups. Measures with different numbers of groups (regions and nations) will yield different upper bounds distorting comparisons.

Figure 4. Trend of Theil Elements for 5 Sectors, Regional Level
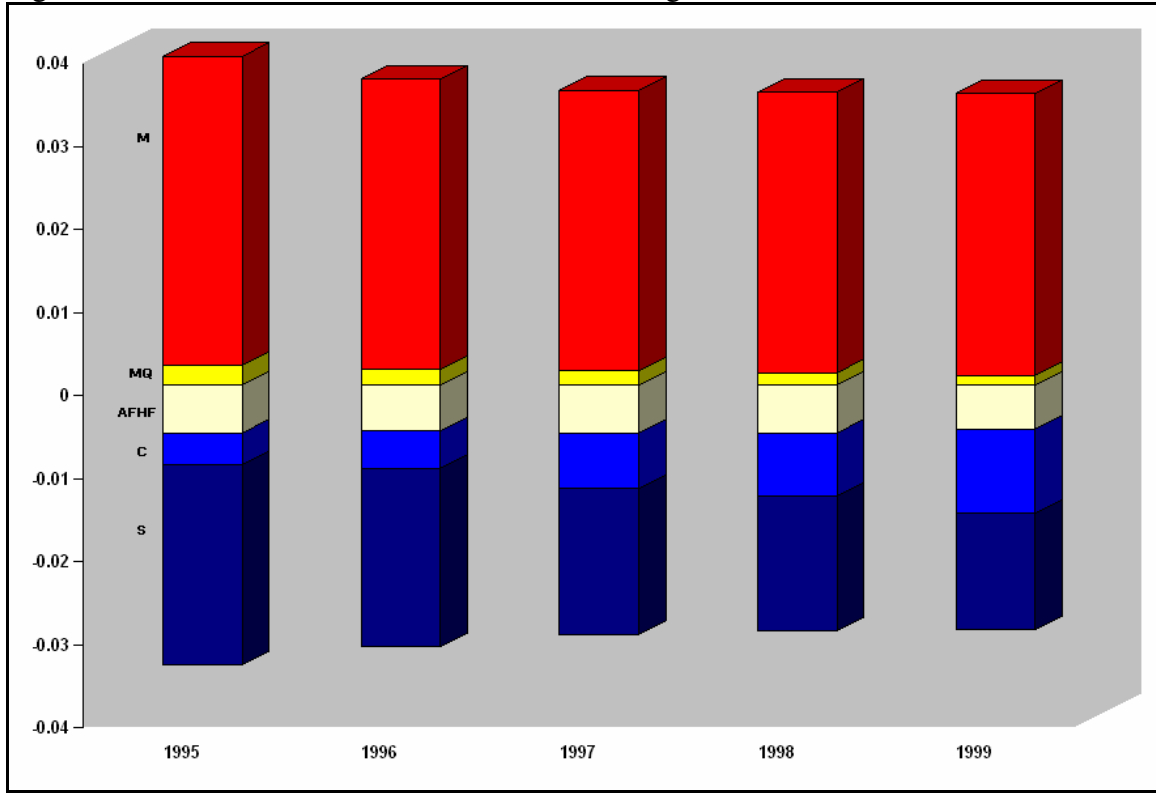
Under this taxonomy, the service sector (S) contributes to inequality from below the average. Even though relative wages for 'agriculture, hunting, foresting and fishing' (AFHF) are lower, their contribution to inequality is very small because of their small population share. The manufacturing sector (M) contributes to inequality from above the average, and construction (C) from below. The patterns during this period are an increase in the contribution to inequality from the construction sector, while the contribution from services and manufacturing declines. This would appear to mean that jobs created in the service sector have reduced overall inequality as time has passed.

We next depart from this taxonomy and focus on the service sector itself, disaggregated into 11 sub-sectors. Table 10 presents the between-sectors Theil's T statistic across 11 service sub-sectors at the regional and national level.

Table 10. Inequality Across 11 Service Sectors, National and Regional level, 1995-2000

		1995	1996	1997	1998	1999	2000
Country Level	Between Groups	0.0320	0.0320	0.0307	0.0301	0.0272	0.0256
	Within Groups	0.0334	0.0285	0.0192	0.0175	0.0170	0.0176
	Total	0.0655	0.0605	0.0499	0.0476	0.0442	0.0432
Regional Level	Between Groups	0.0329	0.0328	0.0314	0.0309	0.0278	0.0256
	Within Groups	0.0433	0.0379	0.0295	0.0286	0.0280	0.0282
	Total	0.0762	0.0707	0.0609	0.0594	0.0559	0.0538

The levels of inequality between the 11 sub-sectors are higher than between 5 sectors (Table 9) for two reasons: there are more groups present and there is heterogeneity among the sub-sectors. The between-groups component of Theil's T statistic at the regional and national level are, again, almost identical, suggesting that difference between regions within countries plays relatively little role in adding to inequality. The within-groups component, on the other hand, is larger at the regional level, but this is likely due to the much larger number of regions than countries.

The pattern through time is, again, one of declining inequality within the services sector, both within and between groups, and at both the regional and national levels. By graphing the individual Theil elements of the between-groups component of Theil's T statistic in a stacked bar plot, we can determine which sub-sectors reduced their contributions to the overall level of inequality.

