Sector Bias and Sector Dualism: The Knowledge Society and Inequality*

Daniela Rohrbach†

June 24, 2008

There are several explanations for the inequality upswing in the literature: rising globalization, the institutional re-structuring of the nation states, as well as changes in the relation between the demand for and the supply of skills. Concerning demand changes, Kuznets and Lewis identified two inequality affecting mechanisms with regard to the agriculture-to-industry transition: sector bias - i.e. inequality within sectors - and sector dualism - i.e. inequality between sectors. In this paper it is analyzed whether there are analogue effects on inequality from the sectoral change to the knowledge society. Following the strategy of a most-similar design and a variable oriented approach the hypotheses are tested cross-nationally and longitudinally in 19 OECD countries between 1970 and 1999. To verify sectoral effects, error component models are computed regressing the Gini-coefficient on a globalization measure, the union density, the educational attainment as well as the employment and income differential in the knowledge sector. The results show that some amount of the inequality upswing in the last decades can be explained by the sectoral change to the knowledge society.

First draft. Please, do not quote without the permission of the author.

* Paper to be presented at the Midterm Conference of the ISA-RC02 on *Inequality beyond Globalization*, University of Neuchâtel, Switzerland, June 26-28, 2008. The paper is part of the dissertation project of the author. The project was co-funded by the 'Graduiertenstipendium' of the University of Cologne. The author is deeply greatful for the funding.

† Federal Institute for Vocational Education and Training Germany (BIBB), Data-Research-Center, Robert-Schuman-Platz 3, D-53175 Bonn, Germany. Email: rohrbach@bibb.de.

Contents

1 Inequality in the Emerging Knowledge Societies

1.1 Descriptive results: Inequality trends between countries and within countries over time

The systematic analysis of inequality variation between developed[1] countries and over time is rather a new field of research (e.g. see the meta-analysis of Atkinson and Brandolini 2004). A good proportion of theories aiming at explaining the long-term development of inequality is based on data from societies with very different levels of economic development at a rather small period of time (see Kanbur 2000: 804). This rests upon the assumption that valid trends are deducible from cross-sectional comparisons of societies at different stages of a more or less same trajectory. The "most-dissimilar-system" (Przeworski and Teune 1970) comparison grosso modo reveals that industrialized countries are less unequal than less economically developed countries; there are statistically significant negative associations between the gross national product, the energy consumption, and other indicators for modernization on inequality (e.g. Paukert 1973; Creshaw and Armeen 1994). However, within the industrialized countries there are marked differences in the relative[2] level of income inequality. As often documented, the United States of America and United Kingdom

[1] The discussion of inequality trends from a most-dissimilar-design perspective, i.e. comparing developing countries or countries with strong political reform processes with the group of highest income countries is outside the focus of that paper. See e.g. Cornia and Court (2001) for a global overview.

[2] While measures like the Lorenz-curve based Gini-coefficient and percentiles with unadjusted data show income spreads relative to the countries mean, only data based on purchasing power parities allow for absolute differences between countries (see Gottschalk and Smeeding 2000: 208-5).

on the one hand, and the Scandinavian and the Benelux countries on the other hand, form the highest and lowest poles of the income inequality continuum (Gardiner 1997; Gottschalk and Smeeding 2000; Gangl 2005). These differences in the relative level of inequality seem to persist independently of the trends within countries over time (also see Smeeding and Grodner 2000: 212-4).

Comparable long-term data are available only for a small number of countries (Gottschalk and Smeeding 2000: 292; Morrisson 2000: 220). In the course of development in the USA, UK and some western European countries inequality is declining with proceeding industrialization from the end of 19th century until the 1960s or 70s (Lindert 2000a, 2000b; Williamson and Lindert 1981; Williamson 1985; Paukert 1973; Gottschalk and Smeeding 2000: 292; Morrisson 2000). A curvilinear development is observable in the USA: before declining until the 1960s inequality initially rose with the economic growth at the beginning of 19th century (see Williamson and Lindert 1990: 281, cit. by Nielsen and Alderson 1995: 675). On the contrary, from the 1970s there seems to be a trend reversal in several countries: As Harrison and Bluestone (1988) notice, there is a great u-turn in the inequality development over time (also see Gottschalk et al. 1997a; Katz and Autor 1999; Alderson and Nielsen 2002). Several studies based on different data sets and measures[3] (Gottschalk 1997; Wallerstein 1999; Gottschalk and Smeeding 2000; Smeeding and Grodner 2000; Pontusson et al. 2003; Firebaugh 2003: 161) repeatedly demonstrate that income inequality is rising in developed countries in the last decades (for an overview of existing studies see Hradil 2005; Atkinson and Brandolini 2001). However, apart from a considerable amount of descriptive results the systematic explanation of country and time variation in inequality still stands out (DiPrete 2007; Kenworthy 2007; Atkinson 2007).

1.2 Explaining the trends: Causes of inequality variation

To explain the longitudinal variation there are theories with different scopes: the modernization theories (Bell 1972, 1973; for an overview see Hradil 2005) aim at explaining long-term developments while some factors like globalization and institutional change have been brought forward especially in view of the looming trends at the end of 20th century. With regard to the association between inequality and development, i.e. the historical development of inequality, there are in principle three different forecasts[4]: from the early knowledge society and some modernization theorists the association is negative, from the

[3] For analyses based on different data sets see Gottschalk and Smeeding (2000), for analyses of the Deininger and Squire data beside others see Firebaugh (2003), for the Luxembourg Income Study (LIS) data beside others see Gottschalk (1997: 19), Smeeding and Grodner (2000).

[4] Research summaries decompose the explanations into *two* ("market forces" versus "political institutions" (Pontusson et al. 2002), "modernization" versus "globalization" (Hradil 2005), "supply- and demand-side factors" vs. "institutional factors" (Blau and Kahn 2002: 168 et seqq.) or changes in the "demand for skills" versus "supply of skills" (Galbraith 2001: 6)), *three* ("globalization, skill-biased-technical change and organizational change" (Aghion et al. 1999)), or *four* bundles of factors ("demographic change, economic restructuring, changes in the institutional context and globalization" (Morris and Western 1999)).

globalization theories it is positive and then there are assumptions on a non-linear process (see below). These forecasts are based on the consideration and the weighting of different factors. These factors are: Globalization, institutional change, changes in the supply of labor, and finally changes in the demand of skills (Aghion et al. 1999; Gustafsson and Johansson 1999; Morris and Western 1999; Alderson and Nielsen 2002; Bornschier 2002; de Gregorio and Lee 2002; Eicher and Garcia-Penalosa 2000; Mahler, 2004; Lee 2005).

Genuine inequality increasing effects resulting from rising world economic integration discussed in the literature are mainly the increase in foreign direct investment and rising "North-South-trade" (see e.g. Wood 1994; Hradil 2005). However, the assumption that wage dispersion trends are directly linked with globalization has been criticized (Goldthorpe 2003). One the one hand, the situation for employees would be much more complex than the standard two-economy model (the "Heckscher-Ohlin model", see Aghion et al. 1999) would suggest, because prospects of redistribution by welfare state institutions would be largely ignored (Atkinson 2001). On the other hand, empirical evidence is non-uniform (Nollmann 2006: 640): In contrast to e.g. Alderson and Nielsen (2002) several authors exploiting data also for the second half of the 1990s come to the conclusion of marginal or even no verification of the globalization thesis (Mahler 2004; Kenworthy 2004; Nollmann 2006; also see the meta analysis of Atkinson and Brandolini 2004).

The fact of partly huge differences within the most economically advanced countries has resulted in a research stream focusing on the idea of embeddedness. Against a logic that is purely market based there would be a plenty of ways by which welfare regulation and redistribution affects inequality (for an overview see e.g. Bornschier 2005; Palme 2006; Tranby 2006). Again, the relative importance of institutional changes causing inequality (e.g. less corporatism, de-unionization) as compared to the other factors is judged quite differently (for a discussion see DiPrete 2007: 609 et seqq.)

With regards to changes in the supply of skills foremost changes in the age and gender composition of the work force serve as a candidate for the inequality upswing by lowering the value of skills at the lower part of the skill distribution (Morris and Western 1999). However, comparative studies attach just moderate importance to variables like rates of population increase, female labor force participation and migration (Alderson and Nielsen 2002; Nollmann 2006). On the contrary, changes in the qualificational structure, as such, matter a lot in cross-national analyses. The rising skill supply due to educational expansion applies for an efficient political method to reduce inequality (see Tinbergen 1975; Checci 2000; de Gregorio and Lee 2002: 295). As e.g. Creshaw and Ameen (1994) argue, at higher levels of educational expansion the negative relationship between greater supply of skills and inequality may reverse and become positive due to rising inequality in the educational distribution[5] or rising skill premia resulting from composition effects or accelerated demand

[5] DeGregorio and Lee (2002) can show that in fact in the OECD area educational inequality has risen in the last decades and this in turn has statistically significant effects on income inequality. As e.g.

for skills (Knight and Sabot 1983; Ram 1990; Park 1996b; Kanbur 2000: 820; Bornschhier 2002; van de Werfhorst 2007: 242 et seqq.). Yet, studies exploiting data from advanced industrial societies until the early 1990s predominantely do not find such a curvilinear relationship.

Estimating the relative impact of the factors discussed above Alderson and Nielsen (2002) find that while the institutional settings of the nation states explain much of the variance between countries, globalization has a clear positive longitudinal impact on income inequality. However, the variable for the sectoral change (percentage of labor force in agriculture) has the strongest cross-national and longitudinal impact on inequality.

How, then, sectoral change may influence income inequality? Kuznets (1955) and Lewis (1954, 1983) identified two inequality affecting mechanisms with regard to the agriculture-to-industry transition: sector dualism - i.e. inequality between sectors, and sector bias - i.e. inequality within sectors. Generally, sector dualism causes inequality if there is a change from one sector with relatively low earnings (and skills) to a more modern sector with relatively high earnings (and skills). In the course of the development inequality initially must rise and then start to decline, when the modern sector has become dominant. Sector bias occurs if the older and newer sectors differ with respect to their internal inequality (and skills). If there is a change from the dominance of one sector with relatively low internal inequality to a sector with relatively high inequality, income inequality will rise in the course of this development. Societal development thus can be interpreted as a process of growth that takes place within a modern enclave of the economy but proceeds to become the dominant economic model: in general, "development must be inegalitarian because it does not start in every part of the economy at the same time" (Lewis 1983, cit. by Kanbur 2000: 794). Not until the development has comprised larger fractions of the working population, inequality should begin to decline.

The transition from the agricultural to the industrial society then can be understood, firstly, as a change from a society which is characterized by lower mean earnings and skills to a society that is, on average, better educated and wealthier. At the beginning of that process, i.e. the continuous decline of proportions working in the agricultural sector, inequality has to grow, until it starts declining with rising dominance of the industrial sector. Secondly, the transition can be described as a change from an economy that is dominated by a relatively high unequal sector (agriculture) to a relatively equal dominant sector (industry). Becoming an industrial society then would mean a constant decline in overall inequality. Based on the concurrence of both mechanisms, Kuznets and Lewis predict a curvilinear, inverted u-shaped development of inequality.

There are myriad efforts to empirically proof such an inverted u-shaped development (see Kanbur 2000: 806 et seqq.) - with results confirming (Creshaw and Ameen 1994;

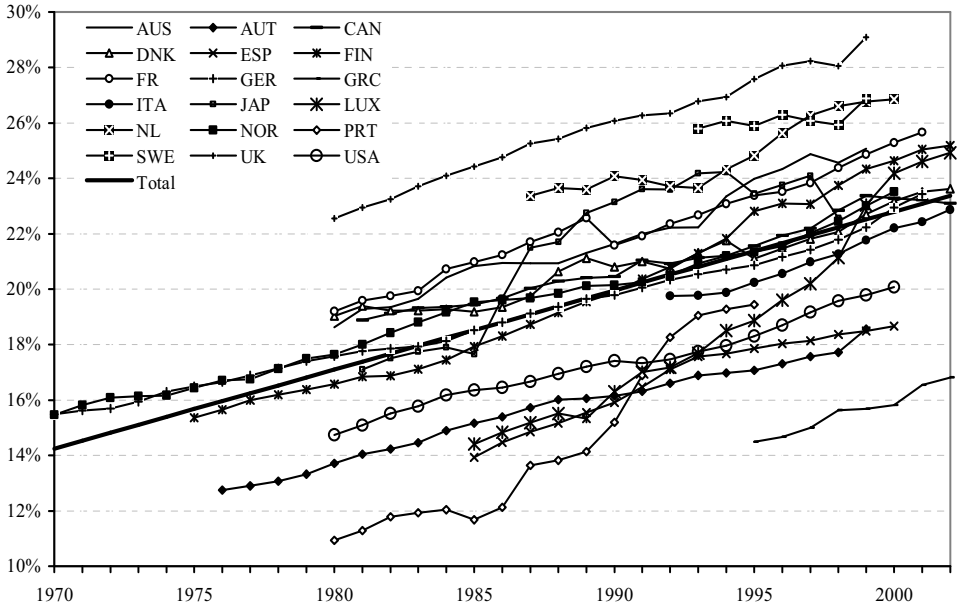
Bornschier (2002) suggests the factual distribution of qualifications becomes more unequal because those who take part in above-secondary education are also more likely to take advantages of more continuing education and training.

Bourguignon and Morrisson 1998; Higgins and Williamson 1999) and not confirming that hypothesis (Morris and Western 1999: 649). Alderson and Nielsen (2002) find that sector dualism between the agricultural and industrial sector has a statistically significant positive effect on inequality indeed in the core model, but that it is not statistically significant or even significantly negative in the full model. On the contrary, as already noticed above, the proportion of people engaged in the agricultural sector indeed has strong significant effect on inequality. But, contrary to what was expected the variable is negatively signed. The authors conclude that this may indicate some sort of agricultiral traditionalism instead of sector bias (ibid.: 1283). Overall, the proponents of the modernization and knowledge society theories have seen the decline in inequality with proceeding industrialization as a proof for the correctness of Kuznets and Lewis hypotheses.

In face of the emerging turning point several authors have suggested that this is due to an anew sectoral change, namely the change from industry to service sector employment. This transition, in contrast, would mean a transition to more inequality (e.g. see Conceicao und Galbraith 2001; Nollmann 2006). Even more than with regards to the agriculture-to-industry change there are mixed empirical results on the de-industrialization thesis. This may not be surprising for the following reasons: first, it is largely neglected that results strongly depend on whether the analyses are based on de-industrializing countries (i.e. the OECD) over time or on countries of rather different economic development within a smaller time-frame (also see Hradil 2005: 463 et seqq.). The overwhelming part of analyses on that issue is based on country samples of very different countries. Secondly, there are shortfalls in the verification of measures: Sector dualism is measured as the differential between the proportion of value added and employment in the relevant sector. This is based on the idea that a positive (negative) value indicates a high (low) productivity and in turn reflects high (low) wages. Inequality within sectors is proxied by the proportion of employment in that sector.

As demonstrated in Rohrbach (2007) there is a clear sectoral trend towards the knowledge society in the OECD area: Proportions of employment (see figure 1) and value added (see figure 2) in the knowledge sector (KS) as compared to services, industry and agriculture are constantly rising from the 1970s on. As for the development towards the industrial society one could assume such sectoral effects in course of the development towards the knowledge society (also see Bornschier (2002: 8) if at least one of the following conditions are met: this expanding sector must be characterized by relatively higher earnings (and skills) or higher inequality of earnings (and skills) than the remainder of the economy.

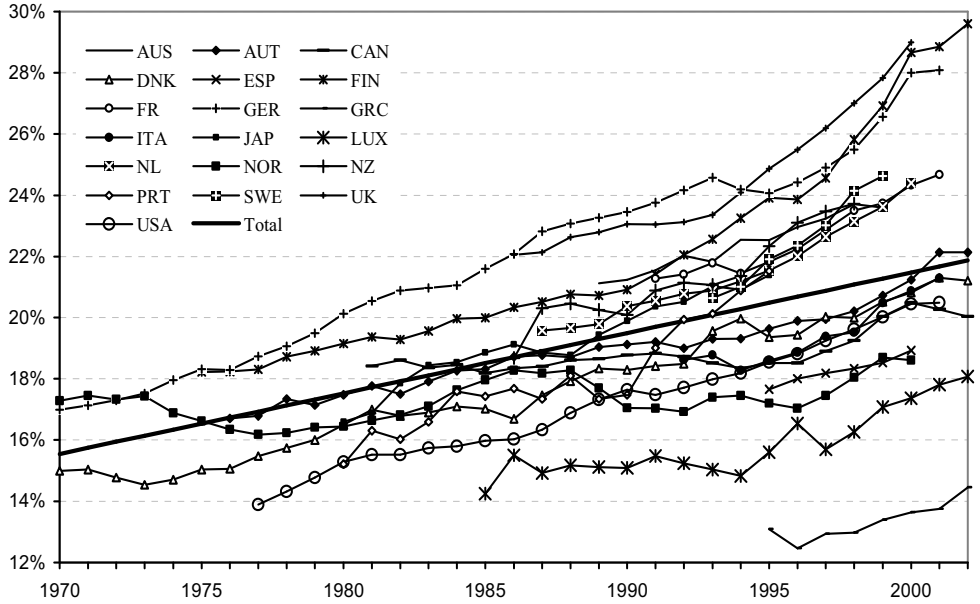
How plausible both assumptions are? With regards to sector dualisms one could argue that due to the technological progress in all sectors, thus the productivity levels and incomes between sectors may have declined or even diminished over time. However, its longitudinal development will be inspected before using the variable as a predictor in the multivariate models. Concerning sector bias, there are good reasons to assume an



Notes: AUT, CAN, JAP, UK: Number of jobs; UK: Number of Employees. **Source**: OECD 2003, 2001; own calculations. *The figure is first appearing in Rohrbach (2007, Social Science Information © SAGE Publication Ltd & Foundation of the Maison des Science de l'Homme).*