Figure 5. Trend of Theil Elements for 11 Service Sectors, Regional Level
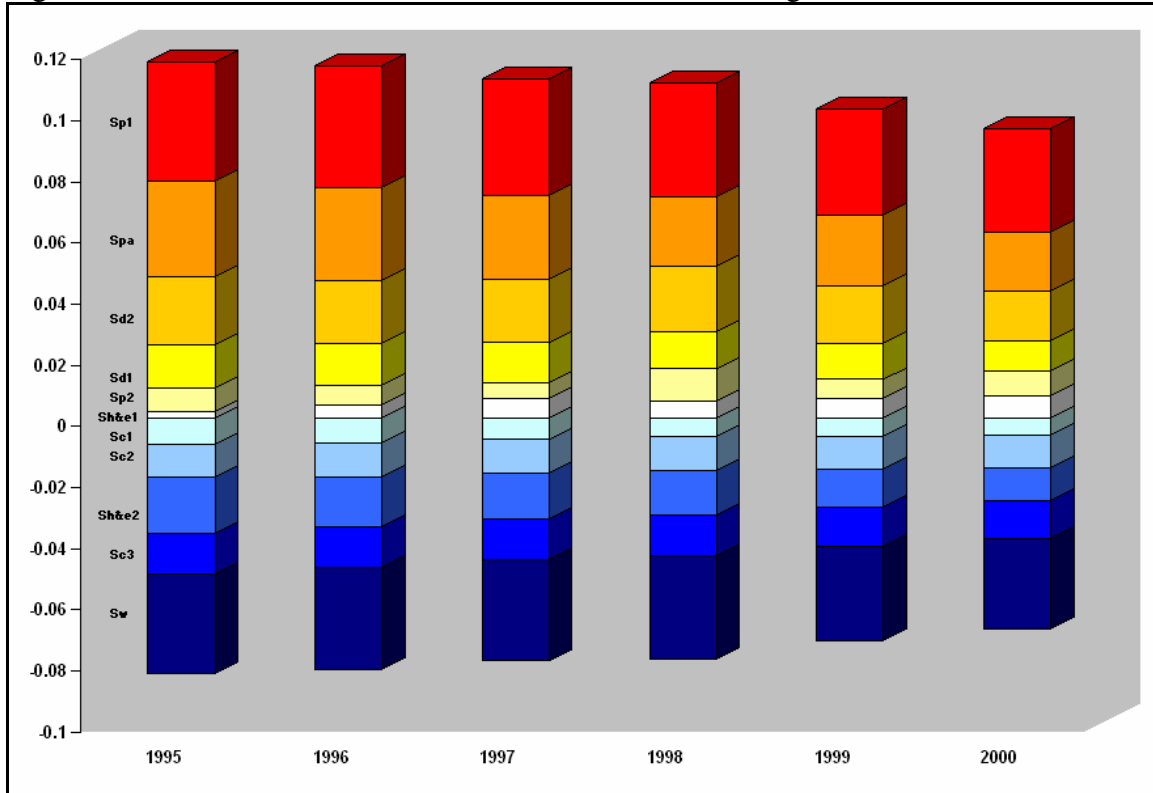
The contribution of 'public administration and defence' (Spa), and 'compulsory social security' (Spa) is positive and declines over time, while the contribution of 'wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods' (Sw), is negative but less negative over time. Both effects reduce inequality within services. This graph also displays movements in the contribution from 'real estate, renting and business activities' (Sp2), and from 'education' (Sh&e1). Both sectors contributed to inequality from above the average but fluctuated over time.

In our next calculations, we measure overall inequality across 16 sectors.

Table 11. Inequality across 16 Sectors, National and Regional level, 1995-2000

		1995	1996	1997	1998	1999	2000
Country Level	Between Groups	0.0262	0.0260	0.0255	0.0254	0.0237	0.0231
	Within Groups	0.0322	0.0267	0.0196	0.0191	0.0188	0.0209
	Total	0.0584	0.0527	0.0451	0.0445	0.0425	0.0441
Regional Level	Between Groups	0.0266	0.0262	0.0255	0.0255	0.0237	0.0227
	Within Groups	0.0717	0.0634	0.0555	0.0535	0.0518	0.0530
	Total	0.0983	0.0896	0.0809	0.0790	0.0755	0.0757

The trend in Table 11 displays a decline in the overall level of pay-inequality across the 16 sectors at the regional and national level, again both within and between groups though more strikingly within them.   Through the stacked bar graph, we determine the evolution of the individual Theil elements.