Figure 1: Percentage share of knowledge sector employment (headcounts) by country (actual values) and regressed for all countries (total), 1970-2002

increasingly biased demand for skills due to the knowledge sector growth. Nevertheless, the structure of changes in the demand for skills is in fact an object of controversial discussion. On the one hand, within the classical skill-biased technical change (SBTC) framework it is taken for granted that within the last decades the demand is monotonously rising in skills, so that the wage distribution is spreaded (Morris and Western, 1999; Acemoglu 2002). On the other hand, authors examining changes in job task content with data from e.g. the Dictionary of Occupational Titles conclude that through computerization it is not low-qualified labor but routine job tasks typically worked by medium qualified people that are shrinking in size (Autor et al. 2006). They argue that computerization replaces human labor in those jobs, be they manual or cognitive, which perform routine tasks. In contrast, technology (as yet) is complementary to non-routine job tasks which may be high-skilled as well as low-skilled (Autor et al. 2003). In the literature the dominant view is one of increasing requirements. Studies for the United States (Autor et al. 2006), Great Britain (Goos and Manning 2004), West Germany (Spitz-Oener 2006) suggest that the relative demand trends for qualifications are better described as polarization than as mere enhancement (also see Warhust and Thompson (2006)). From this perspective, inequality



Notes: AUS, FR, GRC, LUX, NL, NOR, NZ, SWE, USA: annually re-weighted chained Laspeyres, other: fixed-weight Laspeyres; AUS, NZ, PRT, SWE: current prices, CAN: 1997=100, FIN: 2000=100. Source: OECD, own calculations. *The figure is first appearing in Rohrbach (2007, Social Science Information © SAGE Publication Ltd & Foundation of the Maison des Science de l'Homme).*

Figure 2: Percentage Share of Knowledge Sector Value Added by Country (actual values), and regressed for all Countries (total), 1970-2002

not only results from rising skill premia at the top of the educational distribution but also relative losses for medium skills. Overall, empirical analyses on skill demand change are rare; data on the occupational and qualification structure within industries may give an impression of the skill demand trends resulting from KS growth.

The transition from the high-technology based service society to a knowledge society then can be understood, firstly, as a change from a society with lower mean earnings and skills to a society that is, on average, better educated and wealthier (sector dualism). Secondly, the transition can be described as a change from an economy that is dominated by a relatively equal sector to a relatively unequal dominant sector (KS). Becoming a knowledge society would mean a constant increase in overall inequality.

To sum up, there are competing hypotheses on the causes of long-term inequality variation. In addition to the factors often discussed in the literature, the sectoral change towards the knowledge society may serve as a further concept of similar centrality for understanding today's inequality. In the following, it should be empirically tested whether the expansion of the knowledge sector - via sector dualism and sector bias - is a factor for inequality, i.e. the KS has statistically significant partial effects when controlling for globalization,

demographic shifts (each with positive effects), educational expansion and compensating institutional factors (each with negative effects).

1.3 Hypotheses

In a first step, the qualification and wage structure of the KS has to be inspected, thus testing the following hypothesis by cross-national and longitudinal analysis:

- **Wage Differential Hypothesis**: There is a wage differential between the KS and the remainder of the economy.

- **Upgrading Hypothesis**: The KS is more characterized by high qualifications and less by low qualifications than the remaining economy.

- **Polarization Hypothesis**: The KS is more characterized by high-skilled and low-skilled non-routine qualifications and less by medium-skilled routine qualifications than the remaining economy.

In a second step, the wage and qualification structure of the KS is tested against the competing hypotheses on the causes of longitudinal inequality variation. With regard to KS related changes in the demand structure of employment, the following hypotheses should be tested by cross-national and longitudinal analysis:

- **Sector Dualism Hypothesis**: The higher is the wage differential between the KS and the remainder of the economy is, the higher is the income inequality.

- **Sector Bias Hypothesis**: The higher is the employment in the KS is, the higher is the income inequality.

2 Data and Methods

2.1 Data: Country sample and research period

The hypothesis formulated above call for validity in multiple or even all advanced industrialized service societies. The prior aim of that study then is the generalization of theory driven hypotheses by verification in as much countries as possible. In the sense of strategies aiming at achieving the ideal of experimental comparisons Ragin (1987: 30 et seqq.) calls this type of cross-national comparison ”variable oriented method”. Contrary to the ”case oriented method” it is not the accentuation and interpretation of complexity in a few numbers of cases but to bring in statistical control by analyzing as much countries as

possible with quantitative methods. Moreover, considering time, costs and expertise when aiming at analyzing a multitude of countries, Pzewoski and Teune (1970: 32 et seqq.) vote for two strategies: the analysis of countries, in which the number of systemic characteristics is assumed to be at most and thus is assumed to be controlled for - "most similar system design" - or the testing of hypotheses in a range of as much as dissimilar countries - "most dissimilar system design". To test the hypotheses, data for an adequate period of time and as much countries as possible have to be analyzed. The quality of results, however, depends foremost on the functional equivalence of measures, i.e. the spatial and temporal comparability of data (Hoffmeyer-Zlotnik and Wolf 2003; also see Harkness et al. 2003: 8).

Against that background, the following study follows the strategy of a most-similar design and a variable oriented approach, meaning that the hypotheses are tested longitudinally between 1970 and 1999 and cross-nationally in the following 19 OECD countries: Australia (AUS), Austria (AUT), Canada (CAN), Denmark (DNK), Finland (FIN), France (FR), Germany (GER), Greece (GRC), Italy (ITA), Japan (JAP), Luxembourg (LUX), the Netherlands (NL), New Zealand (NZ), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), United Kingdom (UK), and the United States of America (USA).

Income inequality data come from the University of Texas Inequality Project (UTIP 2006) "Estimated Household Income Inequality Data Set" (EHII). It comprises data that derive from the econometric relationship between UTIP and United Nations Industrial Development Organisation (UNIDO) data, other conditioning variables, and the World Bank's Deininger and Squire Data set. It has 3179 observations for 154 countries between 1963 and 1999 (UTIP 2006). A table with the Gini-coefficients used in the model is included in the appendix (see table 5).

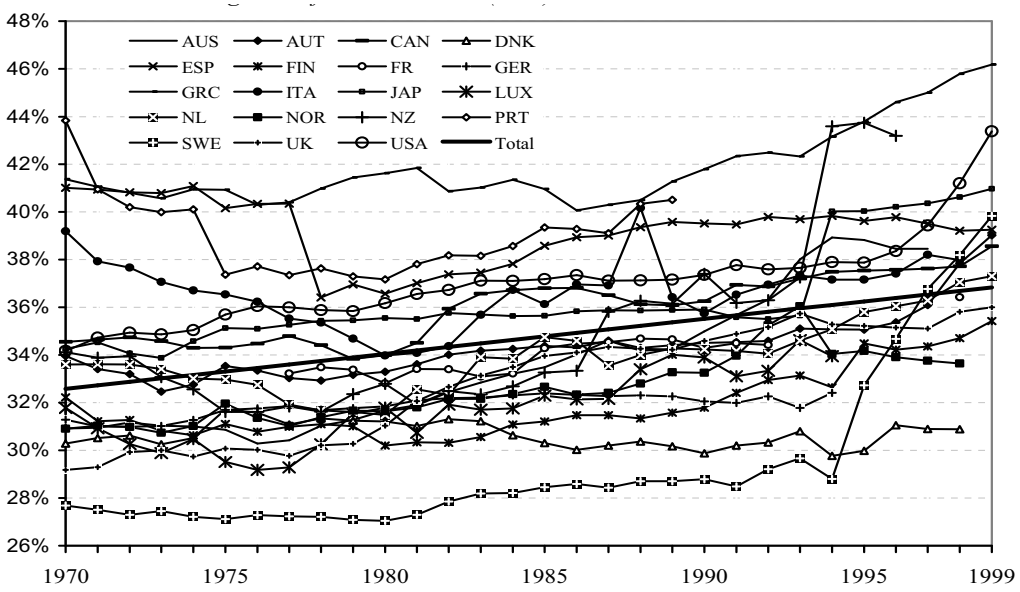
Table 1 (see p.11) shows country means ranked in ascending order and their change over time. The overall mean is 34.7. Concerning the absolute level marked differences between countries are observable: As with other data the Gini-coefficients in the USA as well as in some southern European countries (GRC, ESP, PRT) are above average, whereas the Scandinavian countries have relatively low inequality within the last decades. The maximum distance between the most unequal (GRC) and the most equal country (SWE) add up to 12.5 points. Figure 3 (see p.**??**) plots all Gini-coefficients for the 19 OECD countries. Concerning differences within countries over time the well known "u-turn" is observable with the UTIP data. Except for three of the most unequal countries (ESP, PRT, ITA) the Gini-coefficient is higher at the end of the period than in 1970. Compared to absolute differences between countries the differences within countries over time turn out to be slight. The overall country mean rises from 32.6 in 1970 to 36.8 in 1999, and thus varies only in 4.2 points, on average (however, in SWE, NZ, US, AUS and UK the increase is much higher). Altogether, the trend of declining inequality seems to be reversed in the last decades in the OECD area. The explanation of this trend is subject of the next section. To this end, a macro-level data set has been build that combines the Gini-coefficients

Rank	Country	Mean	Change 1970-1999[a]
1	SWE	0.294	0.121
2	DNK	0.307	0.006
3	LUX	0.318	0.022
4	GER	0.319	0.011
5	FIN	0.319	0.032
6	NOR	0.325	0.027
7	UK	0.328	0.068
8	AUS	0.336	0.075
9	NL	0.339	0.037
10	FR	0.340	0.032
11	AUT	0.343	0.051
12	NZ	0.349	0.091
13	CAN	0.359	0.040
14	JAP	0.363	0.067
15	ITA	0.367	-0.012
16	USA	0.370	0.092
17	PRT	0.390	-0.033
18	ESP	0.392	-0.018
19	GRC	0.419	0.048
	Total	**0.347**	**0.043**

Notes: [a] or other earliest and latest data available. Source: University of Texas Inequality Project (UTIP) 2006; own calculations.