Figure 6. Trend of Theil Elements for 16 Sectors, Regional Level
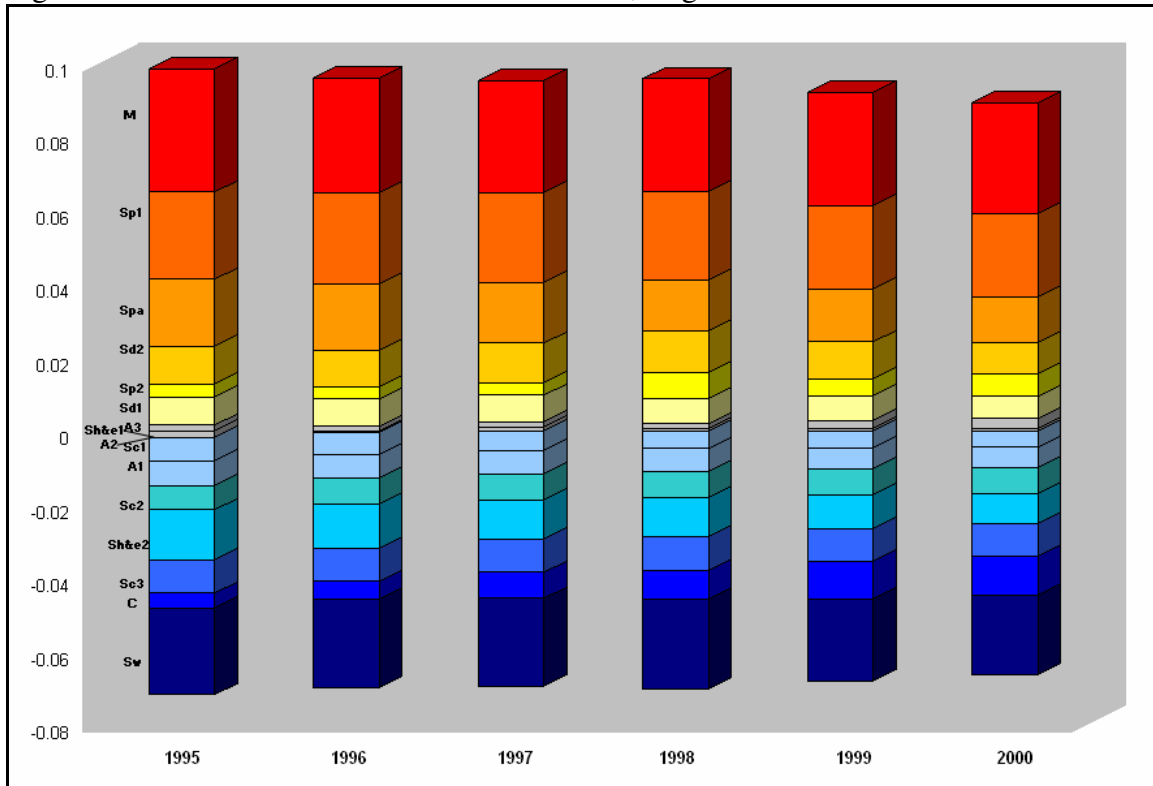
While some sub-sectors within services contribute to inequality from above and others contribute from below, there is no evidence to substantiate that growth in the service sector increases overall inequality. Instead the only sector that increased its contribution to inequality over time is the construction (C) sector.

Consumer services, a low wage sector, contribute to inequality from the lower end of the pay scale as shown in figure 7. The contribution to inequality from 'private households with employed persons' (Sc2) increases from 1995 to 1996 but remains stable thereafter, while the contribution to inequality from 'other community, social, personal activities' (Sc1) and 'hotels and restaurants' (Sc3) decreases, particularly in Sc1.

Figure 7. Movements of the Theil Elements, Consumer Services
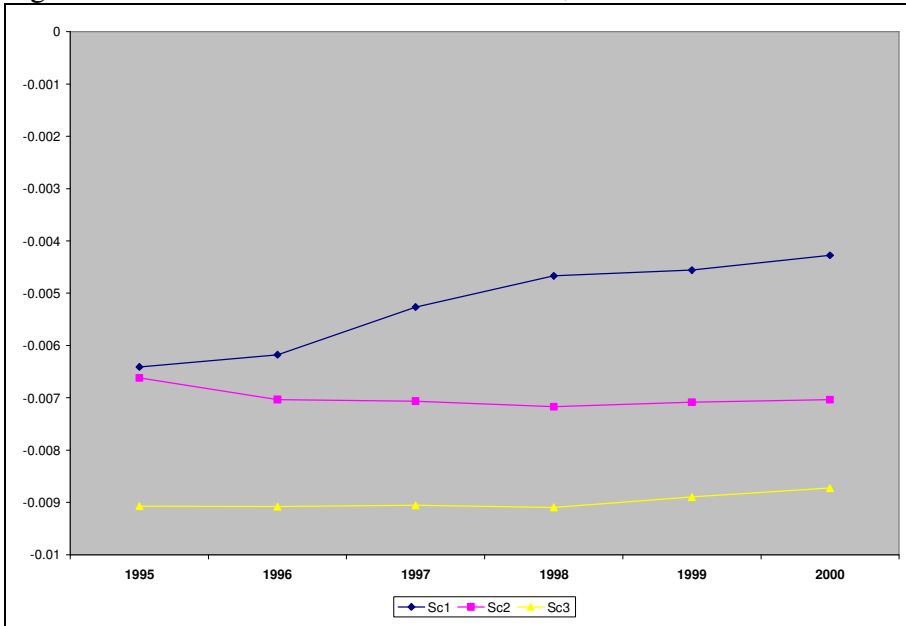
The movements in the Theil elements from distributive services are given in Figure 8. The contribution from distributive services to overall inequality occurs from above the average and marginally decreases over time, meaning that wages in both sub-sectors are losing ground relative to the European average.