Table 1: Gini-Coefficients ranked by Countries

with the national accounts data, i.e. the explanatory variables, and with secondary data from other sources. Comparable data for the KS employment and value added mainly come from the OECD Structural Analysis (STAN) database (OECD 2003). The data for recreational and cultural activities (92) were complemented by the OECD services database "Services. Statistics on Value Added and Employment" (OECD 2001). The measurement of the KS, its subgroups and industries according to the underlying industry classification (International Standard Industry Classification (ISIC), Rev. 3) is shown in table 2 (see page 13), for details see Rohrbach 2007). Before regressing the Gini on the sectoral variables their development over time is inspected. As e.g. Alderson and Nielsen (2002) do, sector dualism is computed as the percentage of KS employment minus its value added share. Thus, mean sectoral wage is proxied by an indicator for productivity. To measure sectoral bias, in the literature the percentage of employment in the old or newer sector is often used as a proxy (see e.g. Gustafsson and Johansson 1999). However, this is a rather loose measure for sector bias. Instead, at first, the qualification structure within



Notes: Total= Regression (OLS) based prediction by year. Source: University of Texas Inequality Project (UTIP) 2006; own calculations.

Figure 3: Gini-coefficients (*100) for Estimated Household Income by Country (actual values) and regressed for all countries (total), 1970-1999

sectors is inspected to see whether the KS is distinct from the remaining economy insofar as it induces a biased demand for skills - either in form of upgrading or polarization. Thus the cross-national development of the ratio between ”nonroutine” and ”routine” employment (polarization) and the ratio of ”high-skilled” versus ”low-skilled” employment (upgrading) respectively, is studied using the OECD ”Employment by industry and occupation” data (OECD 1998). The dataset includes data on the qualification structure by industries in ten OECD countries (AUS, CAN, FR, FIN, GER, ITA, JAP, NZL, UK, and USA) between 1970 and 1996. It is worth noting that even such measures of skill differentials at best can give a rough impression of skill demand structures across time and such a large number of countries. Due to the small number of cases, in the regression models, then the percentage of employment in the KS is used.

The data for the skill supply come from the Barro-Lee database (Barro and Lee 2001) and the OECD. The average years of schooling of the overall population age 25 and over is used. Additionally, a squared term of average years of schooling is included to see whether at higher levels the expected negative relationship is reversed. Moreover, as in the original model of Kuznets, to control for demographic shifts the natural rate of population increase is included (data are from UN 2007). To indicate the countries economic globalization the ”openness” variable from Heston et al. (2002) is used. It measures total trade (exports plus imports) as a percentage share of gross domestic product (in constant prices). To account

Funct. group Stock[6], Spinner[7]	**Knowledge sector industries** *ISIC Rev. 3 Names*	*Divisions*	Machlup[1], Porat[2]	Bell[3]	Castells[4]	OECD[5]
I	Research and development	73	x	x	x	x[6]
II	Manufacture of paper and paper products	21	x	x	-	-
	Manufacture of computers and office machinery	30	x	x	-	x
	Manufacture of electronic machinery and apparatus	31	x	x	-	x(partly)
	Manufacture of radio, television and communication equipment	32	x	x	-	x(partly)
	Medical, precision and optical instruments	33	x	x	-	x(partly)
	Computer and related activities	72	x	x	x	x
	Post and Telecommunications	64	x	x	x	x(partly)
	Renting of machinery and equipment	71	x	x	-	x
	Wholesale of machinery, equipment and supplies	n.av.	x	x	-	x
III	Other business services (Legal, accounting, book-keeping and auditing activities, Tax consultancy, market research and public opinion polling, business and management consultancy; [Architectural, engineering and other technical activities]; Advertising; Business activities n.e.c)	74	x	-	x	-
IV	Education	80	x[1]	x	x	-
	Publishing, printing and reproduction of recorded media	22	x	-	x	-
	Recreationals, cultural and sporting activities (Motion picture, radio, television and other entertainment activ.; News agency activities; Library, archives, museums and other cultural activities; [Sporting and other cultural activities])	92	x	x	x	-

Abbreviations: x= is included, -= is not included; Sources: [1]Machlup (1962: 354-357); [2] Porat (1977); [3]challenging due to low breakdown, see Bell (1980, p. 518); [4] challenging due to low breakdown, see Castells (1996: 208-216; 296 et seqq.); [5]OECD (2002: 81-83); [6]Stock (2000: 21); [7]Spinner (1998: 175 et seqq.).
The table is first appearing in Rohrbach (2007, Social Science Information © SAGE Publication Ltd & Foundation of the Maison des Science de l'Homme).

Table 2: Knowledge Industries by functional groups: Names and ISIC Rev.3 Codes

for different income related institutional settings the percentage of union members in the working age population (union density) is controlled for. The data before 1989 are from the OECD labor statistics (OECD 2006a). The values afterwards are from Visser (2006).

Table 3 (p. 14) shows the descriptive statistics for all variables in the models. The range and means are also included in the summary table (see section 3.2).

2.2 Methods: hierarchical linear models

The study aims at explaining differences in the Gini-coefficient at different points in time. The model thus consists of repeated measurement nested in countries. The data structure is a two-level, hierarchical model. Ordinary least square methods are inadequate when analyzing such panel data (see e.g. Verbeke and Molenberghs 2000; Wooldridge 2003). An adequate method is to estimate linear mixed models, i.e. error component models (Hox 2002). Explicitly modeling the multilevel structure of the data, namely as a system of regression equations in which the lowest-level variable is regressed on covariates from all existing levels, they satisfy statistical and conceptual adequacy. However, in particular with longitudinal data the adequacy of random effect estimators is put into question. The independency of error terms should be tested. A formal test for unobserved heterogeneity

	N_{ij}[a]	Minimum	Maximum	Mean	Standard-deviation
(1) Income Inequality (Gini-Coefficient)…….....….	534	27.04	46.18	35.59	3.66
(2) Average Years of Schooling…...……..…….....	673	2.40	12.30	8.28	1.95
(3) Employment in the KS (Percent)…….	404	10.94	29.09	19.81	3.54
(4) Knowledge Sector Wage Differential (Percentage Points)	344	-2.29	0.84	0.22	0.47
(5) Natural Rate of Population Increase (Percent)…….	532	-2.70	14.10	3.92	3.49
(6) Union Density (Percent)…….	629	7.38	85.20	42.36	19.10
(7) Total Trade as a percentage of GDP (constant prices)…..….	600	10.87	266.88	54.53	44.65

Notes: Measurements nested in countries; Sources, see section 2.1, own calculations.

Table 3: Descriptive Statistics for the Variables in the Model

is the Hausman-Test (Greene 2003). For all models presented in the next section it is permissible to use the consistent and more efficient random effects model[6].

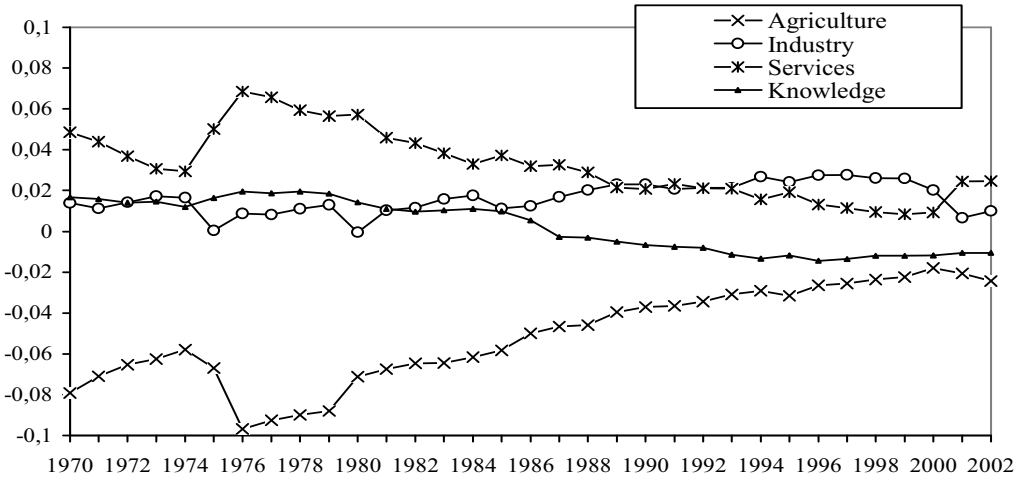
The equation for the empty intercept model is as follows:

$$Y_{ij} = \beta_{00} + \sum(\beta_k * X_{kij}) + u_{0i} + \epsilon_{ij} \quad (1)$$

where **i** denotes the **countries** and **j** denotes the **year**, u_{0i} is the error term of the country level and ϵ_{ij} the error term of the repeated measure level.

As advised in the literature (Hox 2002: 82) for the country level the variance component of a model that includes the time variable is used as a benchmark. The variances explained (total and separate for each level) for all model are weighted by the model's intraclass correlation to qualify the predicting power of each model by the division of variance between levels.

[6] Stata-Output of the Hausman test statistics can be requested from the author.



Notes: N_{ij} = 344 (measurements nested in countries). Sources: OECD STAN (OECD 2003) and OECD 'Services: Statistics on Value Added and Employment' (OECD 2001); own calculations.

Figure 4: Sector dualism: wage differentials by broad economic sectors, 19 OECD countries, 1970-2002

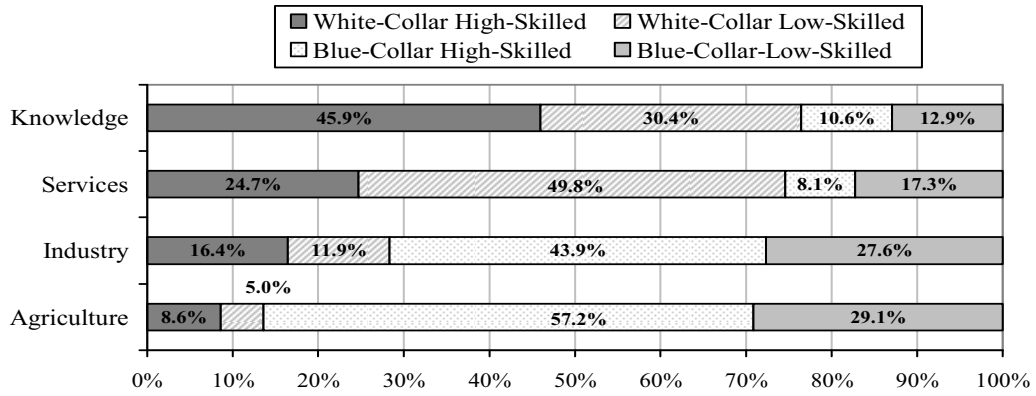
3 Knowledge Society and Income Inequality: Evidence from 19 OECD Countries between 1970 and 2002

3.1 Is there a sector dualism or a sector bias?

Before testing its effects on inequality, it is analyzed whether, at all, there is a wage differential between the KS and the remainder of the economy on the one hand, and a upgrading or polarization of skills within the KS sector one other hand. Figure 4 (see page 15) plots the values for the wage differentials, i.e. the sector dualism variable, separately for each economic sector between 1970 and 2002 averaged for all countries.

As it becomes obvious wage differentials between sectors are clearly on the decline after 1976. Moreover, it is observable that the essential differences in the productivity level have existed between the agricultural and the remaining economy; the differences between the industry, service and knowledge sector are and were comparatively low. Probably due to the today's input of high-technology in all sectors and industries, and thus also in the agricultural sector, the productivity and wages have narrowed. The average income in the KS thus seems to be not higher compared to the other economic sectors; thus the wage differential hypothesis has to be rejected.

Secondly, it has to be expected whether there are systematic differences in the wage or skill inequality between sectors. At first, figure 5 (see page 16) shows the proportion of



Notes: N_{ij} (measurements nested in countries) = 39. Source: OECD 1998, own calculations.

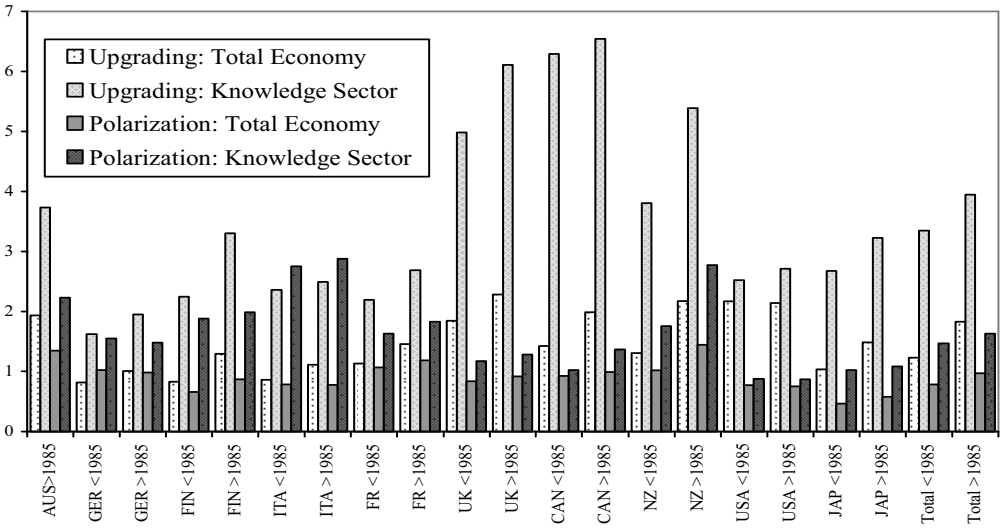
Figure 5: Broad economic sectors by qualifications, 10 OECD countries, 1970- 1996

employment in four qualification groups for each economic sector, separately.

The KS is characterized by the highest qualification structure: Nearly the half (46 %) of the people employed in the KS have white-collar high-skilled occupations. Thus, the share is nearly twice as high as in the service sector, three times higher than in the industrial sector and even five times as high as in the agricultural sector. One third of persons employed have the second highest qualification level, i.e. for low skilled white-collar jobs (typically clerical workers and sales personnel). Only round about each ten percent of employment comes from the blue-collar sector. This is in favor for the upgrading thesis, saying that the KS is more than the rest of the economy characterized by higher qualifications and less characterized by low qualifications.

More demanding is answering the question of polarization. Figure 6 (see page 17) shows the two discussed measures of sectoral bias (the ratio between the percentage of high-skilled and low-skilled labor (SBTC) and the ratio between non-routine and routine labor (ALM)), each for the total economy and for the KS, separate for all available countries and for countries totaling. For reasons of facility of inspection the development in time is represented by observations before 1985 and from 1985 onwards. (The trends deducible from this representation are the same if studying the single country observations).

First of all, figure 6 shows that the proportion of middle qualifications (white-collar low-skilled and blue-collar-high-skilled) is lower in the KS than in the remaining sectors. Over time its share is even more decreasing in favor for the highest and lowest qualification



Notes: N_{ij} = 39 (measurements nested in countries). Upgrading = Σ (*White-Collar High-Skilled* and *White-Collar Low-Skilled*) / Σ (*Blue-Collar High-Skilled* and *Blue-Collar Low-Skilled*). Polarization = Σ (*White-Collar High-Skilled* and *Blue-Collar Low-Skilled*) / Σ (*White-Collar Low-Skilled* and *Blue-Collar High-Skilled*).

Source: OECD 1998, own calculations.

Figure 6: Sector Bias: Upgrading and Polarization, 10 OECD Countries, 1970-1996

groups in the KS. Though this trend is observable in the total economy, the decrease is more pronounced in the KS. For the period after 1985 the ratio is about two-to-one. Similarly, the ratio between high and low-qualified personnel in the KS is comparatively high (approximately 4:1) and it is increasing at a faster rate in the KS than in the other three sectors. However, both ratios are more unbalanced in the KS than in total economy, probably meaning that the KS is more than the remaining sectors marked by an unequal distribution of skills.

Though these measures of skill differentials at best can give a rough impression of skill demand structures across time for a large number of countries, the data indicate that the KS is different from the other three economic sectors with regard to its skill structure. Both measures for sectoral bias are higher in the KS than in the remaining part of the economy. The upgrading as well as the polarization hypothesis therefore can't be rejected. Next, it is analyzed whether there are effects from these sectoral characteristics on inequality.

3.2 Does the KS dualism and KS bias effect inequality?

Table 4 (see page 19) presents the results of the two-level regression analysis of the longitudinal data. In total, there are 225 measurements for which information for all variables in the models are available. These 225 measurements are nested within 19 countries. The 'empty model' includes only the intercept term which is simply the average Gini-coefficient across all countries and years. The intercept-only model estimates the

repeated measure variance as 1.59 and the country level variance as .55. Thus the intraclass correlation, i.e. the proportion of variance between countries is 0.81, meaning that 19 percent of the total variation is variation within countries over time. From model 0 we see that the Gini-coefficient significantly increases over time and that the time variable 'explains' 30.8 percent of the occasion level variance.