Figure 8. Movements of the Theil Elements, Distributive Services
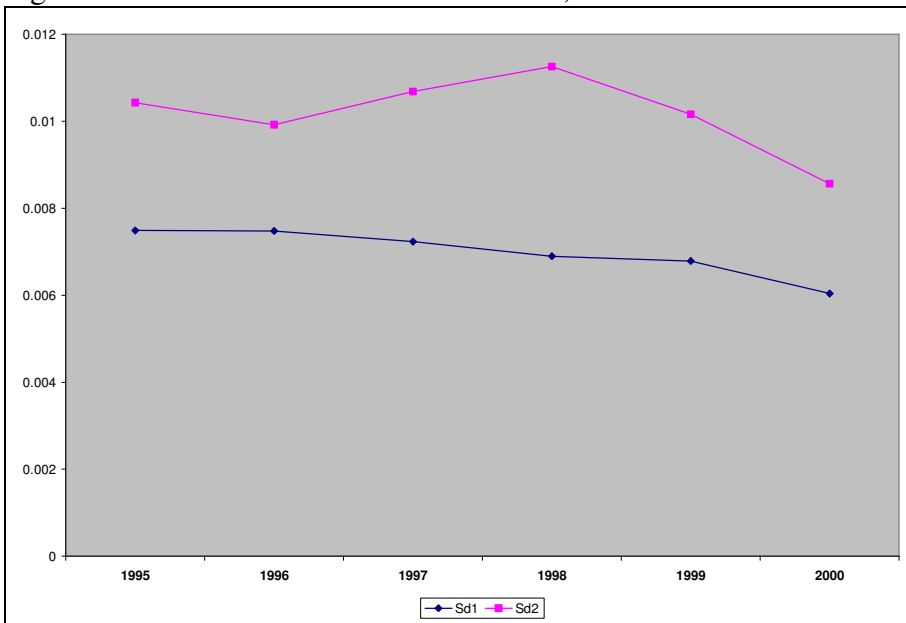
The trends in producer services do not display any significant changes in their contribution to inequality over time. The contribution from 'renting of business activities' (Sp2) to total inequality is very small. (We omit the figure.) Wages in private health and education (Sh&e1, Sh&e2) gained relative to the European average, as shown in Figure 9. The contribution of 'health and social work' (Sh&e2) to total inequality decreases, while the contribution from 'education' (Sh&e1) to inequality remains relatively low. But note that the contribution is from above the average, reflecting relative wage gains in this sector.

Figure 9. Movements of the Theil Elements, Private Sector Health and Education
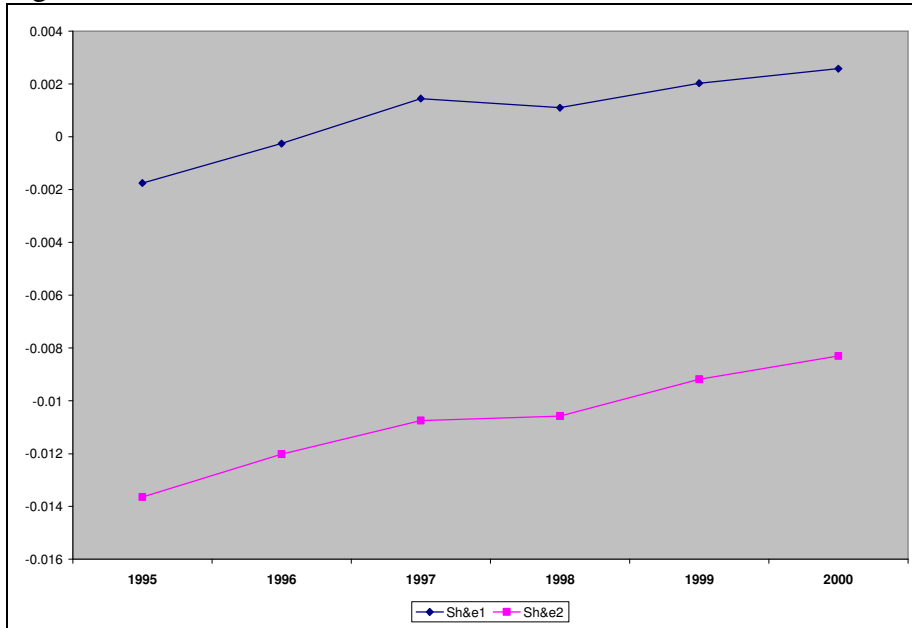
Finally, the contribution from 'public administration and defense, and compulsory social security' (Spa), and from 'wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household good' (Sw) to total inequality decreases during this period. The former, a positive contributor loses relative to the European average, and the latter a negative contributor gains. Both movements are small and we again omit the figure. In the remaining, non-service sectors, the contribution of the construction sector (C) to total inequality increases while in agriculture, fishing, and mining and quarrying (A1, A2, A3) it remains at very low levels with no significant pattern, and in manufacturing (M) it decreases. These patterns may be discerned from earlier figures and need not be repeated.

The overall pattern in services is a striking reduction in contributions to overall wage inequality from 1995-2000. In seven service sub-sectors (Sd1, Sd2, Spa, Sh&e2, Sc1, Sc3, Sw), the contribution to total inequality decreases over time, while in three sub-sectors (Sp1, Sp2, Sh&e1) the contribution remains at the same level. Only in one service sub-sector (Sc2) does the contribution to inequality increase.

Conclusions

The service sector is the main source of employment growth in the period 1995-2000 in Europe. While this fact lends some support to the idea of a "new industrial revolution" or at least the "coming of the post industrial society," we do not find evidence supporting the concept of a 'service sector trilemma' – that expansion in private services employment creates jobs at the lower end of the pay scale and increases overall pay inequality. This finding appears to be an artifact of aggregating heterogeneous service sector categories into a single overarching "sector," and therefore failure to take account of the heterogeneity of services sector employments.

In our analysis we treat the services sector with disaggregated data at the European scale, and we find a significant degree of heterogeneity with this sector. There is a group of service sub-sectors ['other community, social, personal service activities' (Sc2), and 'hotels and restaurants' (Sc3)] that falls at the lower end of the pay distribution. Another group ['electricity, gas and water supply' (Sd1), and 'financial intermediation' (Sp1)] falls at the top of the distribution. And a third group ['transport, storage and communication' (Sd2), 'private sector health and education' (Sh&e1, Sh&e2), 'real estate, renting and business activities' (Sp2) and the public sector (Spa)] comes in around the middle.

This means that as the service sector expands, the new jobs are not necessarily restricted to the bottom of the pay distribution. Indeed, we find that in practice jobs have been created mainly near the middle of the pay distribution. The most important source of employment expansion in services occurs in 'real estate, renting and business activities' (Sp2), and to a lesser extend in 'wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods' (Sw). Wages within these sectors fall around the middle of the pay distribution, and their contribution to total inequality is relatively low. On the other hand jobs are lost in the manufacturing sector (M), the public sector (Spa), in 'electricity, gas and water supply' (Sd1), where the contribution to inequality is relatively high, and in agriculture, fishing and mining (A1, A2, A3).

For these reasons, we find a striking pattern of declining inequality between and within the services sectors across Europe at the regional and national level. This declining pattern of inequality occurs both within the service sector considered alone, and across the whole European economy. It occurs despite a substantial – though not yet sufficient – rise in new job creation in services during this period. The phenomenon would appear to contradict the thesis that growth in employment in Europe requires sharp reductions in wage standards or abandonment of the "European value" of social equality.

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Appendix – Deriving the Theil Statistic

The Theil statistic is composed of two elements a between group inequality component and a within group inequality component:

$$T \equiv T_B + \overline{T_W} \qquad (A.1)$$

where:

T = Total Theil

T_B = Between-groups Theil component

$\overline{T_W}$ = Within-groups Theil component.

The between-groups component can be represented by the following two equations:

$$T_B = \sum_{i=1}^{n} \left(\frac{w_i}{\sum_{i=1}^{n} w_i} \right) \ln \left[\frac{w_i / \sum_{i=1}^{n} w_i}{e_i / \sum_{i=1}^{n} e_i} \right] \qquad (A.2)$$

$$T_B = \sum \frac{e_i}{\sum_{j=1}^{n} ej} \frac{\overline{w}_i}{\overline{w}_Y} \ln \left(\frac{\overline{w}_i}{\overline{w}_Y} \right) \qquad (A.3)$$

The within groups component equals:

$$\overline{T_w} = \sum_{i=1}^{n} \left(\frac{w_i}{w} \right) \bullet T_w \qquad (A.4)$$

$$T_w = \left(\frac{w_{ij}}{w_i} \right) \bullet \ln \left[\frac{w_{ij} / w_i}{e_{ij} / e_i} \right] \qquad (A.5)$$

If we index regions with the subscript i and sectors with the subscript j then

w_{ij} = the total compensation received in region j and sector i

e_{ij} = total people employed in region j and sector i

$\overline{w}_i$ = average income of region i

$\overline{w}_Y$ = average income of all regions

Appendix – Tables

Table A.1 List of Regions Included:

Obs	Code	Obs	Code	Obs	Code	Obs	Code	Obs	Code	Obs	Code
1	de1	32	es13	63	fr63	94	nl13	125	fi2	156	ukf1
2	de2	33	es21	64	fr71	95	nl21	126	se01	157	ukf2
3	de3	34	es22	65	fr72	96	nl22	127	se02	158	ukf3
4	de4	35	es23	66	fr81	97	nl23	128	se04	159	ukg1
5	de5	36	es24	67	fr82	98	nl31	129	se06	160	ukg2
6	de6	37	es3	68	fr83	99	nl32	130	se07	161	ukg3
7	de7	38	es41	69	ie01	100	nl33	131	se08	162	ukh1
8	de8	39	es42	70	ie02	101	nl34	132	se09	163	ukh2
9	de9	40	es43	71	itc1	102	nl41	133	se0a	164	ukh3
10	dea	41	es51	72	itc2	103	nl42	134	be10	165	uki1
11	deb	42	es52	73	itc3	104	at11	135	be21	166	uki2
12	dec	43	es53	74	itc4	105	at12	136	be22	167	ukj1
13	ded	44	es61	75	itd1(na)	106	at13	137	be23	168	ukj2
14	dee	45	es62	76	itd2(na)	107	at21	138	be24	169	ukj3
15	def	46	es7	77	itd3	108	at22	139	be25	170	ukj4
16	deg	47	fr1	78	itd4	109	at31	140	be31	171	ukk1
17	gr11	48	fr21	79	itd5	110	at32	141	be32	172	ukk2
18	gr12	49	fr22	80	ite1	111	at33	142	be33	173	ukk3
19	gr13	50	fr23	81	ite2	112	at34	143	be34	174	ukk4
20	gr14	51	fr24	82	ite3	113	pt11	144	be35	175	ukl1
21	gr21	52	fr25	83	ite4	114	pt12(na)	145	ukc1	176	ukl2
22	gr22	53	fr26	84	itf1	115	pt13(na)	146	ukc2	177	ukm1
23	gr23	54	fr3	85	itf2	116	pt14(na)	147	ukd1	178	ukm2
24	gr24	55	fr41	86	itf3	117	pt15	148	ukd2	179	ukm3
25	gr25	56	fr42	87	itf4	118	pt2	149	ukd3	180	ukm4
26	gr3	57	fr43	88	itf5	119	pt3	150	ukd4	181	ukn0
27	gr41	58	fr51	89	itf6	120	fi13	151	ukd5		
28	gr42	59	fr52	90	itg1	121	fi14	152	uke1		
29	gr43	60	fr53	91	itg2	122	fi15	153	uke2		
30	es11	61	fr61	92	nl11	123	fi16	154	uke3		
31	es12	62	fr62	93	nl12	124	fi17	155	uke4		