	Empty Intercept-only Model	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Time (in years)		0.12***	0.12***	0.07**	0.05*	0.05*	0.06*	0.03
[R: 1970 - 1999; M: 1986][a]		(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Average Years of Schooling			-2.59**	-3.49***	-3.58***	-3.72***	-3.47***	-3.78***
[R: 2.4 - 12.3; M: 8.3] [a]			(0.82)	(0.84)	(0.87)	(0.75)	(0.85)	(0.81)
Average Years of Schooling			0.15***	0.19***	0.20***	0.21***	0.19***	0.22***
(squared)			(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)
Sector Bias: %Employed in the Knowledge Sector				**0.29****	**0.30****	**0.27****	**0.30****	**0.29****
[R: 10.9 - 29.1; M: 19.8] [a]				(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Sectordualism: % Knowledge Sector Wage Differential				**-0.51**	**-0.51**	**-0.53***	**-0.49**	**-0.53***
[R: -2.3 - 0.8; M: 0.2] [a]				(0.27)	(0.27)	(0.26)	(0.27)	(0.26)
% Natural Rate of Population Increase					-0.08			-0.12*
[R: -2.7 - 14.1; M: 3.9] [a]					(0.06)			(0.06)
% Union Density						-0.06***		-0.06***
[R: 7.4 - 85.2; M: 42.4] [a]						(0.01)		(0.01)
Total Trade as a % of GDP (constant prices)							-0.003	-0.003
[R: 10.8 - 266.9; M: 54.5] [a]							(0.01)	(0.01)
Intercept	35.03***	32.76***	43.66***	43.30***	43.84***	46.98***	43.02***	47.41***
	(0.60)	(0.63)	(3.63)	(3.62)	(3.81)	(3.21)	(3.66)	(3.53)
Level-1Variance (time) σ_e^2	1.59	1.10	1.10	1.00	0.08	0.95	0.99	0.92
Level-1Variance (country) σ_{u0}^2	6.55	6.28	4.27	4.38	5.00	2.75	4.59	3.62
Intraclass-correlation ρ	0.81	0.85	0.80	0.81	0.84	0.74	0.82	0.80
R^2 Level-1Variance (time)		30.8	31.6	37.2	38.4	39.8	37.4	42.2
R^2 Level-2Variance (country)		9.2	32.0	30.3	20.3	56.2	27.0	44.8
R^2 total		8.0	31.9	31.5	23.3	52.0	28.9	44.3
Aikaike-IC	817.3	742.5	736.8	723.9	724.4	708.5	725.8	709.0
N_i Measurements	225	225	225	225	225	225	225	225
N_j Countries	19	19	19	19	19	19	19	19

Notes: [a] R = Range, M = Mean (arithmetic). Robust standard errors in parentheses. *: p≤0.05, **: p≤ 0.01; ***: p≤0.001 (two-sided test). Sources: see section 2.1; own calculations.

Table 4: Unstandardized Coefficients from the Random-Effects GLS Regression of Income Inequality (the Gini) on Selected Independent Variables: 19 OECD Countries, 1970-1999

Model 1 tests if increasing supply of skills lowers income inequality, as it follows from simple supply-and-demand framework. As expected, the variable average years of schooling statistically significantly lowers income inequality. Additionally, there is also a statistically significant positive effect of the squared term. Thus, with continuing educational expansion the leveling effect of higher educational attainment is reduced. As models 2 to 6 show this curvilinear relationship holds even when controlling for the sectoral development, a globalization variable, the variable for the demographic change as well as the institutional settings. Based on the coefficients in model 1, the inequality reducing effect of rising skill supply would reverse from a hypothetic average educational attainment of 18 years. The estimated difference between a country which is highly advanced in educational expansion in the year 2000 (e.g. Norway with nearly 12 years education, on average) and a country with comparatively low mean attainment (e.g. Portugal with five years) is approximately eleven points. Together, both variables explain an additionally 0.8 percent of the variation across time but nearly 32 percent of the country level variance. The results support the view that in general the higher the supply of skills, the lower is the income inequality. Either due to rising skill premia or rising educational inequality, at later stages of the educational expansion this association may reverse. Thus, the higher the supply of skills, the higher is the income inequality.

Then, secondly, it is estimated if there is a statistically significant effect of a sectoral change on income inequality. Model 2 is a version of the Kuznets model which yet excludes the variable for demographic changes. It is obvious that the KS employment share statistically significantly increases inequality: A one percent increase in the employment share thus means an increase in the Gini-coefficient of .29 points. Then, the difference between a country where the KS represents thirty percent employment (e.g. UK at the end of the millennium) to a country without any persons employed in the KS adds up to nine scale points. On the contrary, in as much as we see small income differentials between sectors, it is not surprising to find no statistically significant positive sector dualism effect on inequality. On the contrary, the variable for the sector dualism is not statistically significant in model 2. Similarly, in the other models its effects are at best weak. The model thus reduces the error variance at the repeated measurements level and explains an additional six percent of the differences within countries over time. Extending this model by an indicator for demographic change (model 3), union density (model 4), and a variable indicating the economic globalization (model 5), it can be seen that there is a statistically significant inequality increasing effect from sector bias. Thus, even when controlling for the supply side of skills, other shifts in the demographic composition of the population, institutional conditions for work and income, as well as economic globalization, the expansion of the knowledge society is directly linked with inequality.

Models 3 and 5 reveal that when controlling for skill supply and demand no significant effect of the demographic change and globalization measure remains. These results support

the arguments brought forward in the literature against a genuine effect from globalization on inequality, i.e. an inequality causing effect that is over and above the supply and demand side changes. Contrary, the percentage of union participation significantly reduces income inequality in all models, thereby having a notably share in explaining the variance between countries. However, for the inequality upswing over time within countries the changes in the demand for and the supply of skills seem to be the prime reasons.

4 Discussion and Conclusion

There are several explanations for the inequality upswing in the literature: rising globalization, the institutional re-structuring of the nation states, as well as changes in the relation between the demand for and the supply of skills.

As demonstrated in Rohrbach (2007) there is a clear sectoral trend towards the knowledge society in the OECD area: Proportions of employment and value added in the knowledge sector as compared to services, industry and agriculture are constantly rising from the 1970s on.

Generalizing from Kuznets (1955) and Lewis (1954, 1983) two inequality affecting mechanisms with regard to the knowledge society transition are identified: sector dualism - i.e. inequality between sectors, and sector bias - i.e. inequality within sectors. The transition from the high-technology based service societies to knowledge society then can be understood, firstly, as a change from a society with lower mean earnings and skills to a society that is, on average, better educated and wealthier (sector dualism). Secondly, the transition can be described as a change from an economy that is dominated by a relatively equal sector to a relatively unequal dominant sector. Becoming a knowledge society would mean a constant increase in overall inequality.

Following the strategy of a most-similar design and a variable oriented approach competing hypotheses on the causes of inequality variation are tested cross-nationally and longitudinally in 19 OECD countries between 1970 and 1999. To verify sectoral effects, error component models are computed regressing the Gini-coefficient (UTIP 2006) on a globalization measure (the ”openness” variable from Heston et al. (2002)), the union density, the educational attainment, and demographic shifts, as well as the employment and income differential in the KS.

The results are in the support for the sector bias hypothesis; i.e. the assumption that the expansion of the KS has inequality increasing effects. As the skill composition for the broad economic sectors indicates, this may be the case because the KS is characterized by an increasingly biased demand for skills. Inasmuch we see small wage differentials between sectors, it is not surprising to find no statistically significant positive sector dualism effect on income inequality.

The results presented here suggest that it is worthwhile to study the interaction of

changes in the production and disposition of wealth, i.e. the sectoral change towards the knowledge society with inequality. It seems to be the case that sectoral effects are factors of similar centrality for understanding today's inequality that act upon the effects of globalization, institutional restructuring and skill supply side changes.

Moreover, these results may also have decisive consequences for the study of mechanisms that generate unequal rewards at the individual level. A growing body of literature analyses stratification outcomes from a multilevel perspective. Here especially compensating institutional factors are discussed that interact with the association between education and rewards - especially with regard to the European situation. The results presented here argue for a closer inspection of changes in the opportunity structure for work as a contextual condition for stratification outcomes. As it can be demonstrated (Rohrbach 2008), the knowledge sector expansion has a share in explaining the constancy or even decline in the association between education and rewards at the individual level.

References

Acemoglu, D. (2002). Technical change, inequality, and the labor market. *Journal of Economic Literature*, 40(1):7–72.

Aghion, P., Caroli, E., and Garcia-Peñalosa, C. (1999). Inequality and economic growth: the perspective of the new growth theories. *Journal of Economic Literature*, 37(4):1615–1660.

Alderson, A. S. and Nielsen, F. (2002). Globalization and the great u-turn: Income inequality trends in 16 oecd countries. *American Journal of Sociology*, 107(5):1244–1299.

Arrow, K. J., Bowles, S., and Durlauf, S. (2000a). *Introduction*, pages ix–xv. In Arrow et al. (2000b).

Arrow, K. J., Bowles, S., and Durlauf, S. N., editors (2000b). *Meritocracy and Economic Inequality*. Princeton Univ. Press, Princeton.

Ashenfelter, O. and Card, D., editors (1999). *Handbook of Labor Economics*, volume 3A of *Handbooks in Economics*. Amsterdam.

Atkinson, A. B. (2000). *The Distribution of Personal Income: Complex Yet Over-Simplified*, pages 56–71. In Hauser and Becker (2000).

Atkinson, A. B. (2001). Rising income inequality and the role of the welfare state. *Papier präsentiert auf der*. RC28 Frühjahrskonferenz, Mannheim, April 2001.