Table A.2 Employment Share by Country and Sector for 1995 and 2000:

Ind.	yr	be	dk	de	gr	es	fr	ie	it	nl	at	pt	fi	se	uk
a	95	1.5%	2.6%	:	5.2%	14.7%	17.0%	1.2%	33.8%	4.5%	1.5%	2.1%	2.2%	2.9%	10.7%
	00	1.6%	2.5%	:	5.0%	18.2%	19.2%	1.4%	30.6%	5.0%	1.6%	1.6%	2.3%	2.9%	8.3%
b	95	:	4.1%	:	5.0%	40.0%	17.1%	:	20.7%	:	:	11.7%	0.6%	0.8%	:
	00	:	3.2%	:	6.3%	39.3%	17.7%	:	19.2%	:	:	11.2%	2.1%	1.0%	:
c	95	:	0.6%	41.4%	3.4%	12.5%	11.7%	1.1%	7.7%	1.7%	1.8%	0.9%	1.0%	1.9%	14.1%
	00	:	0.8%	32.5%	3.9%	13.8%	10.8%	1.5%	9.2%	1.9%	2.0%	1.4%	1.4%	1.9%	18.7%
d	95	2.4%	1.7%	29.5%	1.5%	8.3%	13.9%	0.8%	15.2%	3.3%	2.5%	1.8%	1.4%	2.7%	15.0%
	00	2.3%	1.6%	29.2%	1.5%	9.5%	13.8%	1.0%	15.2%	3.4%	2.4%	1.8%	1.7%	2.6%	14.0%
e	95	2.3%	1.5%	29.8%	3.4%	6.5%	16.9%	1.1%	13.1%	3.3%	3.2%	0.9%	1.6%	2.6%	13.9%
	00	2.5%	1.3%	27.6%	3.8%	7.0%	19.4%	1.0%	13.1%	3.2%	3.4%	1.0%	1.7%	2.9%	12.2%
f	95	2.2%	1.5%	33.7%	2.0%	12.4%	13.6%	0.8%	10.6%	4.2%	3.3%	1.5%	1.1%	2.2%	10.8%
	00	2.0%	1.6%	29.9%	2.1%	14.4%	13.1%	1.4%	9.8%	4.4%	2.9%	1.8%	1.7%	2.1%	12.6%
g	95	3.1%	2.8%	:	1.4%	10.8%	19.8%	1.1%	12.7%	6.1%	3.9%	1.6%	1.7%	3.8%	31.3%
	00	2.9%	2.7%	:	1.4%	11.4%	19.4%	1.4%	12.9%	6.3%	3.7%	1.5%	1.9%	3.5%	31.0%
h	95	2.3%	1.7%	:	2.2%	13.5%	15.2%	1.5%	12.1%	3.4%	4.9%	1.4%	1.4%	2.5%	37.7%
	00	2.1%	1.6%	:	2.2%	13.2%	15.7%	2.1%	12.5%	3.4%	4.6%	1.6%	1.6%	2.4%	36.9%
i	95	3.0%	2.1%	25.8%	2.2%	7.7%	17.6%	0.7%	10.5%	4.2%	3.0%	0.6%	1.7%	3.4%	17.4%
	00	2.9%	2.1%	24.5%	2.1%	7.7%	17.8%	1.0%	10.5%	4.4%	2.8%	0.6%	2.0%	3.3%	18.2%
j	95	2.7%	1.7%	25.1%	1.6%	7.5%	14.5%	1.0%	12.3%	4.4%	2.6%	0.6%	1.1%	1.9%	22.8%
	00	2.8%	1.6%	26.5%	1.8%	7.1%	13.8%	1.4%	11.9%	5.3%	2.5%	0.5%	0.8%	2.0%	22.3%
k	95	2.3%	1.6%	23.5%	0.8%	5.7%	17.7%	0.5%	9.0%	5.8%	1.7%	0.4%	1.1%	3.0%	26.9%
	00	2.2%	1.5%	27.7%	0.7%	5.2%	17.1%	0.7%	8.6%	5.8%	1.7%	0.3%	1.2%	2.7%	24.6%
l	95	3.4%	1.9%	26.2%	2.4%	10.4%	19.3%	0.6%	12.4%	3.7%	2.1%	1.0%	1.4%	2.7%	12.5%
	00	3.7%	1.8%	24.3%	2.5%	10.9%	20.8%	0.7%	11.9%	3.7%	2.2%	1.1%	1.4%	2.4%	12.6%
m	95	4.4%	2.5%	:	2.5%	9.8%	22.0%	1.2%	19.7%	3.7%	3.0%	1.3%	1.8%	5.0%	23.3%
	00	4.1%	2.4%	:	2.5%	9.8%	21.1%	1.2%	18.0%	3.7%	3.1%	1.4%	1.8%	4.5%	26.3%
n	95	3.0%	4.3%	:	1.6%	8.2%	22.5%	1.1%	11.2%	5.8%	2.7%	0.8%	2.9%	7.4%	28.5%
	00	3.3%	4.5%	:	1.7%	8.4%	22.1%	1.3%	10.9%	6.3%	2.7%	0.9%	3.1%	7.2%	27.7%
o	95	2.6%	2.7%	:	2.5%	10.7%	19.9%	1.3%	14.2%	4.6%	3.6%	0.9%	2.2%	6.2%	28.6%
	00	2.2%	2.5%	:	2.1%	10.7%	21.3%	1.5%	14.6%	4.6%	3.4%	1.0%	2.3%	5.2%	28.6%
p	95	2.9%	0.6%	:	1.6%	29.6%	17.4%	0.4%	44.4%	:	0.4%	2.4%	0.3%	0.0%	:
	00	3.4%	0.4%	:	2.1%	28.3%	19.9%	0.2%	42.4%	:	0.4%	2.3%	0.4%	0.0%	:

Appendix – Figures

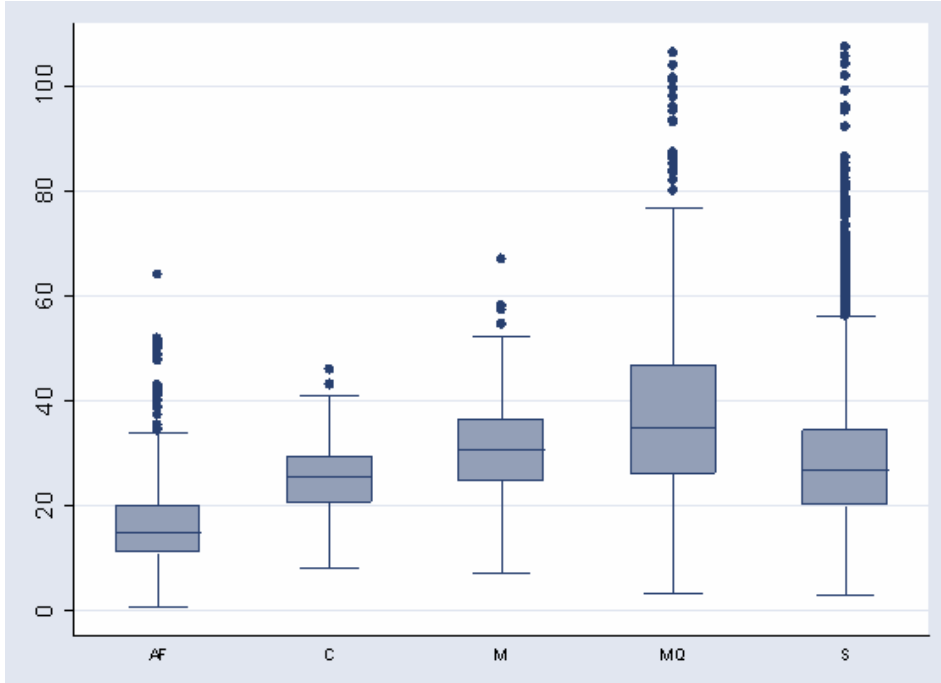Figure A1. Average Wages Across 5 Sectors, 1995-2000

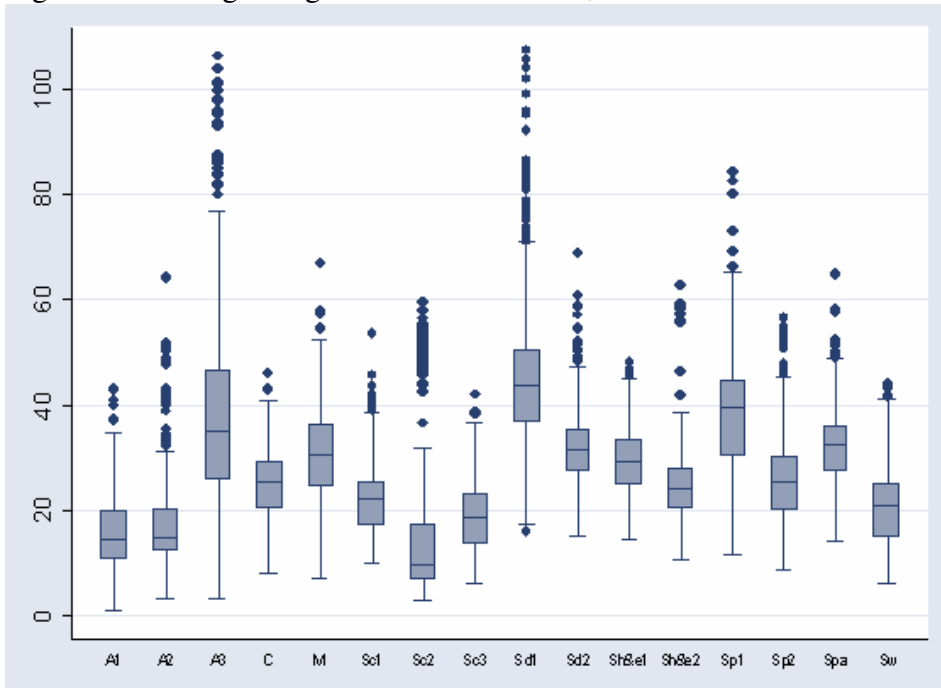Figure A2 Average Wages Across 16 Sectors, 1995-2000