Atkinson, A. B. (2003). *Ungleichheit, Armut und der Wohlfahrtsstaat: Eine europäische Perspektive zur Globalisierungsdiskussion*, pages 63–82.

Atkinson, A. B. (2007). The distribution of earnings in oecd countries. *International Labour Review*, 146(1-2):41–60.

Atkinson, A. B. and Bourguignon, F., editors (2000). *Handbook of Income Distribution*. Handbooks in Economics, Band 16. Elsevier, Amsterdam.

Atkinson, A. B. and Brandolini, A. (2001). Promise and pitfalls in the use of "'secondary"' data-sets: Income inequality in oecd countries as a case study. *Journal of Economic Literature*, 39:771–799.

Atkinson, A. B. and Brandolini, A. (2004). The panel-of-countries approach to explaining income inequality: An interdisciplinary research agenda. oxford/mannheim, unveröffentlichtes manuskript. Available at http://www.nuffield.ox.ac.uk/users/atkinson/Mannheim.pdf, last access 5.5.2007.

Autor, D. H., Katz, L. F., and Kearney, M. S. (2006). The polarization of the u.s. labor market. *NBER Working Paper*, 11986.

Autor, D. H., Levy, F., and Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics*, 118(4):1279–1333.

Barro, R. J. and Lee, J.-W. (2001). International data on educational attainment: Updates and implications. updated files. *Center for International Development at Harvard University (CID). Research Datasets.* Available at http://www.cid.harvard.edu/ciddata/ciddata.html; last access 14.12.2006.

Bell, D. (1973). *The Coming of Post-Industrial Society*. Basic Books, New York.

Bertola, G. and Ichino, A. (1995). Wage inequality and unemployment: United states vs. europe. *NBER Macroeconomics Annual*, 10:13–54.

Bornschier, V. (2002). Changing income inequality in the second half of the 20th century: Preliminary findings and propositions for explanations. *Journal of World-Systems Research*, 8(1):100–127.

Bourguignon, F. and Morrison, C. (1998). Inequality and development: the role of dualism. *Journal of Development Economics*, 57:233–257.

Checchi, D. (2000). Does educational achievement help to explain income inequality? *Dipartimento di Economia Politica e Aziendale Working Paper*, (11).

Checchi, D. (2003). Inequality in incomes and access to education: A cross-country analysis (1960-95). *Labour*, 17(2):153–201.

Conçeicao, P. and Galbraith, J. K. (2001). *Toward a New Kuznets Hypothesis: Theory and Evidence on Growth and Inequality*, pages 139–161.

Creshaw, E. and Ameen, A. (1994). The distribution of income across national populations: Testing multiple paradigms. *Social Science Research*, 23(1):1–22.

de Gregorio, J. and Lee, J.-W. (2002). Education and income inequality: New evidence from cross-country data. *Review of Income and Wealth*, 48(3):395–416.

DiNardo, J. E. and Card, D. (2002). Skill-biased technological change and rising wage inequality: Some problems and puzzles. *Journal of Labor Economics*, 20(4):733–783.

DiPrete, T. A. (2005). Labor markets, inequality, and change. *Work and Occupations*, 32(2):119–139.

DiPrete, T. A. (2007). What has sociology to contribute to the study of inequality trends? *American Behavioral Scientist*, 50(5):603–618.

DiPrete, T. A. and Grusky, D. B. (1990). Structure and trend in the process of stratification for american men and women. *American Journal of Sociology*, 96(1):107–143.

Firebaugh, G. (2003). *The New Geography of Global Income Inequality*. Harvard University Press, Cambridge.

Gagliani, G. (1987). Income inequality and economic development. *Annual Review of Sociology*, 13:313–334.

Galbraith, J. K. (2001). *The Macroeconomics of Income Distribution*, pages 3–16.

Goos, M. and Manning, A. (2004). Lousy and lovely jobs: the rising polarization of work in britain. *Centre for Economic Performance (CEP) Discussion Papers*, dp0604.

Gottschalk, P. T. (1997a). Inequality, income growth, and mobility: The basic facts. *Journal of Economic Perspectives*, 11(2):21–40.

Gottschalk, P. T. (1997b). *Policy Changes and Growing Earnings Inequality in the US and Six Other OECD Countries*, pages 12–35. In Gottschalk et al. (1997a).

Gottschalk, P. T., Gustafsson, B. A., and Palmer, E. E., editors (1997a). *Changing Patterns in the Distribution of Economic Welfare*. Cambridge Univ. Press, Cambridge.

Gottschalk, P. T., Gustafsson, B. A., and Palmer, E. E. (1997b). *What's behind the Increase in Inequality? An introduction*, pages 1–11. In Gottschalk et al. (1997a).

Gottschalk, P. T. and Smeeding, T. M. (1997). Cross-national comparisons of earnings and income inequality. *Journal of Economic Literature*, 35:633–687.

Gottschalk, P. T. and Smeeding, T. M. (2000). *Empirical Evidence on Income Inequality in Industrialized Countries*, pages 261–307. In Atkinson and Bourguignon (2000).

Gustafsson, B. A. and Johansson, M. (1999). In search of smoking guns: What makes income inequality vary over time in different countries. *American Sociological Review*, 64(4):585–605.

Harrison, B. and Bluestone, B. (1988). *The Great U-Turn: Corporate Restructuring and the Polarizing of America*. Basic Books, New York.

Haskel, J. E. and Slaughter, M. (2002). Does the sector bias of skill-biased technical change explain changing wage inequality? *European Economic Review*, 46(10):1757–1783.

Hauser, R. and Becker, I., editors (2000). *The Personal Distribution of Income in an International Perspective*. Springer, Berlin, New York.

Heston, A., Summers, R., and Aten, B. (2002). *Penn World Table Version 6.1, Oktober*. Center for International Comparisons at the University of Pennsylvania (CICUP).

Hox, J. (2002). *Multilevel Analysis*. LEA, Mahwah, New Jersey, London.

Hradil, S. (2005). *Warum werden die meisten entwickelten Gesellschaften wieder ungleicher?*, pages 460–483.

Kanbur, R. (2000). *Income Distribution and Development*, pages 791–841. Volume 1 of Atkinson and Bourguignon (2000).

Katz, L. F. and Autor, D. H. (1999). *Changes in the Wage Structure and Earnings Inequality*, pages 1463–1555. Volume 3A of Ashenfelter and Card (1999).

Kenworthy, L. (2007). Inequality and sociology. *American Behavioral Scientist*, 50(5):584–602.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review*, 45(1):1–28.

Lee, C.-S. (2005). Income inequality, democracy, and public sector size. *American Sociological Review*, 70(1):158–181.

Lewis, W. A. (1954). Economic development with unlimited supplies of labor. *Manchester School of Economics and Social Studies*, 22:139–181.

Lewis, W. A. (1983). *Development and Distribution*, pages 443–459.

Li, H., Xie, D., and Zou, H.-f. (2000). Dynamics of income distribution. *Canadian Journal of Economics*, 33:937–961.

Lindert, P. H. (2000a). *Three Centuries of Inequality in Britain and America*, pages 167–216. Volume 1 of Atkinson and Bourguignon (2000).

Lindert, P. H. (2000b). When did inequality rise in britain and america? *Journal of Income Distribution*, 9:11–25.

Lundberg, M. and Squire, L. (2003). The simultaneous evolution of growth and inequality. *Economic Journal*, 113:326–344.

Mahler, V. A. (2004). Economic globalization, domestic politics, and income inequality in the developed countries. *Comparative Political Studies*, 37(9):1025–1053.

Milanovic, B. (2006). Global income inequality: What it is and why it matters. *World Bank Policy Research Working Paper*, 3865.

Moran, T. P. (2003). On the theoretical and methodological context of cross-national inequality data. *International Sociology*, 18(2):351–378.

Morris, M. and Western, B. (1999). Inequality in earnings at the close of the twentieth century. *Annual Review of Sociology*, 25:623–657.

Morrisson, C. (2000). *Historical Perspectives on Income Distribution: The Case of Europe*, pages 217–260. Volume 1 of Atkinson and Bourguignon (2000).

Neal, D. and Rosen, S. (2000). *Theories of the Distribution of Earnings*, pages 379–427. In Atkinson and Bourguignon (2000).

Nielsen, F. and Alderson, A. S. (1995). Income inequality, development, and dualism: Results from an unbalanced cross-national panel. *American Sociological Review*, 60:674–701.

Nollmann, G. (2006). Erhöht globalisierung die ungleichheit der einkommen? *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 58(4):638–659.

OECD (2001). *Services. Statistics on Value Added and Employment (Database)*. OECD, Paris, 2001 edition.

OECD (2003). *Structural Analysis (STAN) Database, Edition 2003*. OECD, Paris.

OECD (2006). *Labour Force Statistics 1985-2005, 2006 Edition*. OECD, Paris.

Osberg, L. (2001). *Inequality*, pages 7371–7377.

Palme, J. (2006). Welfare states and inequality: Institutional designs and distributive outcome. *Research in Social Stratification and Mobility*, 24(4):387–403.

Park, K. H. (1996). Educational expansion and educational inequality on income distribution. *Economics of Education Review*, 15(1):51–58.