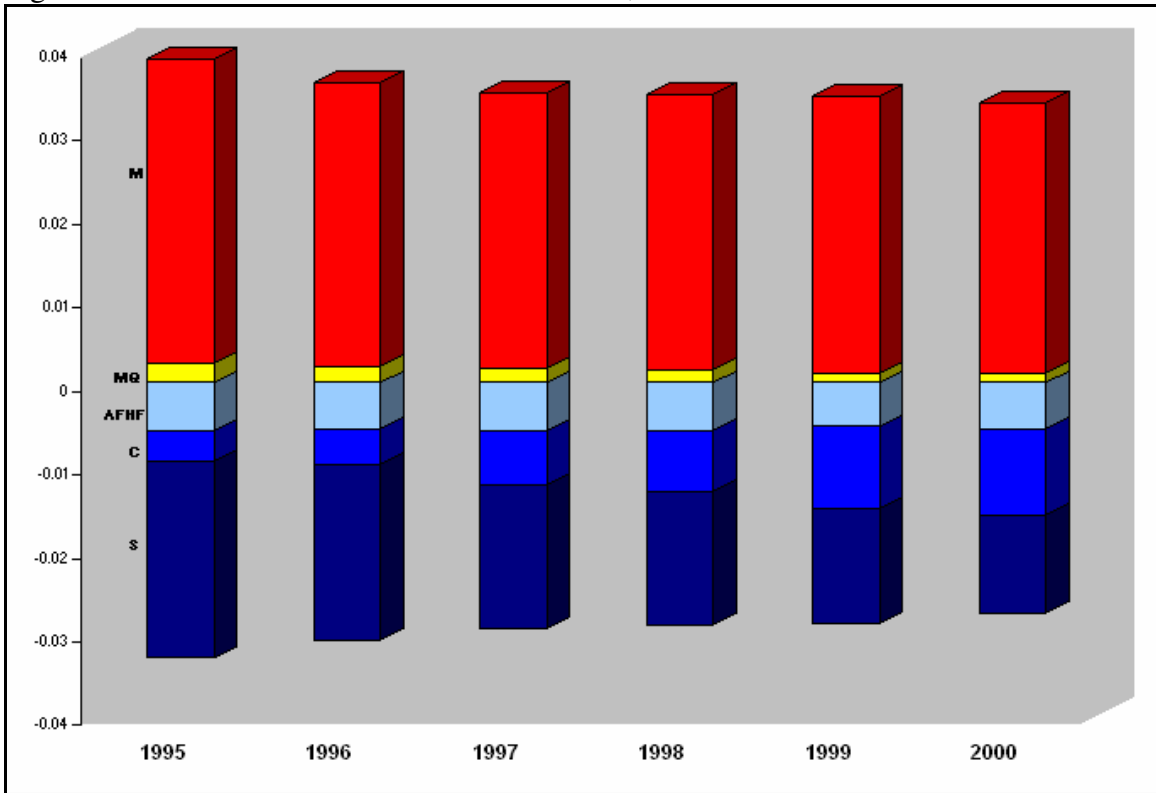Figure A3 Trend of Theil Elements for 5 Sectors, National Level

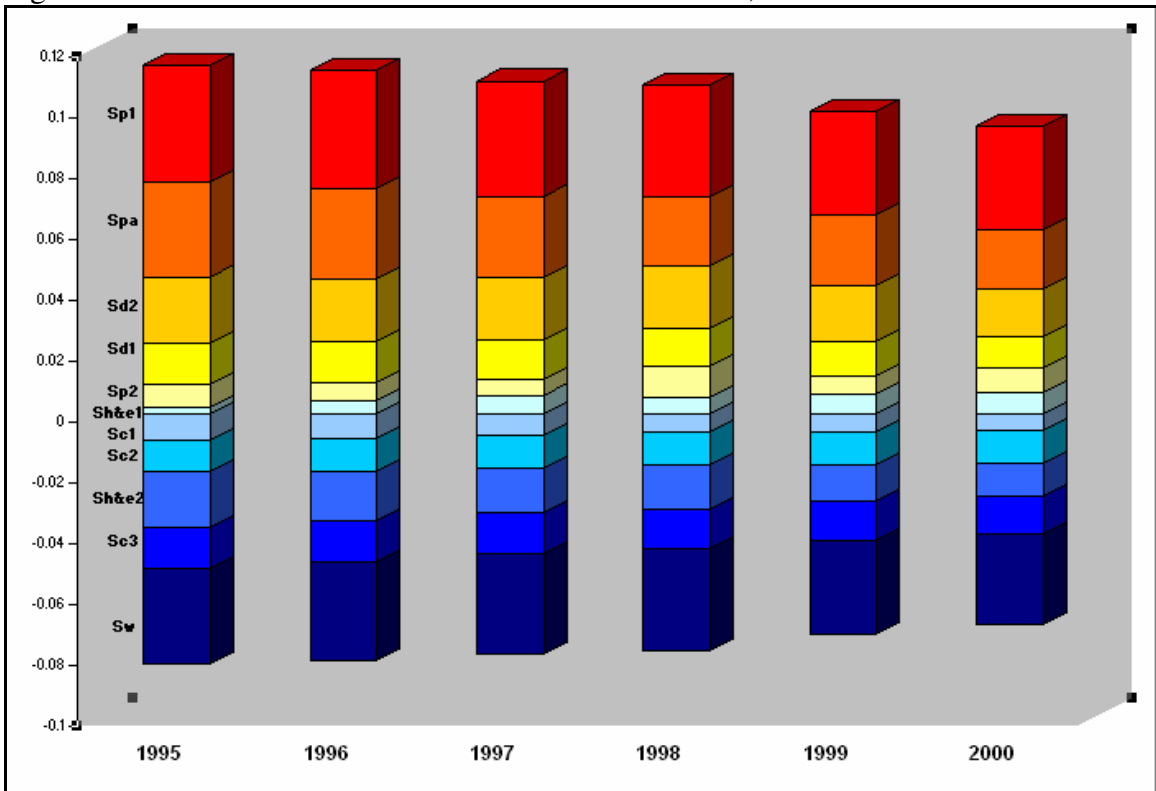Figure A4 Trend of Theil Elements for 11 Service Sectors, National Level

Figure A5 Trend of Theil Elements for 16 Sectors, National Level