Paukert, F. (1973). Income distribution at different levels of development. a survey of evidence. *International Labour Review*, 108(2):97–125.

Pontusson, J., Rueda, D., and Way, C. R. (2002). Comparative political economy of wage distribution: The role of partisanship and labour market institutions. *British Journal of Political Science*, 32:281–308.

Przeworski, A. and Teune, H. (1970). *The Logic of Comparative Inquiry*. Wiley, New York.

Ram, R. (1990). Educational expansion and schooling inequality: International evidence and some implications. *The Review of Economics and Statistics*, 72(2):266–274.

Rohrbach, D. (2007). The development of knowledge societies in 19 oecd countries between 1970 and 2002. *Social Science Information*, 46(4):655–689.

Rohrbach, D. (2008). Meritocratic knowledge societies? returns to education in cross-national and longitudinal perspective. *Paper presented at the ISA-RC28 Spring Meeting 2008, 15-18 May Florence, Italy*.

Smeeding, T. M. and Grodner, A. (2000). *Changing Income Inequality in OECD Countries: Updated Results from the Luxembourg Income Study (LIS)*, pages 205–244. In Hauser and Becker (2000).

Spitz-Oener, A. (2006). Technical change, job tasks and rising educational demands: Looking outside the wage structure. *Journal of Labor Economics*, 24(2):235–270.

The University of Texas Inequality Project (2006). *Estimated Household Income Inequality Data Set*. University of Texas, Austin. Available at http://utip.gov.utexas.edu/.

Tinbergen, J. (1975). *Income Distribution: Analysis and Policies*. North Holland Publishing Co., Amsterdam.

UN (2007). *Demographic Yearbook*. United Nations Statistic Division. Available at http://unstats.un.org/unsd/demographic/products/dyb/dyb2.htm, Diverse Ausgaben, letzer Zugriff am 8.2.2007.

van den Werfhorst, H. G. (2007). Scarity and abundance: Reconciling trends in the effects of education on social class and earnings in great britain. *European Sociological Review*, 23(2):239–261.

Verbeke, G. and Molenberghs, G. (2000). *Linear Mixed Models for Longitudinal Data*. Springer Series in Statistics. Springer, New York.

Visser, J. (2006). Union membership statistics in 24 countries. *Monthly Labor Review*, 01:38–49.

Wallerstein, M. (1999). Wage-setting institutions and pay inequality in advanced industrial societies. *American Journal of Political Science*, 43(3):649–680.

Williamson, J. G. (1985). *Did British Capitalism Breed Inequality?* Allen & Unwin, Boston.

Williamson, J. G. and Lindert, P. H. (1980). *American Inequality. A Macroeconomic History*. Academic Press, New York.

Williamson, J. G. and Lindert, P. H. (1981). *Long-term Trends in American Wealth Inequality*, pages 9–94.

Williamson, O. E. (2000). The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature*, 38:595–613.

Wolf, C. and Hoffmeyer-Zlotnik, J. H. P. (2003). *Measuring Demographic and Socio-Economic Variables in Cross-National Research: An Overview*, pages 1–13.

Wood, A. (1994). *North-South Trade, Employment, and Inequality*. Oxford University Press, Oxford.

	AUS	AUT	CAN	DNK	ESP	FIN	FR	GER	GRC	ITA	JAP	LUX	NL	NOR	NZ	PRT	SWE	UK	USA	Total
1970	0,309	0,340	0,345	0,303	0,410	0,322		0,313	0,414	0,392	0,342	0,318	0,336	0,309	0,341	0,438	0,277	0,292	0,342	0,326
1971	0,309	0,334	0,346	0,305	0,409	0,312		0,310	0,411	0,379	0,345	0,309	0,336	0,310	0,339	0,410	0,275	0,293	0,347	0,327
1972	0,312	0,332	0,347	0,306	0,408	0,313		0,310	0,408	0,377	0,341	0,303	0,336	0,310	0,340	0,402	0,273	0,299	0,349	0,329
1973	0,310	0,325	0,346	0,303	0,408	0,308		0,310	0,406	0,371	0,339	0,299	0,334	0,307	0,331	0,400	0,274	0,300	0,349	0,330
1974	0,310	0,328	0,343	0,305	0,411	0,306		0,313	0,409	0,367	0,346	0,305	0,330	0,310	0,326	0,401	0,272	0,297	0,350	0,332
1975	0,309	0,335	0,343	0,317	0,402	0,311		0,317	0,409	0,365	0,351	0,295	0,330	0,320	0,316	0,374	0,271	0,301	0,357	0,333
1976	0,303	0,333	0,345	0,316	0,403	0,308		0,318	0,403	0,362	0,351	0,292	0,327	0,314	0,316	0,377	0,273	0,300	0,361	0,335
1977	0,304	0,330	0,348	0,311	0,403	0,310	0,332	0,319	0,404	0,355	0,353	0,293	0,319	0,310	0,318	0,374	0,272	0,298	0,360	0,336
1978	0,310	0,329	0,344	0,313	0,364	0,311	0,335	0,317	0,410	0,354	0,354	0,303	0,317	0,314	0,316	0,376	0,272	0,302	0,359	0,338
1979	0,313	0,332	0,338	0,312	0,370	0,310	0,334	0,318	0,414	0,347	0,354	0,315	0,316	0,317	0,324	0,373	0,271	0,303	0,358	0,339
1980	0,317	0,333	0,340	0,312	0,366	0,302	0,328	0,318	0,416	0,340	0,355	0,318	0,315	0,316	0,328	0,372	0,270	0,310	0,362	0,340
1981	0,319	0,336	0,345	0,310	0,370	0,303	0,334	0,321	0,418	0,341	0,355	0,307	0,326	0,318	0,319	0,378	0,273	0,321	0,366	0,342
1982	0,324	0,340	0,359	0,313	0,374	0,303	0,334	0,322	0,409	0,344	0,358	0,319	0,323	0,322	0,325	0,382	0,279	0,327	0,367	0,343
1983	0,328	0,342	0,366	0,312	0,375	0,306	0,331	0,322	0,410	0,357	0,357	0,317	0,339	0,322	0,323	0,382	0,282	0,331	0,371	0,345
1984	0,332	0,342	0,367	0,306	0,378	0,311	0,332	0,323	0,414	0,367	0,356	0,318	0,338	0,324	0,327	0,386	0,282	0,335	0,371	0,346
1985	0,335	0,344	0,368	0,303	0,386	0,312	0,343	0,324	0,410	0,361	0,356	0,323	0,347	0,327	0,333	0,393	0,284	0,340	0,372	0,348
1986	0,340	0,343	0,368	0,300	0,389	0,315	0,345	0,323	0,401	0,370	0,358	0,321	0,346	0,323	0,333	0,393	0,286	0,341	0,374	0,349
1987	0,346	0,346	0,365	0,302	0,390	0,315	0,345	0,323	0,403	0,369	0,359	0,322	0,335	0,324	0,358	0,391	0,284	0,343	0,371	0,351
1988	0,342	0,343	0,361	0,304	0,394	0,313	0,347	0,323	0,405	0,402	0,359	0,334	0,340	0,328	0,363	0,403	0,287	0,343	0,371	0,352
1989	0,342	0,344	0,361	0,302	0,396	0,316	0,347	0,323	0,413	0,364	0,359	0,340	0,343	0,333	0,362	0,405	0,287	0,342	0,372	0,354
1990	0,350	0,345	0,363	0,299	0,395	0,318	0,343	0,321	0,418	0,357	0,359	0,339	0,342	0,333	0,374		0,288	0,346	0,374	0,355
1991	0,357	0,345	0,369	0,302	0,395	0,324	0,345	0,320	0,423	0,365	0,356	0,331	0,342	0,340	0,362		0,285	0,349	0,378	0,357
1992	0,363	0,346	0,369	0,303	0,398	0,329	0,344	0,323	0,425	0,370	0,355	0,333	0,340	0,352	0,363		0,292	0,352	0,376	0,358
1993	0,380	0,351	0,372	0,308	0,397	0,331		0,318	0,423	0,373	0,357	0,346	0,346	0,360	0,373		0,297	0,357	0,377	0,360
1994	0,389	0,351	0,375	0,298	0,398	0,326		0,324	0,432	0,372	0,400	0,340	0,351	0,340	0,436		0,288	0,353	0,379	0,361
1995	0,388	0,351	0,375	0,300	0,396	0,345			0,438	0,372	0,400		0,358	0,342	0,437		0,327	0,352	0,379	0,363
1996	0,385	0,354	0,376	0,311	0,398	0,342			0,446	0,374	0,402		0,360	0,339	0,432		0,347	0,351	0,384	0,364
1997	0,385	0,361	0,376	0,309	0,395	0,344			0,450	0,382	0,404		0,363	0,338			0,368	0,351	0,394	0,365
1998		0,378	0,377	0,309	0,392	0,347	0,364		0,458	0,380	0,406		0,371	0,336			0,382	0,358	0,412	0,367
1999		0,390	0,386		0,393	0,354			0,462		0,410		0,373				0,398	0,360	0,434	0,368

Quelle: University of Texas Inequality Project 2006; eigene Darstellung.

Table 5: Gini-Coefficients for 19 OECD Countries, 1970 to 1999